I U C L I D

D a t a S e t

Existing Chemical Substance ID: 64-18-6
CAS No. 64-18-6
EINECS Name Formic acid
EINECS No. 200-579-1
Molecular Weight 46.03
Molecular Formula CH2O2

Producer Related Part
Company: BASF AG
Creation date: 12-NOV-1992

Substance Related Part
Company: BASF AG
Creation date: 12-NOV-1992

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Memo: Master

Date of last Update: **24-MAY-2000**

Number of Pages: **80**

Chapter (profile): Chapter: 1, 2, 3, 4, 5, 7
Reliability (profile): Reliability: without reliability, 1, 2, 3, 4
Flags (profile): Flags: without flag, confidential, non confidential, WGK (DE), TA-Luft (DE), Material Safety Data Set, Risk Assessment, Directive 67/548/EEC

1.0.1 OECD and Company Information

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1.0.2 Location of Production Site

-

1.0.3 Identity of Recipients

-

1.1 General Substance Information

Substance type: Organic
Physical status: Liquid
Purity: >= 99 % w/w
Remark: The Iuclid Data Sheet is also submitted on behalf of BASF Antwerpen N.V. (B).
The substance-related part is also submitted on behalf of the following companies:

BP Chemicals LTD (GB)
Huels AG,
Kemira OY (SF)
Norsk Hydro A/S (N)
Novo Nordisk A/S (DK)
Perstorp AB (S)
Perstorp SpA, Div. Polyols (I)

15-MAR-2000 (1)

1.1.1 Spectra

-

1.2 Synonyms

Ameisensaeure

Ameisensaure

Aminic acid

Formic acid (7CI, 8CI, 9CI)

Formira

Formisoton

Formylic acid

Hydrogen carboxylic acid

Methanoic acid

Methanoic acid monomer

Myrmicyl

1.3 Impurities

-

1.4 Additives

-

1.5 Quantity

-

1.6.1 Labelling

Labelling: As in Directive 67/548/EEC
Symbols: C
Nota: B
Specific limits: Yes
R-Phrases: (35) Causes severe burns
S-Phrases: (1/2) Keep locked up and out of reach of children
(23) Do not breathe vapour
(26) In case of contact with eyes, rinse immediately with plenty of water and seek medical advice
(45) In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible)
Remark: INDEX No. 607-001-00-0
01-MAR-2000 (1) (2) (3)

1.6.2 Classification

Classification: As in Directive 67/548/EEC
Class of danger: Corrosive
R-Phrases: (35) Causes severe burns
Remark: INDEX No. 607-001-00-0
01-MAR-2000 (1) (2) (3)

1.7 Use Pattern

-

1.7.1 Technology Production/Use

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1.8 Occupational Exposure Limit Values

Type of limit: MAK (DE)
Limit value: 5 ml/m3
Short term expos.
Limit value: 10 ml/m3
Schedule: 5 minute(s)
Frequency: 8 times
01-MAR-2000 (1) (4)

Type of limit: MAK (DE)
Limit value: 9 mg/m3
01-MAR-2000 (1) (4)

Type of limit: TLV (US)
Limit value: 9.4 mg/m3
01-MAR-2000 (5) (1)

Type of limit: TLV (US)
Limit value:
Remark: Limit value: 5 ppm
01-MAR-2000 (5) (1)

1.9 Source of Exposure

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1.10.1 Recommendations/Precautionary Measures

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1.10.2 Emergency Measures

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1.11 Packaging

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1.12 Possib. of Rendering Subst. Harmless

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1.13 Statements Concerning Waste

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1.14.1 Water Pollution

Classified by: KBwS (DE)
Labelled by: KBwS (DE)
Class of danger: 1 (weakly water polluting)
01-MAR-2000 (1)

1.14.2 Major Accident Hazards

Legislation: Stoerfallverordnung (DE)
Substance listed: No
01-MAR-2000 (1) (6)

1.14.3 Air Pollution

Classified by: TA-Luft (DE)
Labelled by: TA-Luft (DE)
Number: 3.1.7 (organic substances)
Class of danger: III
01-MAR-2000 (1)

1.15 Additional Remarks

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1.16 Last Literature Search

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1.17 Reviews

-

1.18 Listings e.g. Chemical Inventories

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2.1 Melting Point

Value: = 8 degrees C
Reliability: (4) Not assignable
Manufacturer / producer data without proof
04-MAY-2000 (7)

Value: = 8.4 degrees C
Reliability: (4) Not assignable
Manufacturer / producer data without proof
24-JAN-2000 (8)

2.2 Boiling Point

Value: = 100.6 degrees C at 1013 hPa
Reliability: (4) Not assignable
Manufacturer / producer data without proof
24-JAN-2000 (8)

Value: = 100.8 degrees C
Reliability: (4) Not assignable
Secondary citation
24-JAN-2000 (9)

Value: = 101 degrees C
Reliability: (4) Not assignable
Manufacturer / producer data without proof
04-MAY-2000 (7)

2.3 Density

Type: Density
Value: = 1.22 g/cm3 at 20 degrees C
Reliability: (4) Not assignable
Manufacturer / producer data without proof
04-MAY-2000 (7)

Type: Relative density
Value: = 1.22 at 20 degrees C
Remark: Specific gravity 20/4 °C
Reliability: (4) Not assignable
Handbook
24-MAY-2000 (10)

Type: Density
Value: = 1.2223 g/cm3 at 20 degrees C
Reliability: (4) Not assignable
Manufacturer / producer data without proof
24-JAN-2000 (8)

2.3.1 Granulometry

-

2.4 Vapour Pressure

Value: = 42 hPa at 20 degrees C
Reliability: (4) Not assignable
Manufacturer / producer data without proof
04-MAY-2000 (7)

Value: = 44 hPa at 20 degrees C
Reliability: (4) Not assignable
Manufacturer / producer data without proof
24-JAN-2000 (8)

Value: = 46.7 hPa at 20 degrees C
Reliability: (4) Not assignable
Handbook
24-MAY-2000 (10)

Value: = 72 hPa at 30 degrees C
Reliability: (4) Not assignable
Handbook
24-MAY-2000 (10)

Value: = 170 hPa at 50 degrees C
Reliability: (4) Not assignable
Manufacturer / producer data without proof
04-MAY-2000 (7)

2.5 Partition Coefficient

log Pow: = -.54 at 20 degrees C
Method: Other (measured)
Year:
Reliability: (2) Valid with restrictions
Discrepancy between documented test parameters and standard methods, but scientifically acceptable
24-MAY-2000 (11)

log Pow: = -.492
Method: Other (calculated): Increment method by Rekker with computer program of CompuDrug Ltd.
Year:
Reliability: (2) Valid with restrictions
Calculated value in accordance with generally accepted standard methods
24-MAY-2000 (12)

log Pow:
Method:
Year:
Result: Log P oct = -1.55/-0.22 (calculated)
Reliability: (4) Not assignable
Handbook
24-MAY-2000 (10)

2.6.1 Water Solubility

Value: At 20 degrees C
Qualitative: Miscible
pH: 2.2 at 10 g/l and 20 degrees C
Reliability: (4) Not assignable
Manufacturer / producer data without proof
04-MAY-2000 (7)

Value: At 25 degrees C
Qualitative: Miscible
Reliability: (4) Not assignable
Secondary citation
24-JAN-2000 (9)

2.6.2 Surface Tension

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2.7 Flash Point

Value: = 48 degrees C
Type: Closed cup
Method: Other: DIN 51 755
Year:
Test substance: Formic acid, purity 99%
Reliability: (1) Valid without restriction
National standard specification
04-MAY-2000 (13)

2.8 Auto Flammability

Value: 480 degrees C
Method: Other: DIN 51 794
Remark: Ignition temperature
Reliability: (4) Not assignable
Manufacturer / producer data without proof
04-MAY-2000 (7)

Value: = 505 degrees C
Method: Other: DIN 51 794
Remark: Ignition temperature
Test substance: Formic acid, purity 99%
Reliability: (1) Valid without restriction
National standard specification
24-JAN-2000 (14)

2.9 Flammability

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2.10 Explosive Properties

Result: Not explosive
Remark: Because of chemical structure
Reliability: (2) Valid with restrictions
Expert judgement
24-JAN-2000 (15)

2.11 Oxidizing Properties

Result: No oxidizing properties
Remark: Because of chemical structure
Reliability: (2) Valid with restrictions
Expert judgement
24-JAN-2000 (15)

2.12 Additional Remarks

Result: Explosive limits in air: 13.5 - 36.5 vol.%
Test substance: Formic acid, purity 99%
Reliability: (2) Valid with restrictions
Discrepancy between documented test parameters and standard methods, but scientifically acceptable
24-JAN-2000 (14)

Result: Viscosity: 1.8 mPa.s at 20 °C

Explosion limits: 12 - 38 vol.%

Hazardous reactions:
Exothermic reaction with: alkalis, amines or products containing amines
Thermal decomposition products: carbon monoxide
Reliability: (4) Not assignable
Manufacturer / producer data without proof
04-MAY-2000 (7)

3.1.1 Photodegradation

Type: Air
INDIRECT PHOTOLYSIS
Sensitizer: OH
Conc. of sens.: 500000 molecule/cm3
Degradation: = 50% after 35.7 days
Method:
Year: **GLP:**
Test substance:
Remark: Rate constant: 4.5*10^-13 cm^3/mol*sec
Test condition: Gas phase reaction with OH radicals; 25 degrees C
(16)

Type: Other: Water / air
Method:
Year: **GLP:**
Test substance:
Remark: Gas and solution phase rate constants: K(gas)= 3.7*10^-3 cm^3/mol*sec; K(solution)= 2.2*10^-13 cm^3/mol*sec
(17)

Type: Water
INDIRECT PHOTOLYSIS
Sensitizer: OH
Degradation: = 50% after .9 year
Method:
Year: **GLP:**
Test substance:
Remark: Rate constant: 2.5*10^9 M^-1 sec^-1
Test condition: pH=7; temperature 15-25 deg C
(18)

Type: Water
INDIRECT PHOTOLYSIS
Sensitizer: OH
Method:
Year: **GLP:**
Test substance:
Remark: Rate constant: 0.28*10^10 l/mol*sec
Test condition: OH formed by pulsed radiolysis; neutral pH
(19)

Type: Water
Method:
Year: **GLP:**
Test substance:
Result: Rate constants for reaction of OH radicals (297 K) in water with HCOO- (340 +/- 39) x 10e7 mol e-1 sec e-1 and for HCOOH (10.1 +/- 1.3) x 10e7 mol e-1 sec -1.
Reliability: (2) Valid with restrictions
23-NOV-1999 (20)

Type: Water
Method:
Year: **GLP:**
Test substance:
Result: k (HCOOH) = (3.3 +/- 1.0) x 10e5 l mol e-1 sec e-1, k (HCOO-) = (5.0 +/- 0.4) x 10e7 l mol e-1 sec e-1 (298 K)
Reliability: (2) Valid with restrictions
24-NOV-1999 (21)

Type: Other
Method:
Year: **GLP:**
Test substance:
Remark: Rate constant (298 K): K= (10.37 +/- 0.04)*10^-12 cm^3/mol* sec.
(22)

3.1.2 Stability in Water

-

3.1.3 Stability in Soil

-

3.2 Monitoring Data (Environment)

Type of measurement: Other
Medium: Other: Food / rain
Remark: Numerous foodstuffs and beverages, such as milk, cheese, wine, fruits, honey and coffee, contain formic acid; natural concentrations are mentioned in a range of from 1-7,700 mg/kg (FDA,PB 266282).
Formic acid is found in the atmosphere and can be detected in rainwater among others:
Rainwater in Ithaca (USA,1977) - 110 ug/l; rainwater in New Hampshire (USA,1977) - 9.2 ug/l; rainwater in the Taunus (1983/84) - 120 ug/l (Hahn, 1986)
Rainwater in Hanover (1987) - 260 ug/l (Winkeler et al., 1988)
Rainwater in Juelich (1986) - 250 ug/l. (Mueller,1986)
(23)

Type of measurement: Other
Medium: Other: Industrial effluent (paper manufacture)
Remark: Evidence of 18 mg/l (gas liquid chromatography mass spectrometry)
(24)

Type of measurement: Other
Medium: Other: Sewage & effluents (oxidation pond water)
Remark: Evidence of 31 mg/l (gas liquid chromatography mass spectrometry)
(24)

Type of measurement: Other
Medium: Other: Surface water (lake)
Remark: Evidence of 3-18 ug/l (liquid chromatography)
(25)

Type of measurement: Other
Medium: Other: Surface water (Ohio river)
Remark: Evidence of 10-24 ug/l (gas liquid chromatography)
(26)

Type of measurement: Other
Medium: Other: Industrial influent/effluent (kraft pulp)
Remark: Evidence of 18/31 mg/l (influent to /effluent from stabilization basin)
(27)

Type of measurement: Other
Medium: Biota
Remark: Formic acid is a natural substance which is formed biogenically as an intermediate and final product in the microbial, plant and animal metabolism. It is an excretion product of natural acid-forming prokaryotic fermenting organisms. These anaerobes are bacteria which belong to the enterobacteriaceae and are also typically native to the human intestines (e.g. E. coli). Formic acid is moreover formed in the glands of ants and stinging nettles and in other animals and plants.
09-NOV-1999 (23)

Type of measurement: Other
Medium: Other
Remark: Formic acid found in (ppbv): 1. Germany: Continental anticyclone 1.04 +/- 1.08, marine influence 0.17 +/- 0.06; 2. Amazon/basin, ABLE-2A, dry season: 1.6 +/- 0.6 (boundary layer); 3. Amazon/basin, ABLE-2B, wet season: 0.37 +/- 0.24 (boundary layer), 0.15 +/- 0.09 (free troposphere); 4. Central Africa/DECAFE, dry season: 3.7 +/- 1.0 (boundary layer), 0.9 +/- 0.3 (free troposphere).
(28)

3.3.1 Transport between Environmental Compartments

Type: Volatility
Media: Water - air
Method: Other
Year:
Remark: Henry's constant: 1.67*10^-7 atm*m^3/mol (calculated from original citation: "6*10^3 mol l^-1 atm^-1")
The Henry's Law Constant indicates that volatilization from water would not be significant.
(29) (30)

3.3.2 Distribution

Media: Air - biota - sediment(s) - soil - water
Method: Calculation according to Mackay, Level I
Year:
Result: Water: 92%, air: 7.99%, soil: 2.09E-3; sediment: 1.96E-3
Reliability: (1) Valid without restriction
15-NOV-1999 (31)

3.4 Mode of Degradation in Actual Use

-

3.5 Biodegradation

Type: Aerobic
Inoculum: Other: Effluent of a communal sewage treatment plant
Concentration: 20 mg/l related to DOC (Dissolved Organic Carbon)
Degradation: = 98% after 14 days
Result: Readily biodegradable
Kinetic:
7 days = 12%
10 days = 26%
13 days = 93%
14 days = 98%
Method: OECD Guideline 301 E "Ready biodegradability: Modified OECD Screening Test"
Year: **GLP:** Yes
Test substance:
Remark: Lag phase: 7 d; degradation phase: 6 d; test duration: 14 d
test substance 72 mg/l initial concentration
Test condition: Neutralized with NaOH
Reliability: (2) Valid with restrictions
15-NOV-1999 (32)

Type: Aerobic
Inoculum: Other: Effluent of a communal sewage treatment plant
Concentration: 20 mg/l related to DOC (Dissolved Organic Carbon)
Degradation: = 100% after 11 days
Result: Readily biodegradable
Kinetic:
2 days = 2%
3 days = 4%
7 days = 13%
8 days = 38%
9 days = 100%
Method: OECD Guideline 301 E "Ready biodegradability: Modified OECD Screening Test"
Year: **GLP:** Yes
Test substance:
Remark: Lag phase: 6 d; degradation phase: 3 d; test period: 11 d
Test substance 77 mg/l initial concentration
Test condition: Neutralized with NaOH
Reliability: (2) Valid with restrictions
15-NOV-1999 (33)

Type: Aerobic
Inoculum: Other bacteria: freshwater, acclimatized
Degradation: = 51% after 5 days
Method: Other: Sealed bottle test; (BSB of the THSB)
Year: **GLP:**
Test substance:
Remark: Initial concentration 3-10 mg/l test substance
Test results with a variable test period:
Degree of elimination (10/15/20 d) = 47/39/60%
Test condition: neutralized
(34)

Type: Aerobic
Inoculum: Other bacteria: freshwater, not acclimatized
Degradation: = 48% after 5 days
Method: Other: sealed bottle test; (BSB of the THSB)
Year: **GLP:**
Test substance:
Remark: Initial concentration 3-10 mg/l test substance
Test results with a variable test period:
Degree of elimination (10/15/20 d) = 54/66/68%
Test condition: Neutralized
(34)

Type: Aerobic
Inoculum: Other bacteria: salt water, synthetic
Degradation: = 62% after 5 days
Method: Other: Sealed bottle test; (BSB of the THSB)
Year: **GLP:**
Test substance:
Remark: Initial concentration 3-10 mg/l test substance
Test results with a variable test period:
Degree of elimination (10/15/20 d) = 91/92/95%
Test condition: Neutralized

(34)

Type: Aerobic
Inoculum: Other bacteria: Sewage, communal
Degradation: About 80% after 5 days
Method: Other: Respirometric dilution method; (BSB of the THSB)
Year: **GLP:**
Test substance:
Remark: Dilution series: Initial concentration of the test substance variable from 24-1200 mg/l
13-AUG-1996

(35)

Type: Aerobic
Inoculum: Other bacteria: Freshwater
Concentration: 20 mg/l related to test substance
Degradation: = 40.5% after 5 days
Method: Other: Dilution method; (BSB of the THSB)
Year: **GLP:**
Test substance:

(36)

Type: Aerobic
Inoculum: Other bacteria: Salt water, synthetic
Concentration: 40 mg/l related to test substance
Degradation: = 51.7% after 5 days
Method: Other: Dilution method; (BSB of the THSB)
Year: **GLP:**
Test substance:

(36)

Type: Aerobic
Inoculum: Activated sludge
Concentration: 500 mg/l related to test substance
Degradation: = 70% after 1 day
Method: Other: Warburg method; (BSB of the THSB)
Year: **GLP:**
Test substance:
Remark: Test results with a variable test period:
Degree of elimination (6/12 h) = 28.3/45.4%

(37)

3.6 BOD5, COD or BOD5/COD Ratio

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3.7 Bioaccumulation

Species:
Exposure period:
Concentration:
BCF: Approx. .22
Elimination:
Method: Other
Year: **GLP:**
Test substance:
Remark: BCF calculated on the basis of the log Pow = -0.54 and the equation "log BCF = 0.76 log Pow -0.23"

(38)

Species:
Exposure period:
Concentration:
BCF:
Elimination:
Method: Other
Year: **GLP:**
Test substance:
Remark: The log Pow measured of -0.54 suggests the absence of a bioaccumulation potential.

(23)

3.8 Additional Remarks

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AQUATIC ORGANISMS

4.1 Acute/Prolonged Toxicity to Fish

Type: Other: No data
Species: Lepomis gibbosus (fish, freshwater)
Exposure period: 24 hour(s)
Unit: mg/l **Analytical monitoring:** No data
LC50: = 5000
Method: Other: Freeman, L.: Sewage Ind. Wastes 25 (7), 845
Year: 1953 **GLP:** No data
Test substance: No data
Remark: Bluegill sunfish
Test substance: Sodium formate
06-SEP-1995 (39) (40)

Type: Other: No data
Species: Lepomis macrochirus (fish, freshwater)
Exposure period: 24 hour(s)
Unit: mg/l **Analytical monitoring:** No data
LC50: = 175
Method: Other: Freeman, L.: Sewage Ind. Wastes 25 (7), 845
Year: 1953 **GLP:** No
Test substance: No data
Remark: The result is only available as a brief secondary citation.
06-SEP-1995 (39) (41)

Type: Static
Species: Leuciscus idus (fish, freshwater)
Exposure period: 48 hour(s)
Unit: mg/l **Analytical monitoring:** No
NOEC: = 100
LC50: = 122
Method: Other: Determination of the effect of water constituents on fish, DIN 38412 part 15
Year: **GLP:** Yes
Test substance: No data
23-OCT-1995 (42)

Type: Static
Species: Leuciscus idus (fish, freshwater)
Exposure period: 96 hour(s)
Unit: mg/l **Analytical monitoring:** No
NOEC: 100 mg/L at neutral pH
LC50: > 100 mg/L at neutral pH
Method: Other: Determination of the effect of water constituents on fish, DIN 38412 part 15

Dilution water was reconstituted freshwater with a total hardness of 2.5 mmol/L, acid capacity of 0.8 mmol/L, a 4:1 ration of Ca:Mg. A 10:1 ratio of Na:K, and a pH of about 8.0.

Fish ranging from 6.0 to 7.2 cm were tested, 10 per concentration level at a loading of 2.8 grams of fish per L. of test water. The test temperature was 20°C and all glass aquaria containing 10 L water were utilized. Fish were not fed during the test.

Oxygen levels of the test water were measured at 0, 24, 48, 72 and 96 hours and was between 7.8 and 8.9 mg/L for all readings without any trend toward lower levels with increasing time or concentration.

Without pH adjustment the following pH level at study initiation was measured 7.5, 7.0, 4.3 and 3.3; at 10, 21.5, 46.4 and 100 mg/L, respectively. In the 100 mg/L test where the pH was adjusted, the initial pH was 7.2 and the final pH at 96 hours was 7.5.

Under pH unadjusted conditions, 96-hour mortality was 100% at 100 mg/L and 0% at all other concentrations. No significant in-life signs were reported.

Under pH-adjusted conditions, mortality was 0% at 100 mg/L and 0% in the control. No adverse clinical signs were reported.

Year: 1982 **GLP:** No
Test substance: Formic Acid, Purity 95.3%
Remark: To assess the physiologic effect of the relatively low pH on the golden orfe the highest test concentration (100 mg/l) was investigated in parallel after adjusting the pH with NaOH approximately to the pH of the control. After the pH adjustment, 100 mg/l was tolerated without mortality and without any symptoms. The low pH is considered responsible for the mortality.

23-OCT-1995 (43)

4.2 Acute Toxicity to Aquatic Invertebrates

Species: Daphnia magna (Crustacea)
Exposure period: 48 hour(s)
Unit: mg/l **Analytical monitoring:**

EC0: = 25
EC50: = 34.2
EC100: = 50
Method: Directive 84/449/EEC, C.2 "Acute toxicity for Daphnia"

Test water was filtered tap water with total hardness of 2.7 mmol/L and a pH of 7.8 was used for the tests that were conducted at 293.7°K. Test vessels were glass centrifuge tubes containing 10 ml of test water with 5 daphnids each in quadruplicate (20 daphnids per concentration). The pH at 0, 0.781, 1.56, 3.12, 6.25, 12.5, 25, 50 and 100 mg/L at the beginning of the study was 8.07, 8.01, 7.91, 7.75, 7.56, 7.14, 6.64, 4.55 and 3.74, respectively and at the end of the 48 hour exposure the pH was 7.54, 7.76,7.71, 7.67, 7.55, 5.98 and 3.59, respectively. Dissolved oxygen levels generally remained above 8.5 mg/L at all concentrations and times.

The 48-hour mortality was 100% at 50 and 100 mg/L and 10% at 25 mg/L. It is not known of the test substance itself, the low pH, or a combination of the two was responsible for the mortality.

Year: **GLP:**
Test substance: Formic acid, purity 95.5%
23-SEP-1999 (44)

Species: Daphnia magna (Crustacea)
Exposure period: 48 hour(s)
Unit: mg/l **Analytical monitoring:**
EC50: = 151.2
Method: Other: Test for inhibition of swimming ability (immobilization)
Year: **GLP:**
Test substance:
Remark: Confidence limits: 138-165 mg/l
Test condition: 22 degrees C; pH 7.0-8.2

(45)

Species: Daphnia magna (Crustacea)
Exposure period: 48 hour(s)
Unit: mg/l **Analytical monitoring:**
EC50: = 120
Method:
Year: **GLP:**
Test substance:
Remark: Immobilization

(46)

Species: Other aquatic arthropod: Artemia salina (naupliar larvae)
Exposure period: 24 hour(s)
Unit: mg/l **Analytical monitoring:**
LC50 : = 410
Method:
Year: **GLP:**
Test substance:

(34)

4.3 Toxicity to Aquatic Plants e.g. Algae

Species: Scenedesmus quadricauda (algae)
Endpoint:
Exposure period: 96 hour(s)
Unit: mg/l **Analytical monitoring:**
TGK : = 100
Method: Other: Cell multiplication inhibition test

Remark:

The literature report this information was obtained from contained data on several compounds and specific information, such as pH was not provided. The composition of the Algal growth medium, however, was provided and it contained 140 mg/L of potassium dihydrogen phosphate. This indicates that the media was much more strongly buffered than the standard DIN media that was used in the studies (reference 44) listed below. Based on the stronger buffering capacity in this study, the pH was not likely to have been affected as strongly as with DIN media by the addition of formic acid.

Year: **GLP:**
Test substance: Formic acid, purity not stated

(46)

Species: Scenedesmus subspicatus (algae)
Endpoint:
Exposure period: 72 hour(s)
Unit: mg/l **Analytical monitoring:**
EC50: = 26.9
EC20 : = 14.9
Method: Other: Scenedesmus cell multiplication inhibition test, DIN 38412 part 9, determination of the inhibitory effect of water constituents on green algae

The algal medium was prepared as described in DIN 38412 Part 9. The test was run in 100 ml flasks with an initial inoculum of 10,000 cells/ml. The temperature was 23 °C, Cell mass was estimated fluorometrically. The pH of the solution were not adjusted and were lower at higher acid concentrations.

The pH at the beginning of the incubation was 7.8, 7.7, 7.6, 7.6, 7.4, 6.9, 6.5, and 4.5 and at the end of the 96-hour total incubation was 9.9, 9.9, 9.9, 10.0, 9.8, 9.7, 8.9, and 4.9 at concentrations of 0, 0.78, 1.56, 3.13, 6.25, 13.5, 25.0, and 50.0 mg/L, respectively.

Significant growth inhibition appears only at levels where the pH is significantly reduced. It is not clear if this effect is pH related or related to formate levels.

Year: **GLP:** no data
Test substance: Formic acid, purity 95.5%
Remark: EC90(72h)=45.6 mg/l

(44)

Species: Scenedesmus subspicatus (algae)
Endpoint:
Exposure period: 96 hour(s)
Unit: mg/l **Analytical monitoring:**
EC50: = 25
EC20 : = 12.6
Method: Other: Scenedesmus cell multiplication inhibition test, DIN 38412 part 9, determination of the inhibitory effect of water constituents on green algae

The algal medium was prepared as described in DIN 38412 Part 9. The test was run in 100 ml flasks with an initial inoculum of 10,000 cells/ml. The temperature was 23 °C, Cell mass was estimated fluorometrically. The pH of the solution were not adjusted and were lower at higher acid concentrations.

The pH at the beginning of the incubation was 7.8, 7.7, 7.6, 7.6, 7.4, 6.9, 6.5, and 4.5 and at the end of the 96-hour total incubation was 9.9, 9.9, 9.9, 10.0, 9.8, 9.7, 8.9, and 4.9 at concentrations of 0, 0.78, 1.56, 3.13, 6.25, 13.5, 25.0, and 50.0 mg/L, respectively.

Significant growth inhibition appears only at levels where the pH is significantly reduced. It is not clear if this effect is pH related or related to formate levels.

Year: **GLP:** no data
Test substance:

Remark: EC90(96h)=45.1 mg/l

(44)

4.4 Toxicity to Microorganisms e.g. Bacteria

Type: Aquatic
Species: Other bacteria: Activated sludge, adapted
Exposure period: 30 minute(s)
Unit: mg/l **Analytical monitoring:**
EC20 : > 1000
Method: Other: Test for Inhibition of Oxygen Consumption by Activated Sludge, ISO 8192
Year: **GLP:**
Test substance:
Remark: If the test substance is properly introduced into adapted biological sewage treatment plants, no disorders of the degradation activity of the activated sludge are expected. No respiratory inhibition of activated sludge up to 1000 mg/l
22-NOV-1999 (47)

Type:
Species: Escherichia coli (bacteria)
Exposure period: 24 hour(s)
Unit: mg/l **Analytical monitoring:**
NOEC : = 1000
Method:
Year: **GLP:**
Test substance:
Remark: Below 1000 mg/l without any inhibitory effect on the acid formation by Escherichia coli.

(46)

Type:
Species: Pseudomonas putida (bacteria)
Exposure period: 17 hour(s)
Unit: mg/l **Analytical monitoring:**
EC10: = 33.9
EC50: = 46.7
EC90 : = 59.5
Method: Other: Pseudomonas cell multiplication inhibitory test, DIN 38412 part 8, adopted for yellow publication, determination of the inhibitory effect of water constituents on bacteria
Year: **GLP:**
Test substance:

(44)

4.5 Chronic Toxicity to Aquatic Organisms

4.5.1 Chronic Toxicity to Fish

-

4.5.2 Chronic Toxicity to Aquatic Invertebrates

-

TERRESTRIAL ORGANISMS

4.6.1 Toxicity to Soil Dwelling Organisms

-

4.6.2 Toxicity to Terrestrial Plants

-

4.6.3 Toxicity to other Non-Mamm. Terrestrial Species

Species: Other avian: Red-winged blackbird
Endpoint: Other: Mortality and repellency
Expos. period:
Unit:
LD50 : >= 111
Method: Other
Year: **GLP:** No data
Test substance: No data
Remark: The acute oral toxicity and a "repellency toxicity index" were determined.
07-DEC-1995 (48)

Species: Other avian: Red-winged blackbird
Endpoint:
Expos. period:
Unit: mg/kg bw
LD50 : > 111
Method: Other: Acute toxicity test
Year: **GLP:**
Test substance:
(23)

4.7 Biological Effects Monitoring

-

4.8 Biotransformation and Kinetics

-

4.9 Additional Remarks

Memo: Aedes aegyptii (insect larva): LC50 = 400 mg/l (4 h), or LC50 = 0.04 % v/v (4 h); 22 - 24 °C
13-JAN-2000 (49)

5.1 Acute Toxicity

5.1.1 Acute Oral Toxicity

Type: LD50
Species: Rat
Sex:
Number of Animals:
Vehicle:
Value: = 1830 mg/kg bw
Method: Other: No data
Year: **GLP:** No
Test substance: No data
Remark: The result is only available as a table in the form of a secondary citation.
06-SEP-1995 (50) (51)

Type: LD50
Species: Rat
Sex:
Number of Animals:
Vehicle:
Value: = 1210 mg/kg bw
Method: Other: No data
Year: **GLP:** No
Test substance: No data
Remark: The result is only available as a secondary citation.
06-SEP-1995 (52) (41)

Type: LD50
Species: Rat
Sex:
Number of Animals:
Vehicle:
Value: = 730 mg/kg bw
Method: OECD Guideline 401 "Acute Oral Toxicity"
Year: 1981 **GLP:** No data
Test substance: No data
Method: 5 males and 5 females were used per dose group (501, 631, 794 and 1000 mg/kg). The observation period was 14 days.

Results

Dose Group	Sex	Dead/ Affected/Total	Body wt gain (mean, grams)	
501 mg/kg	M	0/5/5	56.1	Clinical signs are not given by dose level, but included: squatting, tumbling, aggressive behavior, prone position, strong sedation, bloody nose, blood in urine and twitching. All animals were symptom free within 8 days of doing, except for the high-dose group.
	F	1/5/5		
631 mg/kg	M	2/5/5	45.9	
	F	2/5/5		
794 mg/kg	M	1/5/5	28.3	
	F	5/5/5		
1000 mg/kg	M	4/5/5	-3.4	
	F	4/5/5		

At necropsy hyperemias of the small intestine mucous membranes, spotting on the livers and light coloring of kidneys and pancreas were observed.

Result: According to the authors, body weight gain was reduced clearly related to the dose.

Test substance: Formic acid 99%

11-SEP-1995 (53)

Type: LD50
Species: Rat
Sex:
Number of Animals:
Vehicle:
Value: = 1100 mg/kg bw
Method: Other: No data
Year: **GLP:** No data
Test substance: No data
Remark: The result is only available as a secondary citation.
07-DEC-1995 (54)

Type: LD50
Species: Rat
Sex:
Number of Animals:
Vehicle:
Value: = 3050 mg/kg bw
Method: Other
Year: **GLP:** No
Test substance: Other TS
Test substance: Calcium formate
23-OCT-1995 (55)

Type: LD50
Species: Mouse
Sex:
Number of Animals:
Vehicle:
Value: = 1100 mg/kg bw
Method: Other: No data
Year: **GLP:** No
Test substance: No data
Remark: 55 animals were used; no further data. The result is only available as a table.
06-SEP-1995 (50) (56) (51)

Type: LD50
Species: Mouse
Sex:
Number of Animals:
Vehicle:
Value: = 11200 mg/kg bw
Method: Other: No data
Year: **GLP:** No
Test substance: Other TS
Remark: 45 animals were used; no further data. The result is only available as a table.
Test substance: Sodium formate
05-SEP-1995 (56)

Type: LD50
Species: Mouse
Sex:
Number of Animals:
Vehicle:
Value: = 1920 mg/kg bw
Method: Other: No data
Year: **GLP:** No
Test substance: Other TS
Remark: 45 animals were used; no further data. The result is only available as a table.
Test substance: Calcium formate
05-SEP-1995 (56)

Type: LD50
Species: Mouse
Sex:
Number of Animals:
Vehicle:
Value: = 700 mg/kg bw
Method: Other: No data
Year: **GLP:** No data
Test substance: No data
Remark: The result is only available as a secondary citation.
07-DEC-1995 (54)

Type: LDLo
Species: Rabbit
Sex:
Number of Animals:
Vehicle:
Value: > 4000 mg/kg bw
Method: Other
Year: **GLP:** No data
Test substance: Other TS
Test substance: Formic acid
28-JUL-1997 (57)

Type: Other
Species: Dog
Sex:
Number of Animals:
Vehicle:
Value: = 4000 mg/kg bw
Method: Other: No data
Year: **GLP:** No
Test substance: Other TS
Remark: Deaths occurred. In the source, supposed methemoglobin formation is described. The original (Fleig 1907) is not available, and von Oettingen (1959) does not mention this effect. The finding seems to be unlikely.
Test substance: Test substance: Sodium formate
05-SEP-1995 (50) (58) (41) (59)

Type: LDLo
Species: Sheep
Sex:
Number of Animals:
Vehicle:
Value:
Method: Other
Year: **GLP:** No data
Test substance: Other TS
Remark: Formic acid (150 mg/kg) was without any adverse effect except for some indications of anorexia.
Test substance: Formic acid
29-JUL-1997 (60)

5.1.2 Acute Inhalation Toxicity

Type: LC50
Species: Rat
Sex:
Number of Animals:
Vehicle:
Exposure time: 4 hour(s)
Value: = 7.4 mg/l
Method: Other: BASF test
Year: **GLP:** No
Test substance: As prescribed by 1.1 - 1.4
Remark: Whole-body exposure (vapor). 10 males and 10 females were used per group. The animals were observed for 14 days.
05-SEP-1995 (61)

Type: LC50
Species: Rat
Sex:
Number of Animals:
Vehicle:
Exposure time: 15 minute(s)
Value: = 15 mg/l
Method: Other: No data
Year: **GLP:** No data
Test substance: No data
Remark: The result is only available as a secondary citation.
06-SEP-1995 (54)

Type: Other: IHT
Species: Rat
Sex:
Number of Animals:
Vehicle:
Exposure time: 50 minute(s)
Value:
Method: Other: Carried out on the basis of the method described by H.F. Smith et al.: Am. Ind. Hyg. Ass.J. 23, 95-107 (1962)
Year: 1962 **GLP:** no
Test substance: As prescribed by 1.1 - 1.4
Remark: Mortality (2/12) after 3 minutes, 5/6 after 10 min. and 6/6 after 30 and 50 min respectively. Exposure to an atmosphere enriched or saturated at 20 degrees C.
06-SEP-1995 (62)

Type: Other: IHT
Species: Rat
Sex:
Number of Animals:
Vehicle:
Exposure time: 7 hour(s)
Value:
Method: Other: Carried out on the basis of the method described by H.F. Smith et al: Am. Ind. Hyg. Ass. J. 23, 95-107 (1962)
Year: 1962 **GLP:** No
Test substance: Other TS
Remark: No mortality after 30 min. Exposure to an atmosphere enriched or saturated at 20 degrees C.
Lethality after prolonged exposure
Test substance: Formic acid 50% in water
05-SEP-1995 (63)

Type: Other: IHT
Species: Rat
Sex:
Number of Animals:
Vehicle:
Exposure time: 7 hour(s)
Value:
Method: Other: BASF test
Year: **GLP:** No
Test substance: Other TS
Remark: No mortality after 3-hour exposure to an atmosphere enriched or saturated at 20 degrees C.
Lethality after prolonged exposure.
Test substance: Formic acid 25% in water
05-SEP-1995 (64)

Type: Other: IHT
Species: Rat
Sex:
Number of Animals:
Vehicle:
Exposure time: 7 hour(s)
Value:
Method: Other: BASF test
Year: **GLP:** No
Test substance: Other TS
Remark: No mortality after 7-hour exposure to an atmosphere enriched or saturated at 20 degrees C.
Test substance: Formic acid 10% in water
05-SEP-1995 (65)

Type: Other: IHT
Species: Rat
Sex:
Number of Animals:
Vehicle:
Exposure time: 10 minute(s)
Value:
Method: OECD Guideline 403 "Acute Inhalation Toxicity"
Year: 1981 **GLP:** No data
Test substance: No data
Remark: Inhalation hazard test: Lethality in 6 of 6 rats used after 10-min exposure to an atmosphere saturated at 20 degrees C (44,168 ppm)
06-SEP-1995 (66)

Type: Other: IHT
Species: Rat
Sex: Male/female
Number of Animals: 6
Vehicle:
Exposure time: 116 minute(s)
Value:
Method: Other: IHT
Year: 1981 **GLP:** No
Test substance: Other TS
Remark: 12/12 rats died after 10 and 116 min by inhalation of an atmosphere that had been saturated with the volatile part of the compound at 20 degrees centigrade. 8/12 rats died after 3 min by inhalation.
Test substance: Formic acid, purity >98%
16-MAY-2000 (67)

Type: LC50
Species: Mouse
Sex:
Number of Animals:
Vehicle:
Exposure time: 15 minute(s)
Value: = 6.2 mg/l
Method: Other: No data
Year: **GLP:** No data
Test substance: No data
Remark: The result is only available as a secondary citation.
07-DEC-1995 (54)

5.1.3 Acute Dermal Toxicity

-

5.1.4 Acute Toxicity, other Routes

Type: LD50
Species: Mouse
Sex:
Number of Animals:
Vehicle:
Route of admin.: i.p.
Value: = 940 mg/kg bw
Method: Other: No data
Year: **GLP:** No
Test substance: No data
Remark: The result is only available as a secondary citation.
07-DEC-1995 (50) (51) (68) (52)

Type: LD0
Species: Rabbit
Sex:
Number of Animals:
Vehicle:
Route of admin.: s.c.
Value: > 300 mg/kg bw
Method: Other
Year: **GLP:** No data
Test substance: Other TS
Remark: Rabbits tolerated a 300 mg/kg s.c. administration without adverse effect.
Test substance: Formic acid
28-JUL-1997 (69)

Type: LDLo
Species: Rabbit
Sex:
Number of Animals:
Vehicle:
Route of admin.: s.c.
Value:
Method: Other
Year: **GLP:** No data
Test substance: Other TS
Remark: Doses of 0.46-1.25 mg/kg caused central nervous system depression, vasoconstriction and diuresis in rabbits; larger doses (about 4 g/kg) produced convulsions and death.
Test substance: Formic acid
29-JUL-1997 (69)

Type: LD50
Species: Mouse
Sex:
Number of Animals:
Vehicle:
Route of admin.: i.v.
Value: = 145 mg/kg bw
Method: Other: No data
Year: **GLP:** No
Test substance: No data
Remark: 50 animals were used; no further data. The result is only available as a table.
07-DEC-1995 (50) (56) (51) (52)

Type: Other: MLD
Species: Rabbit
Sex:
Number of Animals:
Vehicle:
Route of admin.: i.v.
Value: = 239 mg/kg bw
Method: Other: No data
Year: **GLP:** No
Test substance: No data
Remark: Deaths occurred. The result is only available in a table as a secondary citation.
06-SEP-1995 (50)

5.2 Corrosiveness and Irritation

5.2.1 Skin Irritation

Species: Rabbit
Concentration:

Exposure:
Exposure Time:
Number of Animals:
PDII:
Result: Corrosive
EC classificat.:
Method: Other: No data
Year: **GLP:** No
Test substance: No data
Remark: The various results are only available as secondary citations.
07-DEC-1995 (70) (51) (71) (72) (52) (73)

Species: Rabbit
Concentration:

Exposure:
Exposure Time:
Number of Animals:
PDII:
Result:
EC classificat.:
Method: Other: 610 mg open
Year: **GLP:** No
Test substance: No data
Remark: The result is only available as a secondary citation.
Effect: "mild" according to RTECS
06-SEP-1995 (74)

Species: Other: No data
Concentration:

Exposure:
Exposure Time:
Number of Animals:
PDII:
Result: Highly corrosive
EC classificat.:
Method: Other
Year: **GLP:** No data
Test substance: No data
23-OCT-1995 (75)

5.2.2 Eye Irritation

Species: Rabbit
Concentration:
Dose:
Exposure Time:
Comment:
Number of Animals:
Result: Irritating
EC classificat.:
Method: Other: Application to the cornea
Year: **GLP:** No data
Test substance: No data
06-SEP-1995 (76)

Species: Rabbit
Concentration:
Dose:
Exposure Time:
Comment:
Number of Animals:
Result: Irritating
EC classificat.:
Method: Other: No data
Year: **GLP:** No
Test substance: No data
Remark: Method: 122 mg
Effect: "severe" according to RTECS
The result is only available as a secondary citation.
06-SEP-1995 (74)

Species: Other: No data
Concentration:
Dose:
Exposure Time:
Comment:
Number of Animals:
Result: Irritating
EC classificat.:
Method: Other: No data
Year: **GLP:** No
Test substance: No data
Remark: Conjunctivitis, corneal injuries
Origin of the result not comprehensible
06-SEP-1995 (77)

5.3 Sensitization

Type: No data
Species: Human
Number of Animals:
Vehicle:
Result:
Classification:
Method: Other: No data
Year: **GLP:** No data
Test substance: No data
Remark: According to the present secondary source (HSDB), sensitization to formic acid may occur in rare cases in persons who had previously been exposed to formaldehyde.
06-SEP-1995 (76)

5.4 Repeated Dose Toxicity

Species: Rat **Sex:** Male
Strain: Wistar
Route of admin.: Inhalation
Exposure period: 3-8 days
Frequency of treatment: 6 h daily
Post. obs. period: No data
Doses: 0.037 mg/l (20 ppm)
Control Group: Yes, concurrent vehicle
Method: Other
Year: **GLP:** No data
Test substance: No data
Result: No clinical symptoms. On the 3rd day of exposure, the glutathione concentration was reduced in the liver and kidneys and increased in the brain as compared with the control. The cerebral and acid proteinase activity was increased at the end of the test. The hepatic superoxide dismutase activity was below the control level whereas the activity of the ethoxycoumarin deethylase was increased. The activities of cytochrome P450 and ethoxycoumarin deethylase were reduced in the kidneys. No relation of the changes to the duration of exposure.
06-SEP-1995 (78) (79)

Species: Rat **Sex:** Male/female
Strain: Fischer 344
Route of admin.: Inhalation
Exposure period: 13 weeks
Frequency of treatment: 5 days per week, 6 hours a day
Post. obs. period: None
Doses: 0.015; 0.030; 0.061; 0.122; 0.244 mg/l (8, 16, 32, 64, 128 ppm)
Control Group: Yes, concurrent no treatment
NOAEL: .06 mg/l
LOAEL: .12 mg/l
Method: Other
Year: **GLP:** Yes
Test substance: No data
Remark: 10 males and 10 females were used per group. Another 10 males and 10 females per group were used for the clinicopathologic examination which was carried out on the 3rd and 23rd day of the study. The body weights were determined at the beginning and at the end of the study and at weekly intervals in between. The organ weights (thymus, heart, right kidney, lungs, liver and right testis) were determined. Hematologic and biochemical serum examinations as well as gross-pathologic and histopathologic organ examinations were carried out at the end of the study.

New: Animals were exposed and maintained in inhalation chambers (1.7 cubic meters manufactured by Harford Systems, Inc., Aberdeen, MD). Oxygen was excluded from the liquid formic acid reservoir by a blanket of nitrogen. Liquid formic acid (purity approximately 95% with 5 water) was pumped from the reservoir to a vaporizer using micrometering pump constructed compatible materials.

The vaporizer was a stainless steel cylinder covered with a glass fiber wick. The wick using heat from the cylinder produced the vapor. Incorporated in the stainless cylinder were an 80-watt heater and 2 temperature-sensing elements. The temperature of the vaporizer was maintained at approximately 97 ± 5 deg C. The vaporizer was positioned in the fresh-air duct leading to a vapor distribution manifold.

Vapor entered a short distribution manifold where individual delivery lines carried a metered amount of vapor to each exposure chamber. A concentration of approximately 2300 ppm formic acid vapor, was maintained in the distribution duct. Dilution air was filtered by HEPA and charcoal filters and conditioned to room temperature and about 50% relative humidity. Vacuum pumps at the chamber end of each vapor delivery line drew the formic acid vapor from the distribution manifold through fine metering valves to the chambers. The vapor was diluted with conditioned air immediately before entry of the vapor into the chambers to achieve the required target concentrations.

The test material was a vapor in the dilution air and concentration was monitored using a Miran infrared spectrometer (The Foxboro Co., Foxboro, MA) with a 20-meter, variable-pathlength, heated gas cell. Chambers and controls (room air and pure nitrogen) were each monitored approximately once every 40 minutes. The infrared cell path length was set to9.75 meters and the analytical wavelength for formic acid was 9.050 microns. The on-line monitor was calibrated by comparing monitor readings with GC analyses of grab samples collected from the exposure chambers at the time of the Miran readings. During the study, 91% of the measured concentrations for each chamber were within 10% of the target concentrations.

Result: All animals used survived. The body weight of the males of the 32 ppm group was slightly but significantly increased at the end of the study. The body weight gains of the males of the 16, 32 and 64 ppm groups were also significantly increased. No definitely substance-related clinical signs of toxicity were observed during the study. The hematologic changes observed were all slight: At the end of the study, the number of neutrophils was significantly but not dose-dependently reduced in animals of both sexes in all dose groups. Other hematologic changes were rather of an incidental nature and not relevant. Furthermore, few and slight changes of the biochemical serum parameters were observed.
No unusual gross lesions were observed. The absolute liver weights were significantly increased in the males of all exposure groups, and the relative liver weights were significantly increased in the three highest dose groups only. The absolute and relative lung weights were significantly reduced in the females of all exposure groups. In the males, the relative lung weights were significantly reduced in all exposure groups, and the absolute lung weights were significantly reduced in the two highest dose groups only. Most of the histopathologic changes at the respiratory and olfactory nasal epithelia were restricted to the highest dose group. The respiratory epithelium mainly showed slight squamous epithelial metaplasias, and the olfactory epithelium showed minimal to slight degenerative changes. In the 32 and 64 ppm groups, a minimal degeneration of the olfactory epithelium was observed in one male in each case.

Affected Organ Weights (absolute in grams)							
		Dose Groups (ppm)					
		Control	**8**	**16**	**32**	**64**	**128**
Liver,	Absolute	10.57	11.74*	11.59*	12.41**	12.46**	11.15**
Males	Relative	31.2	32.7	32.4	33.8**	34.1**	33.3**
Lungs,	Absolute	1.97	1.76	1.74	1.93	1.66**	1.61**
Males	Relative	5.81	4.90**	4.87**	5.28**	4.45**	4.81**
Lungs,	Absolute	1.47	1.24**	1.20**	1.25**	1.17**	1.24**
Females	Relative	6.97	5.96**	5.85**	6.06**	5.68**	6.18**
* p 0.05 , ** p 0.01							

As compared with the 2-week study (q.v.), there was no increase in the degree of lesions after prolonged exposure. According to the NTP, a NOAEL of 64 ppm (0.122 mg/l) is obtained from the results of this 13-week study, whereas a NOAEL of 32 ppm (0.06 mg/l) is obtained from the results of the 2-week study.

Test substance: Formic acid, approx. 95% with approx. 5% water. Water was the only Significant impurity.

11-SEP-1995 (80) (81)

Species: Rat **Sex:** Male/female
Strain: Fischer 344
Route of admin.: Inhalation
Exposure period: 12 days
Frequency of treatment: 5 days per week, 6 hours per day
Post. obs. period: 1 day
Doses: 0.06; 0.12; 0.24; 0.48; 0.95 mg/l (31; 62.5; 125; 250; 500 ppm)
Control Group: Yes, concurrent no treatment
NOAEL: .06 mg/l
LOAEL: .12 mg/l
Method: Other
Year: **GLP:** No
Test substance: No data
Remark: The study was used as a pretest for the 13-week study. 5 males and 5 females were used per group. After the 3rd day of exposure, the urine of the animals was collected for 16 hours. The following parameters were determined in the urine: volume, pH, glucose, protein and activities of aspartate aminotransferase (AST), gamma-glutamyl transpeptidase (GGT) and alkaline phosphatase (AP). One day after the end of exposure, blood samples were taken and examined. The animals and their organs (liver, thymus, right kidney, right testis, heart and lungs) were examined by gross pathology, and the respiratory organs were also examined histopathologically.

Result: In the highest dose group, three males and one female died on the 10th day of exposure. The body weights at the end of the study were significantly reduced in the males of the two highest dose groups and in the females of the highest dose group. In the two highest dose groups, clinical signs typical of substances which irritate the respiratory tract were observed: nasal discharge, increased preening, hypoactivity and labored breathing. In the highest dose group, corneal opacities were detected in the animals exposed during the study; at necropsy, this effect was however confirmed gross-pathologically and histopathologically in only one male. There were no relevant substance-induced influences on the blood pH, coagulation and serum electrolyte concentrations. At the two highest dose levels, urinalysis showed a reduction in the volume of the 16-hour urine in the animals of both sexes and a simultaneous increase of the specific density due to this. The absolute and relative thymus weights were significantly reduced in animals of both sexes of the highest dose group. The other absolute organ weights did not show any significant changes. The relative kidney weight was significantly increased in animals of both sexes, and the relative heart weight was increased only in the females of the highest dose group.

Histopathologic changes were detected in the upper respiratory tract in animals of both sexes from a test substance concentration of 0.12 mg/l (62.5 ppm) onward in relation to the dose. Up to a concentration of 0.48 mg/l (250 ppm), squamous epithelial metaplasias, inflammations and necroses of the respiratory epithelium as well as necroses of the olfactory epithelium were detected. In the highest concentration, the severest lesions also were squamous epithelial metaplasias and inflammations in the larynx. There were no substance-induced histopathologic changes in the lowest dose.

To sum up, the inhalation of the test substance only led to slight effects of systemic toxicity; the histopathologic changes observed were typical of the inhalation exposure of irritant substances.

Test substance: Formic acid, approx. 95% with approx. 5% water

11-SEP-1995 (80) (81)

Species: Rat **Sex:** No data
Strain: No data
Route of admin.: Oral feed
Exposure period: 5-6 weeks
Frequency of treatment: Continuously with the feed
Post. obs. period: No data
Doses: 0.5 and 1.0% (= 2500 mg/kg/d according to the authors, no information whether 0.5 or 1.0%)
Control Group: Yes, concurrent no treatment
Method: Other: No data
Year: **GLP:** No
Test substance: No data
Remark: Cited according to: Sporn, A. et al.: Igiena (Bucharest) 11, 507-515 (1962)
Result: 8 animals were used per group. Retarded body weight gain, reduction of the organ weights (liver and kidneys in both dose groups, adrenal and spleen in the lowest dose group only), no dose dependence.

The results are only available as a brief keynote summary (secondary citation).

11-SEP-1995 (50)

Species: Rat **Sex:** Male/female
Strain: No data
Route of admin.: Drinking water
Exposure period: Up to 27 weeks
Frequency of treatment: Continuously in the drinking water
Post. obs. period: No data
Doses: 8.2, 10.25, 90, 160, 360 mg/kg/d
Control Group: No data specified
Method: Other: No data
Year: **GLP:** No
Test substance: No data
Result: Group 1: 0.01% in the feed for 11 weeks, 6 animals, 8.2 mg/kg/d.
Group 2: 0.01% in the feed for 14 weeks, 3 animals, 10.25 mg/kg/d.
Group 3: 0.1% in the feed for 15 weeks, 6 animals, 90 mg/kg/d.
Group 4: 0.01% in the feed for 12 weeks and subsequently 0.25% for 15 weeks, 4 animals, 160 mg/kg/d.
Group 5: 0.1% in the feed for 17 weeks and subsequently 0.5% for 9 weeks, 3 animals, 360 mg/kg/d.

Reduction of feed consumption and growth in the highest dose (group 5). Mortality: 1/6 and 2/4 in groups 1 and 4 respectively, otherwise no mortality.
The results are only available as a brief keynote summary or as a table in the original literature (Solmann (1921)). The study does not comply with criteria valid today.

11-SEP-1995 (50) (82)

Species: Rat **Sex:** Male/female
Strain: Wistar
Route of admin.: Drinking water
Exposure period: Lifelong (2-3 years)
Frequency of treatment: Continuously in the drinking water
Post. obs. period: None
Doses: 0.2 and 0.4% (= 150-200 mg/kg/d in the lowest dose according to the authors)
Control Group: Yes, concurrent no treatment
Method: Other: No data
Year: **GLP:** No
Test substance: Other TS
Remark: The results are only summarized in keynotes or presented briefly in a table in the case of body weight gain.
Result: 6 animals were used per group.
No clinical or pathologic changes (growth or organ functions) were detected in any dose group; in particular, there were no disorders of the ocular fundus. The

study includes several generations (up to 5). At the beginning, 8 males and 24 females were used.

Test substance: Ca formate in the drinking water

06-SEP-1995 (56)

Species: Rat **Sex:** No data
Strain: Wistar
Route of admin.: Drinking water
Exposure period: 1.5 years
Frequency of treatment: Continuously in the drinking water
Post. obs. period: None
Doses: 1% (= 274 mg/animal formate or 185 mg/animal calculated to formic acid according to the authors)
Control Group: No data specified
Method: Other: No data
Year: **GLP:** No
Test substance: Other TS
Remark: The results are only available as a brief keynote summary.
Result: No toxicity detected
6 animals/group
Test substance: Na formate in the drinking water

06-SEP-1995 (56)

Species: Rat **Sex:** No data
Strain: No data
Route of admin.: Drinking water
Exposure period: 6 weeks
Frequency of treatment: Continuously in the drinking water
Post. obs. period: No data
Doses: 0.5 and 1.0% (approx. 2500 mg/kg/d according to the authors; no information whether 0.5 or 1.0%)
Control Group: Yes, concurrent no treatment
Method: Other: No data
Year: **GLP:** No
Test substance: No data
Remark: Cited according to: Sporn, A. et al.: Igiena (Bucharest) 11, 507-515 (1962)
Result: 8 animals were used per group. Reduced body weight gain, reduction of organ weights (liver, kidney and adrenal in both dose groups and spleen only in the lowest dose group); no dose dependence

The results are only available as a brief keynote summary (secondary citation).

11-SEP-1995 (50)

Species: Mouse **Sex:** No data
Strain: B6C3F1
Route of admin.: Inhalation
Exposure period: 13 weeks
Frequency of treatment: 5 days per week, 6 hours per day
Post. obs. period: None
Doses: 0.015; 0.030; 0.061; 0.122; 0.244 mg/l (8, 16, 32, 64, 128 ppm)
Control Group: Yes, concurrent no treatment
NOAEL: .06 mg/l
LOAEL: .12 mg/l
Method: Other
Year: **GLP:** No data
Test substance: No data
Remark: 10 males and 10 females were used per group. The body weights were determined at the beginning and at the end of the study and at weekly intervals in between. The organ weights (thymus, heart, right kidney, lungs, liver and right testis) were determined. At the end of the study, the animals were examined by gross pathology. Some organs were assessed gross-pathologically and histopathologically.
Result: According to the authors, there were no clinical signs of toxicity throughout the study, nor was there any mortality due to exposure. The table shows, however, that only 9 of 10 males and females in each case survived in the highest dose group; the authors do not give any further details. The body weight gains were significantly reduced in the animals of both sexes in the highest dose group, and in the females they were still significantly reduced even in the 64 ppm group. In the highest dose group, the body weights at the end of the study were significantly reduced in the animals of both sexes; this also led to increased relative organ weights in some cases. However, slight, significant increases of the relative liver or kidney weights were detected in the males or females of the 32 and 64 ppm groups.
No gross-pathologic changes were observed. Minimal histopathologic lesions (degenerations) were only observed at the olfactory nasal epithelium in some animals of the two highest dose groups.

According to the NTP, a NOAEL of 64 ppm (0.122 mg/l) is obtained from the results of the 13-week study; taking into account the 2-week study (q.v.), however, the NTP fixed a NOAEL of 32 ppm (0.06 mg/l).
Test substance: Formic acid, approx. 95% with approx. 5% water
11-SEP-1995 (80) (81)

Species: Mouse **Sex:** Male/female
Strain: B6C3F1
Route of admin.: Inhalation
Exposure period: 12 days
Frequency of treatment: 5 days per week, 6 hours per day
Post. obs. period: 1 day
Doses: 0.06; 0.12; 0.24; 0.48; 0.95 mg/l (31; 62.5; 125; 250; 500 ppm)
Control Group: Yes, concurrent no treatment
NOAEL: .06 mg/l
LOAEL: .12 mg/l
Method: Other
Year: **GLP:** No
Test substance: No data
Remark: The study served as a pretest for the 13-week study. 5 males and 5 females were used per group. The animals and their organs (liver, thymus, right kidney, right testis, heart and lungs) were assessed by gross pathology, and the respiratory organs were also examined histopathologically.

Result: All animals of the highest dose group died during the first week of the study; one female of the 250 ppm group (0.48 mg/l) had to be sacrificed on the 4th day on account of its moribund state. At the end of the study, the body weights of the animals of both sexes were significantly reduced in the 250 ppm group. Clinical signs of toxicity due to exposure were only observed in the two highest dose groups and were typical of the exposure to irritant substances by inhalation as in the case of the study with rats. Corneal opacities were observed in the males and females of the highest dose group.
The deaths that occurred were attributed to swelling of the nasal mucosa up to nasal occlusion and severe impairment of respiration due to this. No gross-pathologic changes were observed in any other animals at necropsy at the end of the study. The relative kidney weights of the males of the 62.5, 125 and 250 ppm groups and of the females of the 250 ppm group were slightly increased. In the 250 ppm group, the absolute and relative thymus weights were reduced in animals of both sexes and the relative lung weights were slightly increased. The histopathologic changes showed no substantial sex-specific differences and, except for the highest dose group, they were detected only in the nasal passages. The severity of the histopathologic changes observed (squamous epithelial metaplasias, inflammation and necroses) was dose-dependent, and larynx, pharynx and trachea were also affected in the highest dose group. The males of the two lowest doses showed no changes due to exposure; two females

of the 62.5 ppm group demonstrated squamous epithelial metaplasias of the respiratory epithelium. No histopathologic changes were observed in the lowest dose.

To sum up, inhalative exposure to the test substance only led to slight systemic toxicity; the histopathologic changes observed were typical of the inhalation of irritant substances. When comparing the species, the mouse proved to be more sensitive than the rat.

Test substance: Formic acid, approx. 95% with approx. 5% water

11-SEP-1995 (80) (81)

Species: Mouse **Sex:** No data
Strain: Swiss
Route of admin.: Dermal
Exposure period: 50 days
Frequency of treatment: Twice per week
Post. obs. period: None
Doses: No data
Control Group: Yes, concurrent no treatment
Method: Other
Year: **GLP:** No
Test substance: No data
Remark: The method is not acceptable and does not comply with current criteria. Moreover, documentation is inadequate. Therefore, the study cannot be assessed.
Result: Painting at the ear with 8% formic acid in mineral oil. As compared with tumor promotors (croton oil, Tween 60), no histopathologic or histomorphometric changes

11-SEP-1995 (83)

Species: Dog **Sex:** No data
Strain: No data
Route of admin.: Oral feed
Exposure period: No data
Frequency of treatment: Daily
Post. obs. period: No data
Doses: 500 mg/animal (?)
Control Group: No data specified
Method: Other: No data
Year: **GLP:** No
Test substance: No data
Result: No toxicity detected; no further data. Only secondary citation

06-SEP-1995 (59)

5.5 Genetic Toxicity 'in Vitro'

Type: Ames test
System of testing: Salmonella typhimurium TA98, TA100, TA1535, TA1537
Concentration: No data
Metabolic activation: With and without
Result:
Method: Other
Year: **GLP:** No data
Test substance: No data
Remark: Method: Spot test and plate incorporation assay. Bacteriotoxicity was detected; the authors do not make any statement about mutagenicity.
06-SEP-1995 (84)

Type	:	Ames test
System of testing	:	Salmonella typhimurium TA 1535, TA 100, TA 1537, TA 98
Concentration	:	up to 12,500 ug test substance per plate
Cycotoxic conc.	:	greater than 12,500 ug/plate in all strains
Metabolic activation	:	with and without
Result	:	negative
Method	:	OECD Guide-line 471 "Genetic Toxicology: Salmonella thyphimurium Reverse Mutation Assay"
Year	:	1983
GLP	:	yes
Test substance	:	other TS: purity > 99%
Source	:	Bayer AG Leverkusen Bayer Corporation Pittsburgh
Test condition	:	The following concentrations of calcium formate were tested: 20, 100, 500, 2500, and 12,500 ug/plate. Positive controls: Sodium azide (only TA 1535) Nitrofurantoin (only TA 100) 4-Nitro-1,2-phenylene diamine (only TA 1537 and TA 98) 2-Aminoanthracene Solvents used: Deionized water was used with calcium formate and DMSO was used with the positive controls. S9 mix was used for the stimulation of mammalian metabolism. It was made from the livers of adult male Sprague Dawley rats.
Reliability	:	(1) valid without restriction

07.11.2001 (85)

Type: Ames test
System of testing: Salmonella typhimurium TA97, TA98, TA100, TA1535
Concentration: 10, 33, 100, 333, 1000, 3333 ug/plate
Metabolic activation: With and without
Result: Negative
Method: Other: Haworth, S. et al.: Environ. Mutagen. 5, Suppl. 1, 3-142

Test were conducted in the absence or presence of Aroclor induced rat or hamster liver s-9 fraction at both 10 or 30% The preincubation protocol was used with 20 minute preincubation. Triplicate plates were incubated for 2 days and machine counted for revertants. Cytotoxicity is indicated in the table with an s for “slight clearing of the background lawn”.

RESULTS:

TA100	Metabolic Activation System									
	NA		10% HLI		30% HLI		10% RLI		30% RLI	
µg/Plate	MEAN	SE	MEAN	SEM	MEAN	SEM	MEM	SEM	MEM	SEM
0	151	11.0	171	3.2	159	9.2	162	5.1	162	9.1
10	164	8.4	175	3.8			157	12.2		
33	152	10.1	160	9.8	154	4.3	162	9.6	170	3.1
100	157	13.3	161	5.8	139	3.6	167	5.7	161	9.5
333	153	9.8	175	5.2	138	7.5	170	8.5	151	9.0
1000	125	15.3	165	15.0	111	3.5	157	7.9	112	10.7
3333					81s	4.6			46s	20.2
POS	316	3.5	657	5.1	399	4.9	599	23.1	497	17.5

TA1535	Metabolic Activation System									
	NA		10% HLI		30% HLI		10% RLI		30% RLI	
µg/Plate	MEAN	SE	MEAN	SEM	MEAN	SEM	MEAN	SEM	MEAN	SEM
0	26	2.4	9	1.7	8	2.5	11	1.0	18	1.2
10	21	2.7	11	1.3			13	2.6		
33	15	0.9	10	0.9	9	2.3	16	0.7	20	4.3
100	19	1.2	11	1.2	12	2.6	14	2.6	15	0.9
333	13	0.3	11	1.8	12	1.7	10	1.0	16	0.6
1000	13	0.6	12s	1.2	7s	1.2	10	2.1	7s	0.7
3333					4s	2.1			3s	1.5
POS	332	10.2	180	18.9	340	22.8	214	27.7	60	2.3

TA97	Metabolic Activation System									
	NA		10% HLI		30% HLI		10% RLI		30% RLI	
µg/Plate	MEAN	SEM	MEAN	SEM	MEAN	SEM	MEAN	SEM	MEAN	SEM
0	175	14.6	207	11.1	204	19.6	213	5.9	178	15.4
10	181	7.1	213	9.4			211	9.5		
33	182	9.2	214	9.7	214	7.8	214	3.5	191	9.4
100	180	10.5	206	1.8	213	12.5	201	24.8	182	4.4
333	179	9.5	222	2.1	196	16.2	203	10.4	188	17.6
1000	185	11.9	170	8.6	158s	10.7	153	5.2	109	7.2
3333					65s	6.7			85s	17.1
POS	403	11.1	463	15.8	451	19.6	449	10.1	454	25.6

TA98	Metabolic Activation System									
	NA		10% HLI		30% HLI		10% RLI		30% RLI	
µg/Plate	MEAN	SEM	MEAN	SEM	MEM	SEM	MEAN	SEM	MEAN	SEM
0	24	0.3	42	2.1	32	0.3	36	3.7	40	1.5
10	21	2.3	18	0.6			28	5.2		
33	17	1.0	22	2.8	31	1.2	33	5.4	35	4.0
100	20	2.0	42	9.4	26	0.3	30	4.8	31	1.5
333	14	0.3	33	4.0	26	0.6	23	1.5	23	2.3
1000	20	2.0	35	2.2	25	1.3	24	3.5	25	2.0
3333					11	1.5			7s	4.0
POS	1 423	27.7	202	16.0	147	9.3	202	10.9	83	7.3

Test is considered negative for all strains

Year: 1983 **GLP:** No
Test substance: No data
Test substance: Formic acid, approx. 95% with approx. 5% water
06-SEP-1995 (81) (86)

Type: Ames test
System of testing: TA100
Concentration: No data
Metabolic activation: With and without
Result: Negative
Method: Other: Based on Ames, B.N. et al.: Mutation Research 31, 347-364
Year: 1975 **GLP:** No data
Test substance: No data
06-SEP-1995 (87)

Type: Cytogenetic assay
System of testing: CHO-K1 cells
Concentration: 270, 360, 450, 540, 630 ug/ml (6-14 mM)
Metabolic activation: With and without
Result: Ambiguous
Method: Other
Year: **GLP:** No data
Test substance: No data
Remark: Chromosome aberrations were examined. The unbuffered or unneutralized acid was clastogenic at pH values around 6.0 (10-14 mM) and cytotoxic from pH 5.7 (12-16 mM). Clastogenicity is stopped by neutralization with NaOH or by increasing the buffer concentrations in the incubation medium. The authors conclude from this that it is not the substance as such that induces chromosome damage but that the latter is due to the acid pH of the incubation medium as a nonspecific effect.
06-SEP-1995 (88)

Type: Escherichia coli reverse mutation assay
System of testing: Escherichia coli Sd-4
Concentration: 50, 60, 65, 70, 75 ug/ml
Metabolic activation: Without
Result: Positive
Method: Other
Year: **GLP:** No
Test substance: No data
Remark: Weakly positive result (without S9 mix).
The number of bacteria was varied while the test substance concentration remained at almost the same level. The survival rate was reduced with a decrease in the bacterial count (from 100% at 1.5 x 10E9 bacteria up to 2.8% at 2.6 x 10E7). In parallel, the number of mutations was reduced with an increase in the survival rate.
06-SEP-1995 (89)

Type: Mouse lymphoma assay
System of testing: L5178Y mouse lymphoma cells
Concentration: No data
Metabolic activation: No data
Result:
Method: Other: No data
Year: **GLP:** No data
Test substance: No data
Remark: Within the NTP, a mutagenicity test is to be carried out in L5178Y mouse lymphoma cells. No results have been available so far.
07-DEC-1995 (90)

***Type:** Sister chromatid exchange assay
System of testing: Chinese hamster V79 cells
Concentration: 18.4, 27.6, 46.0, 92.0 ug/ml (0.4, 0.6, 1.0, 2.0 mM)
Metabolic activation: With and without
Result: Negative
Method:

SCE Tests were accomplished using Chinese Hamster V-79 cells. The test material was added to the cultures 18 hours after seeding 500,000 cells per culture flask. The cells were exposed for 28 hours in the absence and 3 hours in the presence of metabolic activation (Aroclor-1254 induced rat liver S-9). Clees were rinsed and cultured in the presence of BrdU for 28 hours and colcemide for the last 4 hours. Cells were harvested by shaking them off the flask, fixing on slides and staining. 25 metaphases with harlequin stained chromosomes were analyzed per experimental point and culture. Positive control was 10 mM DMN and gave the expected result.

Year: **GLP:** No data
Test substance: No data
Remark: No increased SCE frequency with and without S9 mix
08-SEP-1995 (91)

Type: Sister chromatid exchange assay
System of testing: Human lymphocytes
Concentration: 29 - 460 ug/ml (0.63 - 10 mM)
Metabolic activation: Without
Result: Negative
Method: Other
Year: **GLP:** No data
Test substance: No data

Method:

The culture medium was RPMI 1640 with 15 % fetal calf serum and 5-bromodeoxyuridine. Blood samples for whole-blood lymphocyte cultures were drawn from a healthy male donor, aged 34. For each culture, 6 ml of growth medium and 0.3 ml of whole blood were injected into a 20-ml

sterile air-tight glass ampoule.

All cultures were incubated for 24 h in 37°C before treatment. Test material was dissolved in growth medium and was injected into culture bottles at a volume of 0.4 ml, the final concentrations being 0.63-10 mM for formic acid (Merck, Darmstadt, Germany; 98-100% purity). Every treatment concentration was represented by two separate cultures. Control cultures were treated with a comparable amount of the solvent (medium or acetone) used. The cells were incubated for 48 h after treatment, making a total culture time of 72 h. Harvesting, slide preparation and fluorescence-plus Giemsa staining were performed as described earlier (Norppa et al., Cancer Res 45:4816,1985).

From each duplicate culture, 25-30 metaphases, if possible, were scored for SCEs. In order to evaluate the average number of replications completed by the cells in the culture the number of first-, second- and third-division cells were counted from 100 metaphases per culture. These "replication indices" (RIs) were calculated according to Bohlke et al. (Human Genetics 63:285-289, 1983). SCE scores from duplicate cultures were combined and analyzed statistically by the two-tailed t-test.

Remark: There was a statistically significantly increased in SCE frequency only in the highest concentration (10 mM); however, the pH is reduced by almost one unit due to the addition of formic acid at this concentration.

Test substance: Formic acid, 98-100%

11-SEP-1995 (92)

***Type:** Other: SOS chromotest
System of testing: Escherichia coli PQ37
Concentration: Up to the solubility limit, but maximally 100 mM (3-5 concentrations)
Metabolic activation: With and without
Result: Negative
Method: Other: Quillardet, P. and Hofnung, M.: Mutation Research 147, 65-78

E. coli PQ37 was incubated with 3-5 levels of formic acid for 2 hours in the absence or presence of a metabolic activation system (Aroclor 1254 induced male rats and male Syrian hamsters). After incubation with the test substance, beta-galactosidase activity was determined relative to alkaline phosphatase activity in the treated bacteria to estimate induction of the SOS gene. 124 different chemicals were reported on in this report and specific details and data are not provided for individual materials. Positive controls consisted of several compounds known to be positive in the Ames test and the performance of the SOS-chromotest was evaluated against these Ames-test results. Neither actual tested concentrations nor dose-response data were provided for most of the 124 chemicals tested, including formic acid.

Year: 1985 **GLP:** No data
Test substance: No data
Remark: In this test system, the SOS gene expression which is induced by DNA damage is measured.
06-SEP-1995 (93)

5.6 Genetic Toxicity 'in Vivo'

Type: Drosophila SLRL test
Species: Drosophila melanogaster **Sex:** Male/female
Strain: Other: Oregon-K
Route of admin.: Other: inhalation and oral feed
Exposure period: 24 h (inhal.); instar and 24 h after hatching (feed)
Doses: No data
Result:
Method: Other: Demerec, M.: Genetics 33, 337-348
Year: 1948 **GLP:** No
Test substance: No data
Remark: Positive after inhalative exposure and administration via the diet with mutation rates of 1.31 and 1.11% as compared with the control limit of 0.15% in each case. If the pH was buffered to 7.5 in the feeding study, there was no increased mutation rate.
06-SEP-1995 (94) (95)

5.7 Carcinogenicity

Species: Mouse **Sex:** No data
Strain: Swiss
Route of admin.: Dermal
Exposure period: 50 days
Frequency of treatment: Twice per week
Post. obs. period: None
Doses: No data
Result:
Control Group: Yes, concurrent vehicle
Method: Other
Year: **GLP:** No
Test substance: No data
Remark: The method is not acceptable and does not comply with current criteria. Moreover, documentation is inadequate. Therefore, the study cannot be assessed.
Result: Painting at the ear with 8% formic acid in mineral oil. As compared with tumor promotors (croton oil, Tween 60), no histopathologic or histomorphometric changes.
06-SEP-1995 (83)

Species: Rat **Sex:** Male/female
Strain: Wistar
Route of admin.: Drinking water
Exposure period: Lifelong (2-3 years)
Frequency of treatment: Continuously in the drinking water
Post. obs. period: None
Doses: 0.2 and 0.4% (= 150 - 200 mg/kg/d according to the authors)
Result:
Control Group: Yes, concurrent no treatment
Method: Other: No data
Year: **GLP:** No
Test substance: Other TS
Result: No neoplasias were observed. However, the conduct of the study does not comply with current requirements (6 animals per group). See also chapter: Toxicity after repeated administration
Test substance: Calcium formate
06-SEP-1995 (56)

Species: Rat **Sex:** No data
Strain: Wistar
Route of admin.: Drinking water
Exposure period: 1.5 years
Frequency of treatment: Continuously in the drinking water
Post. obs. period: None
Doses: 1% (= 274 mg/animal formate or 185 mg/animal calculated to formic acid according to the authors)
Result:
Control Group: No data specified
Method: Other: No data
Year: **GLP:** No
Test substance: Other TS
Result: No neoplasias were observed. However, the conduct of the study does not comply with current requirements (6 animals per group). See also chapter: Toxicity after repeated administration
Test substance: Sodium formate
11-SEP-1995 (56)

5.8 Toxicity to Reproduction

Type: Fertility
Species: Rat **Sex:** Male/female
Strain: Wistar
Route of admin.: Drinking water
Exposure Period: Up to 5th (0.2%) or 2nd (0.4%) generation
Frequency of treatment: Continuously in the drinking water
Premating Exposure Period
male: No data
female: No data
Duration of test: Over several generations
Doses: 0.2 and 0.4% (150-200 mg/kg/d according to the authors)
Control Group: Yes, concurrent no treatment
Method: Other: No data
Year: **GLP:** No
Test substance: Other TS
Remark: The conduct of the study does not comply with current criteria. Moreover, documentation is inadequate. Therefore, the study cannot be assessed.
Result: No influence on fertility or offspring over several generations. No indication of teratogenicity. The fertility of the dams, weight at birth and the weight gain of the offspring were measured.
Test substance: Calcium formate
06-SEP-1995 (56)

Type: Fertility
Species: Rat **Sex:** Male/female
Strain: Fischer 344
Route of admin.: Inhalation
Exposure Period: 13 weeks
Frequency of treatment: 5 days per week, 6 hours per day
Premating Exposure Period
male: No mating
female: No mating
Duration of test: 13 weeks
Doses: 0.015, 0.061, 0.244 mg/l (8, 32, 128 ppm)
Control Group: Yes, concurrent no treatment
Method: Other
Year: **GLP:** Yes
Test substance: No data
Remark: 10 males and 10 females were used per group. The investigation was carried out together with a subchronic study (see chapter 5.4). The weight of the left epididymis, sperm motility and concentration or vaginal cytology and estrous cycles were determined.
Result: Formic acid had no effects on sperm motility, sperm concentration, testicular and epididymal weights or on the duration of the estrous cycles due to exposure.
Test substance: Formic acid, approx. 95% with approx. 5% water
08-SEP-1995 (80) (81)

Type: Fertility
Species: Mouse **Sex:** Male/female
Strain: B6C3F1
Route of admin.: Inhalation
Exposure Period: 13 weeks
Frequency of treatment: 5 days per week, 6 hours per day
Premating Exposure Period
male: No mating
female: No mating
Duration of test: 13 weeks
Doses: 0.015, 0.061, 0.244 mg/l (8, 32, 128 ppm)
Control Group: Yes, concurrent no treatment
Method: Other
Year: **GLP:** Yes
Test substance: No data
Remark: 10 males and 10 females were used per group. The investigation was carried out together with a subchronic study (see chapter 5.4). The weight of the left epididymis, sperm motility and concentration or vaginal cytology and estrous cycles were determined.
Result: Formic acid showed no effects on the testicular and epididymal weights or on the duration of the estrous cycles due to exposure. On account of the high motility value of

the control group, sperm motility was reduced in all exposure groups. No substance-induced influences were detected as compared with the historical control.

Test substance: Formic acid, approx. 95% with approx. 5% water

08-SEP-1995 (80) (81)

5.9 Developmental Toxicity/Teratogenicity

Species: Mouse **Sex:** Female
Strain: CD-1
Route of admin.: Gavage
Exposure period: 8th day of gestation
Frequency of treatment: Single dose
Duration of test: Up to the 10th or 18th day of gestation
Doses: 750 mg/kg/d
Control Group: Yes, concurrent vehicle
Method: Other
Year: **GLP:** No data
Test substance: Other TS
Result: In a pilot study, sodium formate was administered in doses of 25, 250, 500 and 750 mg/kg to CD-1 mice by gavage on the 8th day of gestation. The aim was to determine the formate dose necessary to generate a formate concentration in the blood which is achieved after the inhalation of 10,000 ppm methanol for 6h/d. This blood formate concentration was reached at 750 mg/kg.

In the main study with 750 mg/kg, maximally maternal formate concentrations were obtained in the plasma (1.05 mM) and decidua (2 mmol/kg) which were comparable with those after inhalative methanol exposure (10,000 or 15,000 ppm, 6h/d). No significantly increased incidence of CNS defects (open anterior neural tubes) were observed. The red blood count and the decidua folate concentration were unchanged.

The study was carried out to determine the proximal teratogen after exposure to methanol. According to the authors, the present study showed that methanol itself rather than the metabolite formate induced teratogenicity (exencephaly) in pregnant CD-1 mice which were exposed to high methanol concentrations.

Test substance: Sodium formate

30-OCT-1995 (96)

Species: Rat **Sex:** No data
Strain: Sprague-Dawley
Route of admin.: Other: In vitro incubation in WEC (whole embryo culture)
Exposure period: 48 h incubation
Frequency of treatment: Single dose
Duration of test: 48 h
Doses: 200, 400, 800, 1200, 1600 ug/ml
Control Group: Yes, concurrent no treatment
Method: Other
Year: **GLP:** No data
Test substance: Other TS
Result: The effect of the pH (8.13, 7.75, 7.00, 6.50 and 6.00) on the in vitro teratogenicity of sodium formate (0.2, 0.4, 0.8, 1.2 and 1.6 mg/ml) was investigated in rat embryo cultures (Sprague-Dawley rats, day 9.5 of gestation). Numerous embryonic developmental parameters showed that even the decreasing pH had an influence on embryonic development in this test system. In the highest concentration, the parameters crown-rump length (CRL), head length (HL), somite number (SN), developmental score (DS) and protein concentration were significantly reduced in the incubation medium regardless of the pH. At a test substance concentration of 0.8 and 1.2 mg/ml, these parameters were significantly reduced at a low pH. At a test substance concentration of 0.4 and 0.2 mg/ml, CRL, HL and the protein concentration were still significantly reduced at a pH of 6.5 in the medium. To sum up, a dependence of the embryonic developmental parameters and of embryolethality both on the formate concentration and on the pH in the incubation medium was demonstrated in this test system.
Test substance: Sodium formate
30-OCT-1995 (97)

Species: Rat **Sex:** No data
Strain: Sprague-Dawley
Route of admin.: Other: In vitro incubation in WEC (whole embryo culture)
Exposure period: 24 and 48 h incubation
Frequency of treatment: Single dose
Duration of test: 24 and 48 h
Doses: 200, 400, 800, 1200, 1600, 2000 ug/ml (sodium formate) and 140, 270, 540, 810, 1080 ug/ml (formic acid)
Control Group: Yes, concurrent no treatment
Method: Other
Year: **GLP:** No data
Test substance: Other TS
Result: Rat embryo cultures (9th day of gestation) were treated with the test substances. The pH of the medium was no longer corrected after addition of the test substance. Both after 24- and after 48-h incubation with sodium formate, there was a significant and concentration-dependent reduction of the developmental parameters yolk sac diameter (YSD), crown-rump length (CRL), head length (HL), somite number (SN) and developmental score (DEVSC). Embryolethality was significantly increased only in the highest concentration after 48-h incubation. The number of anomalies (mainly CNS: open anterior and posterior neuropores and erratic neurorrhaphy) was significantly increased at 1.6 and 2.0 mg/ml after 24 h and at 0.8 and 2.0 mg/ml after 48-h incubation. The protein and DNA levels showed a significant and concentration-dependent reduction. Incubations with formic acid also showed a significant and concentration-dependent reduction of YSD, CRL, HL, SN and DEVSC after 24-h incubation and of CRL, HL, SOM and DEVSC after 48 h. Embryolethality was significantly increased in the highest concentration after 24 h and in the two highest concentrations after 48 h. Protein and DNA concentrations showed significant and concentration dependent decreases in both cases. The number of anomalies (open anterior and posterior neuropores, rotatory defects and enlarged maxillary process) showed a significant increase only at 0.81 mg/ml after 48-h incubation.
To sum up, concentration-dependent embryotoxic and dysmorphic changes were detected in the culture both using formate and formic acid in this test system.
Test substance: Formic acid and sodium formate
30-OCT-1995 (98) (99)

Species: Mouse **Sex:** No data
Strain: CD-1
Route of admin.: Other: In vitro incubation in WEC (whole embryo culture)
Exposure period: 5 h incubation
Frequency of treatment: Single dose
Duration of test: 5 h
Doses: 45 ug/ml (1 mM)
Control Group: Yes
Method: Other
Year: **GLP:** No data
Test substance: Other TS
Result: The incubation of CD-1 mouse embryo cells (11th day of gestation) in vitro in serum-free medium with 1mM Na formate only led to a very slight, nonsignificant impairment of 3H-thymidine incorporation. Furthermore, the substantial reduction of thymidine incorporation by the teratogenic substance methoxyacetic acid was considerably weakened after the joint incubation with 1mM Na formate.
Test substance: Sodium formate
23-OCT-1995 (100)

Species: Mouse **Sex:** No data
Strain: CD-1
Route of admin.: Other: In vitro incubation in WEC (whole embryo culture)
Exposure period: 24 h incubation
Frequency of treatment: Single dose
Duration of test: 24 h
Doses: 400, 800, 1600, 2000, 3000 ug/ml (sodium formate) and 270, 540, 810, 1600, 2000 ug/ml (formic acid)
Control Group: Yes, concurrent no treatment
Method: Other
Year: **GLP:** No data
Test substance: Other TS
Result: Mouse embryo cultures (8th day of gestation) were treated with the test substances. The pH of the medium was no longer corrected after the addition of the substances. Both with sodium formate and with formic acid, there was a significant and concentration-dependent reduction of the developmental parameters yolk sac diameter (YSD), crown-rump length (CRL), head length (HL), somite number (SN) and developmental score (DEVSC). Embryolethality was not significantly increased in the case of the incubation with sodium formate; there was a significant incidence of anomalies of the CNS (open anterior and posterior neuropores and erratic neurorrhaphy), enlarged pericardium, enlarged maxillary process and retardation in heart development. In the case of the incubation with formic acid, embryolethality was significantly increased in the three highest concentrations; the number of anomalies was significantly increased from a concentration of >=0.54 mg/ml

and was 100% at 1.6 mg/ml. There was a significant and concentration-dependent reduction of protein and DNA concentrations both with sodium formate and with formic acid. YSD, CRL, HL, SOM and DEVSC showed a significant trend to reduction.
To sum up, concentration-dependent embryotoxic and dysmorphic changes were detected in the culture both using formate and formic acid in this test system. In a species comparison with the rat (see entry before), there were no quantitative or qualitative differences.

Test substance: Formic acid and sodium formate

30-OCT-1995 (98) (99)

Species: Mouse **Sex:** No data
Strain: CD-1
Route of admin.: Other: In vitro incubation in WEC (whole embryo culture)
Exposure period: 12 h incubation
Frequency of treatment: Single dose
Duration of test: 12 h
Doses: 180, 360, 540, 900, 1800 ug formate/ml (4, 8, 12, 20, 40 mM)
Control Group: Yes
Method: Other: Cockroft, D.L., in: Copp, A.J. and Cockroft, D.L. (eds.): Postimplantation Mammalian Embryos - A Practical Approach. IRL Press, Oxford, pp. 15-40
Year: 1990 **GLP:** No data
Test substance: Other TS
Result: Mouse embryo cultures (8th day of gestation) were treated with the test substances. The pH of the medium was no longer corrected after the addition of the substances. There was a significant and concentration-dependent reduction of the developmental parameters yolk sac diameter and crown-rump length. Relative embryonic growth and rotation (75% turning in the embryos treated with the test substance as compared with 90% in the control) were retarded. Moreover, concentration-dependent dysmorphogenic effects, such as dysraphia (incomplete closure of the cranium) with a high and significant incidence only in the highest concentration and a developmental disorder of the neural fold were detected.

Test substance: Sodium formate

30-OCT-1995 (96)

Species: Rat **Sex:** No data
Strain: No data
Route of admin.: Other: In vitro whole embryo culture
Exposure period: 48 h incubation
Frequency of treatment: Single dose
Duration of test: 48 hours
Doses: 0-2 mg/ml
Control Group: Yes
Method: Other: No data
Year: **GLP:** No data
Test substance: Other TS
Remark: Effects of the combination of formic acid and methanol were investigated in the whole embryo culture. Gestational day-9 rat embryos were exposed to various concentrations of methanol and formic acid and the degree of embryotoxicity was compared following 48 h of exposure using the developmental score (DEVSC). Increasing concentrations of either methanol or formate resulted in significant decreases in DEVSC. Exposure to the combination of methanol and formate was less toxic than would have been expected based on the single concentration additivity which suggested an antagonistic activity. This observation was found for embryonic crown length, head length, somite number and DNA concentration.
Test substance: Formic acid, probably neutralized, no further data
29-JUL-1997 (101)

Species: Rat **Sex:** No data
Strain: Sprague-Dawley
Route of admin.: Other: In vitro whole embryo culture
Exposure period: 48 h incubation
Frequency of treatment: Single dose
Duration of test: 48 h
Doses: 0.141-1.055 ul/ml (3.74-27.96 umol/ml)
Control Group: Yes
Method: Other: New, D.A.T., The Mammalian Fetus in Vitro, 15-65, CR Austin (ed), Chapman and Hall, London
Year: 1973 **GLP:** No data
Test substance: Other TS
Remark: In the study, the embryotoxicity of methanol and formic acid was evaluated using rat embryo culture. Rat embryos were explanted on day 10 of gestation and cultured. The results obtained showed that both methanol and formic acid have a concentration-dependent embryotoxic effect on the developing embryo in vitro. The no-effect concentration of formic acid was 7.74 umol/ml while a concentration of 18.66 umol/ml was associated with severe embryotoxicity. When embryos were grown in sera containing 18.66 umol sodium formate/ml or in sera adjusted with hydrochloric acid to pH values similar to those achieved with formic acid, the results indicated that both a low pH and formate contributed to the embryotoxicity of formic acid. The authors concluded that embryotoxicity due

to a low pH or a high formate level would occur only after severe methanol intoxication.
Test substance: Formic acid (89-91%), sodium formate
29-JUL-1997 (102)

Species: Rat **Sex:** Female
Strain: Sprague-Dawley
Route of admin.:
Exposure period: Day 9 of gestation
Frequency of treatment:
Duration of test: 48 hours
Doses: 1.51 mg/ml
Control Group: Yes
Method: Other: In vitro incubation in whole embryo culture (WEC)
Year: 1998 **GLP:** No data
Test substance: Other TS
16-MAY-2000

5.10 Other Relevant Information

Type: Adsorption
Remark: Skin penetration; no data usable directly
06-SEP-1995 (103)

Type: Biochemical or cellular interactions
Remark: Title: An in vitro method for predicting sensitizing properties of inhaled chemicals
06-SEP-1995 (104)

Type: Biochemical or cellular interactions
Remark: The authors investigated the concentrations of 10-formyltetrahydrofolate dehydrogenase (FTHFDH) in tissue preparations of the retina, optical nerve and brain of the rat. Here, the authors observed FTHFDH concentrations that suggest high metabolic capacity of the target organs for formic acid. According to the authors, this might be an explanation for the absence of an ocular effect of formic acid (formate toxicity) in the rat.
08-SEP-1995 (105)

Type: Biochemical or cellular interactions
Remark: The study compared the effects on retinal function and structure of rapidly increasing formate concentrations typical of acute methanol intoxication with low level plateau formate concentrations more likely to be generated by subacute or chronic methanol exposure. Anesthetized rats received i.p. injections of methanol at doses of 4 g/kg followed by supplemental injections of 2 g/kg and 1 g/kg respectively at 12-hour intervals. These dosage regimens were designed to maintain blood formate

concentrations ranging from 8-15 mM or 4-6 mM for 30-40 h. Rats that accumulated the hight formate concentration of 8-15 mM developed metabolic acidosis, retinal dysfunction (reductions in a and b waves of the ERG), and retinal histopathologic changes (vacuolation in the retinal pigment epithelium and photoreceptor inner segments). Rats exposed to 4-6 mM for 48 h showed evidence of retinal dysfunction in the absence of metabolic acidosis and retinal histopathology.

Test substance: Methanol, HPLC grade

29-JUL-1997 (106)

Type: Cytotoxicity
Remark: Title: An evaluation of the utility of four in vitro short term tests for predicting the cytotoxicity of individual compounds derived from tobacco smoke

06-SEP-1995 (107)

Type: Cytotoxicity
Remark: Title: Cytotoxicity of carbohydrates heavily irradiated in solution

06-SEP-1995 (108)

Type: Cytotoxicity
Remark: Title: Formic Acid poisoning: Case report and in vitro study of the hemolytic activity

06-SEP-1995 (109)

Type: Cytotoxicity
Remark: Title: Cytotoxicity Testing of 114 Compounds by the Determination of the Protein Content in HEP G2 Cell Cultures

06-SEP-1995 (110)

Type: Excretion
Remark: The urine specimens of 12 male farmers who were exposed to formic acid in a concentration of 0.0073+/-0.0022 mg/l were examined. Immediately after exposure, the excretion of formic acid was not increased as compared with the control group. After 15 and 30 hours, however, there were substantial and significantly increased concentrations of formic acid in the urine of the persons exposed (factor 2.1 and 3.3). Excretion showed a linear dependence on the exposure concentration. The pH in the urine was unchanged, but the ammonium and calcium excretion was significantly increased 30 hours after exposure.

Test substance: Formic acid

08-SEP-1995 (111) (112)

Type: Metabolism
Remark: The following text generally describes the metabolism of formic acid. The citations on which it is based are listed separately with the titles of the studies.
Formic acid is absorbed well via all routes of administration. As a metabolite, it is partially metabolized into CO2 and expired and partially excreted unchanged in the urine in concentrations of 11.7-60 mg/l. The biologic half-life is between 15 minutes and 1 hour:

Formic acid is absorbed from the gastrointestinal tract, via the lungs and the intact skin. The absorbed substance is degraded to carbon dioxide (CO2) and water and is partially excreted unchanged in the urine. The major part of the absorbed formic acid is metabolized in the liver, but partially also in the intestinal mucosa, lungs, kidneys and spleen. Formic acid is oxidized in relation to folate and according to a katalase-peroxidative mechanism. The half-lives of sodium formate in the blood are 12-23, 31-51 and 55 minutes in rats, monkeys and in humans. Formic acid is metabolized into CO2 considerably more slowly in primates than in rats. The species sensitivity to methanol intoxication (metabolic acidosis caused by formic acid) is possibly dependent on the tetrahydrofolate concentration.
08-SEP-1995

Type: Metabolism
Remark: Title: Evaluation of the Health Aspects of Formic Acid, Sodium Formate, and Ethyl Formate as Food Ingredients
06-SEP-1995 (50)

Type: Metabolism
Remark: Title: Kinetics and toxic effects of repeated intravenous dosage of formic acid in rabbits
06-SEP-1995 (113)

Type: Metabolism
Remark: Title: Studies on Methanol toxicity and formate metabolism in isolated hepatocytes
06-SEP-1995 (114)

Type: Metabolism
Remark: Title: Urinary Formic Acid as an indicator of occupational exposure to Formic Acid and Methanol
06-SEP-1995 (115)

Type: Metabolism
Remark: Title: Urinary Excretion of Formic Acid in rabbits
06-SEP-1995 (116)

Type: Metabolism
Remark: Title: Accumulation of Formic Acid in rabbits after daily dosages
06-SEP-1995 (117)

Type: Metabolism
Remark: Title: Pharmacokinetic and deuterium isotope effect studies on the metabolism of formaldehyde and formate to carbon dioxide in rats in vivo
06-SEP-1995 (118)

Type: Metabolism
Remark: Title: Formate in urine as a biological indicator of formaldehyde exposure: A review
06-SEP-1995 (119)

Type: Metabolism
Remark: Title: Formic-Acid excretion in urine as a biological monitoring parameter in areas with different air-pollution
06-SEP-1995 (120)

Type: Metabolism
Remark: Title: Die akute und chronische Toxizitaet der Ameisensaeure und ihrer Formiate
06-SEP-1995 (56)

Type: Metabolism
Remark: Title: Effect of Renal Formic Acid Excretion on Urinary Calcium and Ammonia Concentrations
06-SEP-1995 (121)

Type: Neurotoxicity
Remark: The authors investigated morphologic lesions caused by sodium formate in cell cultures (primary cerebrocortical fetal mouse cells). According to the authors, information on neurotoxicity, gliotoxicity and cytotoxicity is to be obtained from the lesions investigated. Thus, sodium formate showed specific neurotoxicity in concentrations up to 60 mM (2,760 ug/ml) with lesions mainly in the larger polygonal neurons. Concentrations higher than 120 mM (5,520 ug/ml) led to nonspecific cytotoxicity. Furthermore, changes of the membrane integrity were examined via the release of lactate dehydrogenase and 14C-adenine nucleotides and the metabolic activity of the mitochondria.
Test substance: Sodium formate
08-SEP-1995 (122) (123)

Type: Neurotoxicity
Remark: Formic acid was indicated as the neurotoxic metabolite of methanol.
28-JUL-1997 (124)

Type: Toxicokinetics
Remark: The dose-dependent elimination of formate was investigated in the rat using both in vitro and in vivo systems. The in situ perfused liver was used to define the kinetics of hepatic metabolism and obtain initial in vitro estimates of the hepatic metabolism parameters. Formate was eliminated from the perfused rat liver following the Michaelis-Menten kinetics. Estimates of the Michaelis-Menten parameters obtained from the perfused liver studies were used in a two-compartment pharmacokinetic model of the dose-dependent elimination of formate in vivo. A good fit of the model to the observed in vivo data was obtained. Initial estimates of the Michaelis-Menten parameters, Vmax and Km, obtained from the perfused liver model, were within 40% of the final fitted values of these parameters in the in vivo model.
Test substance: Sodium formate, no further data
29-JUL-1997 (125)

Type: Other
Remark: Title:
"A new in vitro method to determine the corrosivity potential of surfactants and surfactant-based formulations"
Test substance: Formic acid
08-SEP-1995 (126)

Type: Other
Remark: Title:
"Penetration of Industrial Chemicals Across the Skin: A Predictive Model"

On the basis of a model system, the test substance was classified as having a toxicologic potential after dermal application.
Test substance: Formic acid
08-SEP-1995 (127)

Type: Other
Remark: For the validation of a new screening test for skin and eye irritation, conventional pretests were carried out with formic acid, among others. In an open patch test in rats and mice, the test substance showed moderate to severe skin irritation in a 10-12% dilution after a dose applied of 100-120 mg/kg. In an intradermal skin irritation test in rats and mice with 2-3% formic acid, similar effects were obtained with doses of 1-1.5 and 10-15 mg/kg. In an eye irritation test in rats and mice with 5-6% formic acid, moderate to severe effects were observed in doses of 2.5-3 and 25-30 mg/kg.

Test substance: Formic acid
08-SEP-1995 (128)

Type: Other
Remark: Title: the role of formate in methanol-induced exencephaly in CD-1 mice
15-MAY-2000 (129)

Type: Other: Carcinogenicity in vitro
Remark: Formic acid did not show any effect on the metabolic cooperation in Chinese hamster V79 lung fibroblasts.
06-SEP-1995 (130)

Type: Other: Chicken egg test
Remark: The method is not acceptable. Moreover, documentation is inadequate. Therefore, the study cannot be assessed.
Result: Sodium formate was injected into the air space of incubated chicken eggs (5, 10 or 20 mg/egg) and these eggs were incubated further up to the 16th day. There was no increased mortality of the embryos. The survival rate was at the same level as that of the controls. The final weights of the embryos of the eggs treated with sodium formate do not reveal any deviations. Sodium formate that was completely eliminated after 10-12 days of incubation, preferably by oxidation, showed no abnormalities with regard to teratogenicity in the incubated chicken egg. As compared with the untreated controls (n=1051), there was no change in the incidence of malformations either quantitatively or qualitatively.
Test substance: Sodium formate
11-SEP-1995 (56)

Type: Other: Human data
Remark: Occupational health study
10 employees in the formic acid filling plant and in the production of urea formaldehyde resin. Inhalation of methanol (40-160 ppm) and formic acid (2-5.5 ppm) at the workplace. Urine concentration of formic acid 16 h after exposure: 21.2-118 mg/g creatinine
07-DEC-1995 (115)

Type: Other: Human data
Remark: Occupational health study
13 farmers when handling silage solution (approx. 80% formic acid)
Increased urine concentration of formic acid 15 h after exposure
(131)

Type: Other: Human data
Remark: Occupational health study
Employees in a textile factory
Formic acid concentration in the air approx. 15 ppm
Subjective complaints about nausea
06-SEP-1995 (132)

Type: Other: Human data
Remark: Case report
45 cases of ingestion of formic acid. Abdominal pain, vomiting, hematemesis, dysphagia, dyspnea, burns in the gastrointestinal tract with subsequent strictures, coagulation disorders, pneumonia, acute kidney failure and hepatic dysfunction. After ingestion of 45-200 g formic acid, 9 of 16 patients died after perforations in the gastrointestinal tract and 5 died of acute kidney failure.
06-SEP-1995 (133)

Type: Other: Human data
Remark: Case report
53 cases of ingestion of formic acid. Burns of the gastrointestinal tract with esophagus strictures, pneumonia, kidney failure, hypotension and unconsciousness
06-SEP-1995 (134)

Type: Other: Human data
Remark: Case report
3 deaths after ingestion of formic acid. Burns in the gastrointestinal tract, metabolic acidosis, coagulation disorders, hemorrhage, shock, hemolysis, respiratory insufficiency and kidney failure. Methemalbumin level 143 mg% (normally 6 mg%) in the blood
06-SEP-1995 (135)

Type: Other: Human data
Remark: Case report
2 cases of ingestion of formic acid. Irritation, edema, blistering and necrosis of the oropharyngeal mucosa. It was not possible to detect formic acid in the blood or Urine; no methemoglobinemia
06-SEP-1995 (136)

Type: Other: Human data
Remark: Case report
1 death after ingestion of formic acid (approx. 200 ml of an approx. 50% solution). Blood levels of 348 ug/ml of formic acid approx. 2 h after ingestion. Hematemesis, cyanosis, burns in the gastrointestinal tract, shock, metabolic acidosis and hemolysis. In vitro investigation: Hemolysis by acidity
06-SEP-1995 (109)

Type: Other: Human data
Remark: Case report
1 death after the ingestion of formic acid. Hypotension, respiratory insufficiency, coagulation disorders and kidney failure.
06-SEP-1995 (137)

Type: Other: Human data
Remark: Case report
1 case of a local effect of conc. formic acid on the skin. Burns of the legs with subsequent cicatricial changes. Systemic effects: Nausea, vomiting, metabolic acidosis, hemolysis and hemoglobinuria.
06-SEP-1995 (138)

Type: Other: Human data
Remark: Case report
1 case of a local effect of formic acid on the eye. Swelling and opacity of the cornea, pain, lacrimation and contraction of the pupils.
06-SEP-1995 (139)

Type: Other: Mitoses
Remark: Formamide acid 0.1M, 21 hours produce in Pleurodele eggs a dissociation of spindle fibers appears around agglutinated chromosomes.
16-MAY-2000 (140)

Type: Other: Occupational Regulation
Remark: Title: 'Brief introduction to occupational exposure limits in Japan.' In the article, an occupational exposure limit of 5 ppm (9.4 mg/m3) was recommended for formic acid.
Test substance: Formic acid
29-JUL-1997 (141)

Type: Other: QSAR
Remark: Title:
"Quantitative structure activity relationships for skin corrosivity of organic acids, bases and phenols"
Test substance: Formic acid
08-SEP-1995 (142)

Type: Other: Review
Remark: Summary presentations
07-DEC-1995 (70) (50) (143) (144) (51) (71) (72) (52) (73) (59) (145)

Type: Other: Review
Remark: Formic acid irritates the eyes and nasal and pharyngeal mucosas. Direct contact may lead to severe burns to the skin and eyes and in the mouth and pharynx after oral intake. Nausea, vomiting, hemorrhage, acidosis, hemolysis and damage to the heart and central nervous system may occur.
06-SEP-1995 (146)

Type: Other: Review
Remark: One case of an esophagus burn in a child, among others
06-SEP-1995 (147)

Type: Other: Mode of action
Remark: The administration of formic acid in a nonspecified dose to rabbits, dogs and monkeys (presumably via the feed) led to the same histopathologic changes of the retina and the optic nerve as methanol. Acidosis occurred. The authors speculate that the toxic effects might be due to the metabolism of methanol to formic acid via general acidosis. The study is only available as an abstract and the results cannot be assessed.
06-SEP-1995 (76)

Type: Other: Acute toxicity in vitro
Remark: An in vitro model system with Saccharomyces cerevisiae was tested with a total of 160 substances for its suitability as an in vitro model for the determination of the acute toxicity. According to the authors, the IC50 values determined (50% growth inhibition) correlated well with the LD50 values from the literature.
Test substance: Formic acid
08-SEP-1995 (148) (149)

Type: Other: Blood levels
Remark: The formate concentrations were investigated in the blood of 6 volunteers who were administered 200 mg/kg aspartame orally. At the beginning of the study, the formate concentrations were 1.91 +/- 0.61 mg/100 ml, on an average.
Test substance: Aspartame, formic acid
07-DEC-1995 (150)

Type: Other: Blood levels
Remark: The formate concentrations in the blood and urine were investigated in 20 print workers. The aim was to investigate whether the formate concentrations measured allow conclusions to be drawn about the exposure to methanol in the air; the methanol concentrations measured in the respiratory air were 85, 101 and 134 ppm. The formate concentrations in the blood of the workers increased significantly from 3.2 +/- 2.4 mg/l before the beginning of the shift (in the morning) to 7.9 +/- 3.2 mg/l after the shift (in the evening). The specific formate concentrations in the urine increased from 13.1 +/- 3.9 mg/l to 20.2 +/- 7 mg/l. Compared with this, the formate concentrations in the blood of the control persons showed a slight decrease from 5.6 +/- 4.5 mg/l in the morning to 4.9 +/- 4.2 mg/l in the evening; the specific formate concentrations in the urine were 11.9 +/- 6.4 mg/l in the morning and 11.7 +/- 5.6 mg/l in the evening. There was a great interindividual variability of the formate concentrations. According to the authors, the measurement

of the formate concentration in the blood and urine is an important parameter for monitoring the exposure of workers to methanol.
Test substance: Methanol, formic acid
07-DEC-1995 (151)

Type: Other: Final report on the safety assessment of formic acid
Test substance: Formic acid
16-MAY-2000 (152)

Type: Other: Review
Remark: Summary literature
08-SEP-1995 (153) (154)

Type: Other: Review
Test substance: Formic acid
28-JUL-1997 (155)

Type: Other: Review
Remark: Formic acid, draft
15-MAY-2000 (156)

Type: Other: Review - safety assessment
Remark: Final report on the safety assessment of formic acid
15-MAY-2000 (157)

Type: Other: Skin irritation test in vitro
Remark: In an in vitro test system (bovine udder) various substances severely irritating to the skin were investigated. After 2 hours, the tissue was examined biochemically (cytotoxicity and eicosanoid concentrations) and histopathologically. The substances examined had distinct effects on the prostaglandin E2 concentration and on histopathology. According to the authors, further investigations must be carried out to clarify whether slightly skin-irritating substances are also identified in this in vitro test system.
Test substance: Formic acid, 25%
08-SEP-1995 (158)

5.11 Experience with Human Exposure

Remark: Overview: One case of an esophagus burn in a child, among others
(159)

Remark: Overview: Formic acid irritates the eyes and nasal and pharyngeal mucosas. Direct contact may lead to severe burns to the skin and eyes and in the mouth and pharynx after oral intake. Nausea, vomiting, hemorrhage, acidosis, hemolysis and damage to the heart and central nervous system may occur.
(160)

Remark: Occupational health study: When handling silage solution (approx. 80% formic acid), 13 farmers showed an increased concentration of formic acid in the urine 15 h after exposure. (161)

Remark: Occupational health study: After the inhalation of methanol (40-160 ppm) and formic acid (2-5.5 ppm), 10 employees in the formic acid filling plant and in the production of urea formaldehyde resin showed formic acid concentrations of 21.2-118 mg/g creatinine in the urine 16 h after exposure. (162)

Remark: Occupational health study: Employees of a textile factory complained about nausea at concentrations of formic acid of approx. 15 ppm in the air. (163)

Remark: Case report: 45 cases of ingestion of formic acid were described. Abdominal pain, vomiting, hematemesis, dysphagia, dyspnea, burns in the gastrointestinal tract with subsequent strictures, coagulation disorders, pneumonia, acute kidney failure and hepatic dysfunction occurred. After ingestion of 45-200 g formic acid, 9 of 16 patients died after perforations in the gastrointestinal tract and 5 died of acute kidney failure. (164)

Remark: Case report: 53 cases of ingestion of formic acid are described. Burns of the gastrointestinal tract with esophagus strictures, pneumonia, kidney failure, hypotension and unconsciousness occurred. (165)

Remark: Case report: 5 deaths after ingestion of formic acid are described. Burns in the gastrointestinal tract, metabolic acidosis, coagulation disorders, hemorrhage, shock, hemolysis, respiratory insufficiency and kidney failure occurred. The methemoglobin level was 143 mg% (normally 6 mg%) in the blood. (166)

Remark: Case report: 2 cases of ingestion of formic acid are reported. Irritation, edema, blistering and necrosis of the oropharyngeal mucosa occurred. It was not possible to detect formic acid in the blood or urine. There was no methemoglobinemia. (167)

Remark: Case report: One death is reported after ingestion of formic acid (approx. 200 ml of an approx. 50% solution). The blood level is 348 ug/ml formic acid approx. 2h after ingestion. Hematemesis, cyanosis, burns in the gastrointestinal tract, shock, metabolic acidosis and hemolysis occurred.
(168)

Remark: Case report: One death is reported after ingestion of formic acid with hypotension, respiratory insufficiency, coagulation disorders and kidney failure.
(169)

Remark: Case report: One case of a local effect of conc. formic acid on the skin with burns of the legs with subsequent cicatricial changes and nausea, vomiting, metabolic acidosis, hemolysis and hemoglobinuria is reported.
(170)

Remark: Case report: One case of a local effect of formic acid on the eye with swelling and opacity of the cornea, pain, lacrimation and contraction of the pupils is reported.
(171)

Remark: 12 farmers were exposed to an average of 7.3 mg/m3/8h formic acid when handling silage. =0 h after exposure, renal ammonia formation and calcium were increased in the urine.
(172)

Remark: The mean concentration of formic acid in the urine is reported to be 21 mg/l for female and male adults between 20 and 80 years.
(173)

Remark: Case report: After splashing of a drop (0.8 ml 90% formic acid and 0.2 ml 30% hydrogen peroxide) into the eye, there was swelling of the conjunctiva and cornea with complete reversibility after 36-60 hours.
(174)

Remark: From 1989-93, a total of 3 cases of skin and/or eye corrosions after accidental local exposure to formic acid were referred to hospital for further treatment.
(175)

Remark: Twelve male farmers were exposed to 7.3 + 2.2 mg formic acid/m3 for 8 h in silage making. Each gave urine samples immediately, 15h and 30h after the end of the exposure. The excretion of formate was linearly related to the exposure 15 and 30h after exposure. Exposure increased renal ammoniagenesis and urinary calcium at 30h post exposure. Both biochemical effects may be explained by the interaction of formic acid with the oxidative metabolism of renal tubular cells, as formic acid is a known inhibitor of cytochrome oxidase.
25-MAR-1997 (176)

Remark: Report on use of urinary formic acid as a biologic exposure index of methanol exposure.
25-MAR-1997 (177)

Remark: Report on absence of formic acid accumulation in urine following five days of methanol exposure.
25-MAR-1997 (178)

Remark: Report on formic acid excretion in the urine of persons environmentally and occupationally exposed to formaldehyde.
25-MAR-1997 (179)

Remark: Ingestion of over 60 g of formic acid by an adult is potentially fatal. A case of a 36-year-old woman with a history of depression who ingested 110 g of formic acid is reported. She survived a complicated intensive care hospitalization following usage of intravenous folinic acid, urinary alkalinization, intravenous furosemide and supportive care. It is suggested to minimize formate toxicity by enhancing hepatic formate degradation via the folinic acid ¤one carbon pool¤ and by enhanced renal elimination of formate.
25-MAR-1997 (180)

Remark: Systemic toxicity developed in a 3-year-old girl burned by formic acid over 35% of her total body surface area. The patient presented with profound metabolic acidosis and a serum formate level of 400 óg/ml, the highest reported in the literature for poisoning by any route. The patient was successfully treated with hemodialysis, IV bicarbonate, and supportive measures.
25-MAR-1997 (181)

Remark: After inhalation of 200 ppm methanol for 4 h in 22 subjects serum methanol conc. were increased by more than fourfold, as were urinary methanol excretion rates, although formate conc. were not increased over background conc.
25-MAR-1997 (182)

Remark: A case in which a patient sustained an inhalation injury as a result of aerosolized formic acid is reported. The patient sustained a partial thickness burn to the face from a chemical spray; however, as a result of aerosolization, he also inhaled formic acid. This resulted in a reversible pulmonary chemical injury. Inhalation of formic acid results in a reactive airway dysfunction syndrome, a common response to inhalation of an occupational irritant.

25-MAR-1997 (183)

Remark: Compilation of concentrations of drugs affecting digestive system and metabolism. For formic acid the following concentrations in serum/plasma were noted:
Habitual/therapeutic 0-12 µg/ml and toxic 120 µg/ml

Reliability: (4) Not assignable
Only secondary literature

25-NOV-1999 (184)

Remark: Systemic toxicity developed in a 3-year-old girl burned by formic acid over 35% of her total body surface area. The patient presented with profound metabolic acidosis and a serum formate level of 400 µg/ml. The patient was successfully treated with hemodialysis, IV bicarbonate, and supportive measures.

Reliability: (2) Valid with restrictions
Acceptable study, meets basic scientific principles

29-NOV-1999 (185)

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I U C L I D

Data Set

Existing Chemical	:	ID: 107-31-3
CAS No.	:	107-31-3
EINECS Name	:	methyl formate
EC No.	:	203-481-7
TSCA Name	:	Formic acid, methyl ester
Molecular Formula	:	C2H4O2

Producer related part

Company	:	Celanese Ltd
Creation date	:	12.12.2000

Substance related part

Company	:	Celanese Ltd
Creation date	:	12.12.2000
Status	:	
Memo	:	
Printing date	:	03.03.2003
Revision date	:	
Date of last update	:	02.03.2003
Number of pages	:	32
Chapter (profile)	:	Chapter: 1.0.1, 1.2, 2.1, 2.2, 2.3, 2.4, 2.5, 2.6.1, 3.1.1, 3.1.2, 3.3.1, 3.3.2, 3.5, 4.1, 4.2, 4.3, 4.4, 5.1.1, 5.1.2, 5.1.3, 5.1.4, 5.4, 5.5, 5.6, 5.7, 5.8.1, 5.8.2
Reliability (profile)	:	Reliability: without reliability, 1, 2, 3, 4
Flags (profile)	:	Flags: without flag, confidential, non confidential, WGK (DE), TA-Luft (DE), Material Safety Dataset, Risk Assessment, Directive 67/548/EEC, SIDS

1.0.1 APPLICANT AND COMPANY INFORMATION

Type	:	lead organisation
Name	:	American Chemistry Council, Formates Panel
Contact person	:	
Date	:	
Street	:	1300 Wilson Boulevard
Town	:	22209 Arlington, VA
Country	:	United States
Phone	:	
Telefax	:	
Telex	:	
Cedex	:	
Email	:	
Homepage	:	

25.05.2001

Type	:	cooperating company
Name	:	Celanese Ltd
Contact person	:	
Date	:	
Street	:	
Town	:	
Country	:	
Phone	:	
Telefax	:	
Telex	:	
Cedex	:	
Email	:	
Homepage	:	

20.12.2001

Type	:	cooperating company
Name	:	Bayer Corporation
Contact person	:	
Date	:	
Street	:	
Town	:	
Country	:	
Phone	:	
Telefax	:	
Telex	:	
Cedex	:	
Email	:	
Homepage	:	

20.12.2001

Type	:	cooperating company
Name	:	BASF Corporation
Contact person	:	
Date	:	
Street	:	

Town :
Country :
Phone :
Telefax :
Telex :
Cedex :
Email :
Homepage :

20.12.2001

Type : cooperating company
Name : GEO Specialty Chemicals
Contact person :
Date :
Street :
Town :
Country :
Phone :
Telefax :
Telex :
Cedex :
Email :
Homepage :

20.12.2001

Type : cooperating company
Name : Hercules Inc
Contact person :
Date :
Street :
Town :
Country :
Phone :
Telefax :
Telex :
Cedex :
Email :
Homepage :

20.12.2001

1.2 SYNONYMS AND TRADENAMES

Ameisensaeuremethylester

30.01.2001

Formic Acid Methyl ester

30.01.2001

Formic acid, methyl ester (6Cl, 8Cl, 9Cl)

30.01.2001

Methanoic acid methyl ester

30.01.2001

Methyl formate

30.01.2001

Methyl methanoate

30.01.2001

Methylformiat

30.01.2001

R 611

30.01.2001

2.1 MELTING POINT

Value : ca. -100 °C

Remark : Handbook value
Reliability : (2) valid with restrictions
19.11.2001 (33)

Value : = -100.4 °C

Reliability : (2) valid with restrictions
18.11.2001 (14)

2.2 BOILING POINT

Value : = 31.5 °C at 760

Remark : Handbook value
Reliability : (2) valid with restrictions
18.11.2001 (33)

Value : = 32.3 °C at 760

Reliability : (2) valid with restrictions
18.11.2001 (15)

2.3 DENSITY

Type : relative density
Value : = .987 at 15 °C

Remark : Handbook value
Reliability : (2) valid with restrictions
18.11.2001 (33)

Type : density
Value : = .968 g/cm³ at 20 °C

Reliability : (2) valid with restrictions
18.11.2001 (14)

2.4 VAPOUR PRESSURE

Value : = 644 hPa at 20 °C

Reliability : (2) valid with restrictions
18.11.2001 (14)

Value : = 780 at 25 °C

Remark : Given as 585.7 mm Hg, converted to hPa
Reliability : (2) valid with restrictions
19.11.2001 (19)

2.5 PARTITION COEFFICIENT

Partition coefficient :
Log pow : = -.21 at 25 °C
pH value :
Method : OECD Guide-line 107 "Partition Coefficient (n-octanol/water), Flask-shaking Method"
Year : 1988
GLP : no data
Test substance :

Reliability : (2) valid with restrictions
19.11.2001 (8) (14)

Partition coefficient :
Log pow : = .03 at °C
pH value :

Remark : Literature value
Reliability : (2) valid with restrictions
19.11.2001 (23)

Partition coefficient :
Log pow : = -.17 at °C
pH value :
Method : other (calculated)
Year :
GLP :
Test substance :

23.05.2001 (20)

2.6.1 SOLUBILITY IN DIFFERENT MEDIA

Solubility in :
Value : = 300 g/l at 20 °C
pH value : = 4 - 5
concentration : 200 g/l at 20 °C
Temperature effects :
Examine different pol. :
pKa : at 25 °C
Description :
Stable :

Reliability : (2) valid with restrictions
18.11.2001 (14)

Solubility in :
Value : = 30 vol% at °C
pH value :

concentration	:	at °C
Temperature effects	:	
Examine different pol.	:	
pKa	:	at 25 °C
Description	:	
Stable	:	
Remark	:	Handbook value
Reliability	:	(2) valid with restrictions

18.11.2001 (33)

3.1.1 PHOTODEGRADATION

Type	:	air
Light source	:	
Light spectrum	:	nm
Relative intensity	:	based on intensity of sunlight
INDIRECT PHOTOLYSIS		
Sensitizer	:	OH
Conc. of sensitizer	:	1500000 molecule/cm³
Rate constant	:	= cm³/(molecule*sec)
Degradation	:	% after
Remark	:	ca. 50 % after 71 day Based on 12-hour day
Result	:	Rate Constant: 0.227 (+/-0.034)*10-12 cm^3/molecule*sec at 296 K
Reliability	:	(2) valid with restrictions Calculated by an acceptable method.

20.12.2001 (21)

3.1.2 STABILITY IN WATER

Type	:	abiotic
t1/2 pH4	:	at °C
t1/2 pH7	:	= 67.3 hour(s) at 20.2 °C
t1/2 pH9	:	= 40 minute(s) at 20.2 °C
Deg. product	:	
Method	:	other (calculated)
Year	:	
GLP	:	
Test substance	:	
Method	:	Half life calculated from the k(b) published by Humphreys and Hammett (1955). This value was determined using a stirred-flow reactor at a methyl formate concentration of 0.01 to 0.06 mole/L in water. The k(b) was determined at 10, 20 and 30 deg C and at two concentrations at 20 deg C. Enthalpy and entropy of activation were determined for methyl formate and compared to that for methyl acetate. The half -lives were calculated from the relationship: T(1/2) = 0.693/k(b) [OH]
Remark	:	The issue of the relevance of laboratory measurements of hydrolysis rates to hydrolysis under environmental conditions has been discussed by Mabry and Mill (Critical Review of Hydrolysis of Organic Compounds in Water Under Environmental Conditions. J Phys. Chem. Ref. Data 7: 383-415, 1978). These authors deal with the issue of relevance by giving citations that show where rates of hydrolysis have been measure under laboratory conditions in pure water and in natural waters, there is a high degree of correlation. Likewise they demonstrate that laboratory measurements of rates using millimolar concentrations of chemicals are applicable to environmental situations where the concentrations may be several orders

environmental situations where the concentrations may be several orders of magnitude lower. They note that it is "axiomatic that rate processes found to be simple at high concentrations remain so at low concentrations".

This discussion and the specific inclusion of methyl formate in the Mabry and Mill review paper provides credibility that the laboratory measurements can be relied upon to estimate hydrolysis rates in the environment.

Result : Results:

The Hammett determinations gave the following k(b) values:

Temp.	Conc	k(b) (L/mole-sec)
10.04	0.01	15.1
20.15	0.01	28.6
20.08	0.06	27.9
29.97	0.01	50.9

Temp in deg C
Concentration in M

From these the Enthalpy of Activation was determined to be 9.81 kcal and the Entropy of Activation was determined to be -18.41 cal/deg and k(b) was determined to be 38.4 L/mole-sec, all at 25 deg C.

Hammett also determined these parameters for ethyl formate and found the k(b) for that material to be 2.82 L/mole-sec at 25 deg C. He further compared the hydrolysis reaction rates of methyl acetate to that of methyl formate and found that the difference was accounted for mainly by differences in Enthalpy of Activation. He proceeded to discourse about charge separations and the effect of ionic bonding to the solvent on entropy of activation. This thorough analysis lends credibility to the accuracy of the k(b) determination. Furthermore, Hammett shows that the contribution to hydrolysis from the reaction of esters with water is so slow that it can be ignored relative to the reaction with hydroxyl radical at environmentally important pH values.

To keep as close to the original data as possible, the half-lives at pH 7.0 and pH 8.0 were calculated with the data derives from the 0.01 M determination at 20.15 deg C.

Using an [OH] of 1e-7 at pH 7 the half live is projected to be 67.3 hours (2.8 days) at pH 7 and 6.7 hours at pH 8.0 where the concentration of [OH] is tenfold higher.

Test substance : Methyl Formate
Reliability : (2) valid with restrictions
26.02.2003 (24)

Type : abiotic
t1/2 pH4 : at °C
t1/2 pH7 : = 52 hour(s) at 25 °C
t1/2 pH9 : = .5 hour(s) at 25 °C

Method : Calculated from experimental Kb
Remark : These are calculated t1/2 values using a value for Kb found in the literature. The pH 4 t1/2 was not calculated because there is also a mechanism for acid based hydrolysis and the vale derived for the base hydrolysis rate constant may give an unreliable estimate.

an unreliable estimate.

Result : Experimental Kb = 36.6 L/mol-sec
Reliability : (2) valid with restrictions
Calculated from experimental data by an acceptable method.
18.02.2003 (22)

Type : abiotic
t1/2 pH4 : at °C
t1/2 pH7 : = 5.1 day(s) at 25 °C
t1/2 pH9 : at °C
t1/2 pH 8 : = 12.3 hour(s) at 25 °C
Deg. product :
Method : other (calculated)
Year : 2001
GLP : no
Test substance : no data

Remark : These vlaues are directly from from the HYDROWIN 1.67 program and are based on the Kb calculated by HYDROWIN
Reliability : (2) valid with restrictions
18.02.2003 (17)

3.3.1 TRANSPORT BETWEEN ENVIRONMENTAL COMPARTMENTS

3.3.2 DISTRIBUTION

Media : air - biota - sediment(s) - soil - water
Method : Calculation according Mackay, Level III
Year : 2001

Method : EPIWIN level III model with measured VP, Herry's Law constant and Kow
Remark : Values for half-lives of air, water and soil were adjusted from the defaults based on available data. The experimental Ko/w and vapor pressure was also used in the calculation.
Result : Chem Name : Methyl Formate
Molecular Wt: 60.05
Henry's LC : 0.000223 atm-m3/mole (Henry database)
Vapor Press : 586 mm Hg (user-entered)
Log Kow : -0.21 (user-entered)
Soil Koc : 0.253 (calc by model)

	Concentration (%)	Half-Life (hr)	Emissions (kg/hr)
Air	35.9	1180	1000
Water	36.9	120	1000
Soil	27.1	120	1000
Sediment	0.0618	1440	0

	Fugacity (atm)	Reaction (kg/hr)	Advection (kg/hr)	Reaction (percent)	Advection (percent)
Air	5.57e-010	80.7	1.37e+003	2.69	45.6
Water	2.61e-009	812	141	27.1	4.68
Soil	6.93e-008	598	0	19.9	0
Sed	2.17e-009	0.113	0.0047	0.0038	0.00016

Persistence Time: 127 hr
Reaction Time: 256 hr
Advection Time: 252 hr
Percent Reacted: 49.7
Percent Advected: 50.3

Half-Lives (hr), (based upon user-entry):
Air: 1176
Water: 120
Soil: 120
Sediment: 1440

Advection Times (hr):
Air: 100
Water: 1000
Sediment: 5e+0

Reliability : (2) valid with restrictions
19.11.2001 (18)

3.5 BIODEGRADATION

Type : Aerobic
Inoculum : activated sludge, non-adapted
Concentration : 51.7 mg/l related to Test substance
20 mg/l related to DOC (Dissolved Organic Carbon)
Contact time : 28 day(s)
Degradation : = 90 - 100 (±) % after 28 day(s)
Result : readily biodegradable
Kinetic of testsubst. : 7 day(s) = 77 %
14 day(s) = 91 %
21 day(s) = 93 %
28 day(s) = 93 %
%
Control substance : Aniline
Kinetic : 14 day(s) = 72 %
28 day(s) = 91 %
Deg. product :
Method :

Year	:	1997
GLP	:	yes
Test substance	:	
Method	:	The protocol was the same as the current ISO 14593 [Water quality -- Evaluation of ultimate aerobic biodegradability of organic compounds in aqueous medium -- Method by analysis of inorganic carbon in sealed vessels (CO2 headspace test)] but was conducted prior to the ISO protocol being accepted as an international standard. The procedure was also in accord with the current EPA guideline OPPTS 835.3120 (Sealed-Vessel CO2 Production Test).
Result	:	Although the data fulfilled all OECD criteria for ready biodegradation of the material, the initial report only classified the material, "biologically degradable". This was because at the time the report was written the official method was still in the design phase. Since it is now an international standard, the classification can now be evaluated as "Readily Biodegradable" based on the data presented for both the CO2 evolution and the removal of DOC.
Test substance	:	Methyl formate, purity 97.3%
Conclusion	:	The test material is readily biodegradable
Reliability	:	(1) valid without restriction

09.07.2001 (10)

Type	:	aerobic
Inoculum	:	activated sludge
Contact time	:	
Degradation	:	> 90 (±) % after 7 day(s)
Result	:	
Conclusion	:	The material is biodegradable
Reliability	:	(4) not assignable

18.11.2001 (12)

4.1 ACUTE/PROLONGED TOXICITY TO FISH

Type	:	flow through
Species	:	Lepomis macrochirus (Fish, fresh water)
Exposure period	:	96 hour(s)
Unit	:	mg/l
LC50	:	= 15400 calculated
Limit test	:	
Analytical monitoring	:	yes
Method	:	
Year	:	
GLP	:	no data
Test substance	:	other TS: Hydrolysis Product
Method	:	Analytical values determined by spectrofluorimeter. Water obtained from Lake Superior. Water chemistry evaluated along with dissolved oxygen. Five concentrations tested.
Result	:	Effects were noted almost immediately at the two highest concentrations. Most of the mortality was noted within 3 hours.
Test substance	:	Methanol (Burdick & Jackson)
Reliability	:	(1) valid without restriction

01.03.2003 (31)

Type	:	flow through
Species	:	Pimephales promelas (Fish, fresh water)
Exposure period	:	96 hour(s)
Unit	:	mg/l
LC50	:	= 29400 calculated
Limit test	:	
Analytical monitoring	:	yes
Method	:	
Year	:	
GLP	:	no data
Test substance	:	other TS: Hydrolysis Product
Method	:	Five concentrations were tested. Water was from Lake Superior. Water chemistry and dissolved oxygen levels were determined.
Result	:	Effects were noted at the top two concentrations. Most mortality was noted within the first 12 hours.
Test substance	:	Methanol (Burdick & Jackson)
Reliability	:	(1) valid without restriction

01.03.2003 (31)

Type	:	static
Species	:	Leuciscus idus (Fish, fresh water)
Exposure period	:	96 hour(s)
Unit	:	mg/l
NOEC	:	= 46 measured/nominal
LC0	:	= 46 measured/nominal
LC50	:	ca. 120 measured/nominal
LC100	:	<= 215 measured/nominal
Limit test	:	
Analytical monitoring	:	no
Method	:	other
Year	:	1989

GLP :

Test substance :

Method : Based on a range-finding study, concentrations were fixed at 10.0, 21.5, 46.4, 100 and 215 mg/L. Test material was directly added to reconstituted fresh water (total hardness 2.5 mmol/L, acid capacity 0.8 mmol/L, pH about 8). Fish, body length 6.3 to 7.5 cm, were added to 10 liter containers of water in groups of 10 at each concentration plus control using all-glass aquaria at 21° C. Mortality was determined at 1, 4, 24, 48, 72, and 96 hours.

Remark :

The volatility of methyl formate is a concern in this static study using nominal concentrations of methyl formate. As no analytical measurements were conducted, the final concentration of methyl formate may have been much lower due to volatilization and base-catalyzed hydrolysis. The 24-hour result is considered reliable. The lack of additional mortality after 48 hours is consistent with volatilization or hydrolysis. The predicted Henry's Law constant indicates that volatilization will be relative slow in comparison to the duration of the test. Hydrolysis, however, might be a significant means of test material loss. The half live for hydrolysis calculated from the hydroxyl ion concentration at pH 7.4 (the nominal pH during the test) and the Kb of 15.7 L/mol-sec (derived from Hydrowin) is 48 hours. Therefore, significant loss of test material to hydrolysis is expected during the 96 hours of the test. The concentration of non-hydrolyzed test material at the end of the test would be about 25% of the original.

The result is supported by the ECOSAR prediction using the ester model of a 96-hour LC50 of 132 mg/L. This is of the same magnitude as the highest concentration of Methyl formate (500 mg/L) reduced by hydrolysis and evaporation to the range of 100 mg/L by the end of the 96-hour stud

Result :

Mortality was as follows:

Nominal Conc	# fish	2h	4h	24	48	72	96
10.0	10	0	0	0	0	0	0
21.5	10	0	0	0	0	0	0
46.4	10	0	0	0	0	0	0
100.0	10	0	0	1	3	3	3
215.0	10	0	0	10	10	10	10

Adverse clinical sighs were limited to "tumbling" for the 100 mg/L group at the 24 hour observation and the 215 mg/L group at the 4 hour observation

Oxygen levels and pH remained within normal ranges throughout the study. The recorded temperature remained at 21° C at all measurements.

The ca 115 mg/L LC50 was interpolated from these data

Source : BASF AG Ludwigshafen

Test substance : Methyl formate, purity 97.7%
Conclusion : The 24-hour LC50 for methyl formate in this study is > 100 mg/L.
Reliability : (2) valid with restrictions
18.11.2001

Type : static
Species : Leuciscus idus (Fish, fresh water)
Exposure period : 96 hour(s)
Unit : mg/l
LC50 : > 100 measured/nominal
Limit test :
Analytical monitoring : no
Method : other: Determination of the effect of water constituents on fish, DIN 38412 part 15
Year : 1982
GLP : no data
Test substance : other TS

Method : Dilution water was reconstituted freshwater with a total hardness of 2.5 mmol/L, acid capacity of 0.8 mmol/L, a 4:1 ration of Ca:Mg. A 10:1 ratio of Na:K, and a pH of about 8.0.

Fish ranging from 6.0 to 7.2 cm were tested, 10 per concentration level at a loading of 2.8 grams of fish per L. of test water. The test temperature was 20°C and all glass aquaria containing 10 L water were utilized. Fish were not fed during the test.

Oxygen levels of the test water were measured at 0, 24, 48, 72 and 96 hours and was between 7.8 and 8.9 mg/L for all readings without any trend toward lower levels with increasing time or concentration.

Without pH adjustment the following pH level at study initiation was measured 7.5, 7.0, 4.3 and 3.3; at 10, 21.5, 46.4 and 100 mg/L, respectively. In the 100 mg/L test where the pH was adjusted, the initial pH was 7.2 and the final pH at 96 hours was 7.5.
Remark : To assess the effect of the relatively low pH on the golden orfe the highest test concentration (100 mg/l) was investigated in parallel after adjusting the pH with NaOH approximately to the pH of the control. After the pH adjustment, 100 mg/l was tolerated without mortality and without any symptoms. The low pH is considered responsible for the mortality at 100 mg/L without pH adjustment.
Result :

Under pH unadjusted conditions, 96-hour mortality was 100% at 100 mg/L and 0% at all other concentrations. No significant in-life signs were reported.

Under pH-adjusted conditions, mortality was 0% at 100 mg/L and 0% in the control. No adverse clinical signs were reported.
Test substance : Formic Acid, Purity 95.3%
Reliability : (1) valid without restriction
The study was conducted according to an appropriate guideline and used scientifically defensible methodology.

28.02.2003 (9)

4.2 ACUTE TOXICITY TO AQUATIC INVERTEBRATES

Type	:	static
Species	:	Daphnia magna (Crustacea)
Exposure period	:	48 hour(s)
Unit	:	mg/l
EC0	:	= 500 measured/nominal
EC50	:	> 500 measured/nominal
EC100	:	> 500 measured/nominal
Analytical monitoring	:	no
Method	:	Directive 84/449/EEC, C.2 "Acute toxicity for Daphnia"
Year	:	1988
GLP	:	no
Test substance	:	

Method : The study was run in accord with the EU guideline 79/831 EWG Annex C2, without any concentration analysis. Five daphnids were exposed per container with four container per concentration for a total of 20 daphnids per concentration. Concentrations were 0, 62.5, 125, 250 and 500 mg/L. A 500 mg/L stock was prepared and diluted to produce the dilution series. THe test was conducted in filtered tap water with a hardness of 2.7 mmol/L at a pH of 7.7 to 8.3.

Remark : The test material was susceptible to volatility and base-catalyzed hydrolysis and as no analytical measurements were taken, the actual concentrations during the test are not known.

Concerning the possible volatility of methyl formate in this study conducted under static conditions, although methyl formate has a high vapor pressure, it is hydrophilic and hence binds to water reducing its rate of volatilization from aqueous media. The Henry's Law constant for methyl formate of 2.23E-4 atm-m3/mole (found in EPIWIN 3.05 Henry's Law experimental dataset) is in a range where atmospheric loss during a study will occur but probably would not be highly significant under normal experimental conditions.

Base catalyzed hydrolysis, however, is expected to be a significant source of test material conversion to hydrolysis products. Using the measured Kb at 25° C, and a typical pH reported during this study of 8.0, the initial concentration of 500 mg/L would be expected to fall to about 30 mg/L after 24 hours (four half-lives) and to about 2 mg/L by the end of the 48 hour study. As the temperature was a bit lower than 25°C, the levels may not have fallen as much due to hydrolysis but it is expected that the vast majority of the initial methyl formate would be converted to methanol and formic acid by the end of the 48-hour test period.

AAlthough the concentration of test material and hydrolysis products cannot be established with certainty, the results are considered sufficient for characterization of the toxicity of Methyl formate to invertebrates because under environmental conditions rapid hydrolysis will also occur and the initial level was five times the maximum level recommended for a limit test under current OECD guidance.

recommended for a limit test under current OECD guidance.

Result : There was no mortality at any time or concentration thoughout the test.
Test substance : Methyl formate, purity 97%
Conclusion : The 48-hour EC50 for this material is greater than 500 mg/L based on nominal concentrations
Reliability : (2) valid with restrictions
01.03.2003 (11)

Type : semistatic
Species : other aquatic crustacea: Chaetogammarus marinus
Exposure period : 96 hour(s)
Unit : mg/l
NOEC : = 32 measured/nominal
EC0 : = 320 measured/nominal

Method : exposure time: 24-96 h;
LC0 and LC100 based on nominal concentration
organism length= 5 mm
glass stoppered conical flasks were used
initial pH of medium =8
medium = sea water
temperature: 15 deg C
salinity: 28 o/oo
renewal every 24 hours
Test in duplicate, 10 animals per vessel
volume = 1000 sea water
no analysis
Concentrations = 1, 10, 32, 100, 320, 560, 1000 mg/L
pH varied from 7.9 at 0 mg/L to 6.9 at 1000 mg/L
Test substance : Methyl formate, Fluka AG, Purity > 97%
Reliability : (2) valid with restrictions
01.03.2003 (1)

Type : flow through
Species : Daphnia magna (Crustacea)
Exposure period : 48 hour(s)
Unit : mg/l
NOEC : = 120 measured/nominal
EC0 : = 247 measured/nominal
EC50 : > 1050 measured/nominal
Analytical monitoring : yes
Method :
Year :
GLP : yes
Test substance : other TS: Hydrolysis Product

Method : The study was conducted using a flow-through design at 5nominal concentrations (60, 120, 250, 500 and 1000 mg/L)test material. Actual concentrations were measured(duplicate) at the beginning and end of the 96-hour exposureperiod and the means were: 74, 122, 247, 447 and 1070mg/L.Dilution water was blended well water/RO water with ahardness of 178 mg/L, alkalinity of 210 mg/L, and a pH of 7.8. Twenty first-instar daphnids per concentration wereexposed (four replicate chambers of five daphnids at eachconcentration plus control) using a flow rate of 6.1 volumereplacements per day for the 1-liter test chamberscontaining five daphnids each. Daphnids were observed dailyfor mortality and compound related sub-lethal effects.Temperature, oxygen levels, pH and test

related sub-lethal effects.Temperature, oxygen levels, pH and test materialconcentrations were measured at 0 and 48 hours.

Result : The mortality and extent of sublethal effects are shown in the table.

	MORTALITY			
Nom. Conc	Meas Conc	24 hr	48 hr	Other Effects
0	0	1	1	none
60	74	1	1	none
120	122	0	0	none
250	247	0	0	very few
599	447	1	1	few
1000	1070	1	1	many

Test substance : Sodium formate, described as white granules, received fromHoechst Celanese Corporation coded C-01261. Purity notspecified.

Conclusion : Under these conditions, the EC50 for daphnids was greaterthan 1070 mg/L, the NOEC was 122 mg/L.

Reliability : (1) valid without restriction

01.03.2003 (2)

Type : static
Species : Daphnia magna (Crustacea)
Exposure period : 48 hour(s)
Unit : mg/l
EC50 : > 10000 calculated
Method : other: DIN 38412
Year :
GLP :
Test substance : other TS: Hydrolysis Product

Method : The protocol followed IN 38412. Concentrations tested were from 0 to 0000 ppm.
Immobilization was the endpoint evaluated. Water chemistry was determined.

Remark : For similar study see Calleja, M.C., G. Persoone, and P.Geadi, (1994), Comparative acute toxicity of the first 50 multicentre evaluations of in vitro cytotoxicity chemicals to aquatic non-vertebrates. Arch. Environ. Contam. Toxicol. 26, 69 - 78 The L(E)C50 for methanol in Daphnia Magna was reported as 668,000 umol/L).

Test substance : Methanol
Reliability : (1) valid without restriction

01.03.2003 (25)

4.3 TOXICITY TO AQUATIC PLANTS E.G. ALGAE

Species : Phaeodactylum tricornutum (Algae)
Endpoint : growth rate
Exposure period : 840 hour(s)
Unit : mg/l
NOEC : > 100 calculated
LOEC : > 100 calculated
EC10 : = 600 calculated
Method : OECD Guide-line 201 "Algae, Growth Inhibition Test"
Year :
GLP :

Test substance : other TS: Hydrolysis Product

Test substance : Methanol
Reliability : (1) valid without restriction
01.03.2003 (30)

Species : Scenedesmus subspicatus (Algae)
Endpoint :
Exposure period : 96 hour(s)
Unit : mg/l
EC50 : = 190 calculated
EC20 : = 90 calculated
Method : other: Scenedesmus-Zellvermehrungs Hemmtest, DIN 38412 Teil 9,
Year :
GLP :
Test substance :

Remark : EC90(72h) >500 mg/l.
Source : BASF AG Ludwigshafen
Reliability : (2) valid with restrictions
24.05.2001 (13)

Species : Selenastrum capricornutum (Algae)
Endpoint : growth rate
Exposure period : 96 hour(s)
Unit : mg/l
NOEC : = 125 measured/nominal
EC10 : = 99 calculated
EC50 : = 790 calculated
Limit test :
Analytical monitoring : yes

Method : Two preliminary toxicity tests were conducted to setconcentration levels for the definitive test. In the first96-hour preliminary test, test concentrations of 1, 10 or100 mg/L produced growth inhibitions of 0, 18 or 50%,respectively. The second preliminary test was started as adefinitive test with triplicate cultures at concentrationsof 20, 40, 80, 160 or 320 mg/L. Algal cells counts in thisstudy wer 110, 110, 110, 110 or 86 % of the controlpopulation. Thus it was determined that there was aninsufficient inhibitory response to define the IC50 and afinal definitive test was set up. Algal media was inoculatedwith 1 million cells of test organism into triplicate 250 mlflasks, closed with a foam plug, containing 100 ml algalgrowth media. Dilutions of test material in growth mediawere prepared from a 1000 mg/L stock of test material ingrowth media. Flasks were incubated and agitated (100 rpm)in random positions for 96 hours under 4300 Lux lighting at24 degrees C. Cell counts were conducted daily for each testreplicate using a hemacytometer and compound microscope.Concentration of test material in the media was determinedat the beginning and end of the incubation period and meanconcentrations reported. Cell counts for each replicate andcontrols were subjected to analysis of variance (ANOVA)followed by Dunnett's test accepting p< 0.05 as significant.IC50 values were calculated from a regression plot. Tworegression plots were constructed using either the mean cellcount or the log of the cell count. The regression equationgiving the best fit was used to determine the IC50.
Remark : Supported by a 1984 Huels study reported in IUCLID 2000, in which the EC50 for Scenedesmus subspicatus was reported to be greater than or equal to 1000 mg/L.

Result : Measured concentrations were very close to nominal concentrations, the concentration at termination was similar to the starting concentration and no loss of test material was apparent. Concentrations above 250 mg/L were inhibitory and the data are shown in the table.

pH varied from 6.9 to 7.4 at initiation and 7.8 to 8.1 at 96-hours. It was not concentration dependent.

Mean cells counts were as follows:

Nomin Conc	Meas Conc	TIME (hours) 24	48	72	96
0(mg/L)	<5	2.9	12	45	140
63	58.3	2.0	8.2*	40	140
125	121	1.1*	8.3*	30*	110
250	243	1.3*	6.8*	28*	93*
500	498	0.78*	4.6*	27*	88*
1000	1001	0.93*	3.5*	8*	61*

Counts are in units of 10,000 cells/ml
* Denotes significant inhibition at p<0.0

A quadratic equation was developed using percent difference in cell count from control versus ln concentration. From this equation, the EC50 was calculated to be 790 mg/L and the EC10 as 99 mg/L (based on nominal concentrations). The NOEC is considered to be 125 mg/L.

Test substance : Sodium formate, described as white granules, received from Hoechst Celanese Corporation coded C-01261. Purity not specified.

Conclusion : Under these conditions, the 96-hour EC50 for algal growthwas 790 mg/L and the NOEC was estimated to be 125 mg/L. TheEC10 was calculated to be 99 mg/L from thje regressionequation.

Reliability : (1) valid without restriction
02.03.2003 (3)

Species : Selenastrum capricornutum (Algae)
Endpoint : growth rate
Exposure period : 96
Unit : mg/l

Method : Two preliminary toxicity tests were conducted to setconcentration levels for the definitive test. In the first96-hour preliminary test, test concentrations of 1, 10 or100 mg/L produced growth inhibitions of 0, 18 or 50%,respectively. The second preliminary test was started as adefinitive test with triplicate cultures at concentrationsof 20, 40, 80, 160 or 320 mg/L. Algal cells counts in thisstudy wer 110, 110, 110, 110 or 86 % of the controlpopulation. Thus it was determined that there was aninsufficient inhibitory response to define the IC50 and afinal definitive test was set up. Algal media was inoculatedwith 1 million cells of test organism into triplicate 250 mlflasks, closed with a foam plug, containing 100 ml algalgrowth media. Dilutions of test material in growth mediawere prepared from a 1000 mg/L stock of test material ingrowth media. Flasks were incubated and agitated (100 rpm)in random positions for 96 hours under 4300 Lux lighting at24 degrees C. Cell counts were conducted daily for each testreplicate using a hemacytometer and compound microscope.Concentration of test material in the media was determinedat the beginning and end of the incubation period and

determinedat the beginning and end of the incubation period and meanconcentrations reported. Cell counts for each replicate andcontrols were subjected to analysis of variance (ANOVA)followed by Dunnett's test accepting p< 0.05 as significant.IC50 values were calculated from a regression plot. Tworegression plots were constructed using either the mean cellcount or the log of the cell count. The regression equationgiving the best fit was used to determine the IC50.

Result : Measured concentrations were very close to nominal concentrations, the concentration at termination was similar to the starting concentration and no loss of test material was apparent. Concentrations above 250 mg/L were inhibitory and the data are shown in the table.

pH varied from 6.9 to 7.4 at initiation and 7.8 to 8.1 at 96-hours. It was not concentration dependent.

Mean cells counts were as follows:

Nomin Conc	Meas Conc	TIME (hours) 24	48	72	96
0(mg/L)	<5	2.9	12	45	140
63	58.3	2.0	8.2*	40	140
125	121	1.1*	8.3*	30*	110
250	243	1.3*	6.8*	28*	93*
500	498	0.78*	4.6*	27*	88*
1000	1001	0.93*	3.5*	8*	61*

Counts are in units of 10,000 cells/ml
* Denotes significant inhibition at p<0.0

A quadratic equation was developed using percent difference in cell count from control versus ln concentration. From this equation, the EC50 was calculated to be 790 mg/L and the EC10 as 99 mg/L (based on nominal concentrations). The NOEC is considered to be 125 mg/L.

Test substance : Sodium formate, described as white granules, received from Hoechst Celanese Corporation coded C-01261. Purity notspecified.

Conclusion : Under these conditions, the 96-hour EC50 for algal growth was 790 mg/L and the NOEC was estimated to be 125 mg/L. The EC10 was calculated to be 99 mg/L from the regression equation.

01.03.2003 (4)

4.4 TOXICITY TO MICROORGANISMS E.G. BACTERIA

5.1.1 ACUTE ORAL TOXICITY

Type	:	LD50
Value	:	ca. 1500 mg/kg bw
Species	:	rat
Strain	:	Sprague-Dawley
Sex	:	male/female
Number of animals	:	
Vehicle	:	
Doses	:	
Method	:	
Year	:	1979
GLP	:	no
Test substance	:	

Method : The test material in aqua dest. was administered at a volume of 10 mg/kg to group of 5 Sprague-Dawley rats of each sex. Five dose levels were administered and animals were observed for 14 days prior to sacrifice and necropsy. The age of rats was not reported; however, bodyweights are provided.

Result : The following mortality was recorded, all deaths occurred within the first hour after dosing.

DOSE (mg/kg)	Males	Females
2150	5/5	5/5
1470	2/5	2/5
1000	0/5	0/5
681	0/5	0/5
464	0/5	0/5

The following clinical signs were reported

Dose	Signs
2150	Irregular respiration Apathy Staggering Spastic gait Cyanotic Poor general appearance Shortness of breath
1470	Irregular respiration Apathy Staggering Poor general appearance
1000	Irregular respiration Apathy Poor general appearance
681	none reported
464	none reported

The flowing necropsy observation were reported in animals dying from exposure:

Lungs:	Bloodfilled with edema
Stomach:	Erosion of the glandular stomach
Heart:	Dilation
Intestine:	Irritation

The flowing necropsy observation were reported in animals dying from exposure:

All organs normal

Body weights were as follows:

Males: mean body weights

		DAYS AFTER TREATMENT		
Dose	0-day	2-4	7	14
2150	190	-	-	-
1470	270	300	321	344
1000	270	289	317	336
681	260	288	312	329
464	200	231	252	277

Females: mean body weights

Dose	0-day	2-4	7	14
2150	180	-	-	-
1470	180	192	208	211
1000	190	216	222	232
681	200	223	228	231
464	210	232	240	244

The LD50 was estimated from examination of the data as the dose that produced 40% mortality in the study. There were insufficient data points to apply a quantitative mathematical model.

Test substance : methyl formate, purity 98 %
Conclusion : The Acute oral LD50 for rats is about 1500 mg/kg
Reliability : (2) valid with restrictions
20.02.2003 (5)

Type : LD50
Value : = 1600 mg/kg bw
Species : rabbit
Strain :
Sex :
Number of animals :
Vehicle :
Doses :
Method :
Year : 1972

GLP :
Test substance :

Remark : The value refers to LD50/24 hours and ND50 (narcotic dose 50%) according to the authors.

24.05.2001 (29)

5.1.2 ACUTE INHALATION TOXICITY

Type : LC50
Value : > 21 mg/l
Species : rat
Strain : Sprague-Dawley
Sex : male/female
Number of animals :
Vehicle :
Doses :
Exposure time : 4
Method : other
Year : 1988
GLP : yes
Test substance : as prescribed by 1.1 - 1.4

Method : Three male and three female animals were treated using whole-body exposure to vapors of test material for 4 hours. Animals were housed individually. Males were 8-weeks old and weighed between 298 and 314 grams at the time of the exposure. Females were 10 weeks old and weighed between 216 and 229 grams. The target and nominal concentrations were 20 mg/L. Actual concentration was measured once an hour during the exposure using a MIRAN 1A Ambient Air analyzer. Mean measured concentration was 21 mg/L over the 4-hour exposure. Temperature during the exposure ranged from 76 to 78 °F., relative humidity ranged from 48 to 50%. Rats were observed daily for adverse clinical manifestations for seven days after exposure and were sacrificed without post-mortem exposure.
-

Remark : This study is considered key and considered reliable for establishing the LC50 value even though it does not meet the current OECD guideline. The study was conducted under glp conditions and the nominal and measured concentrations of test substance were similar. Animals showed few serious clinical signs during the exposure and recovered rapidly.
-

Result : All animals survived the duration of the study. Observations noted during exposure included lacrimation, reduced activities, and eyes closed. Signs exhibited upon removal from the chamber and during the two-hour poet-exposure period were limited to a few secretory signs and ano-genital staining. Virtually no adverse sings were exhibited by animals during the 7-day observation period. Animal weights were recorded prior to exposure and at the end of the 7-day observation period. All animals gained weight during this period and the body weight date were considered unremarkable by the study director.
-

-

Conclusion : The 4-hour inhalation LC50 in rats is greater than 21 mg/L
Reliability : (2) valid with restrictions
13.07.2001 (16)

Type : LC50
Value : > 5.2 mg/l
Species : rat
Strain : Sprague-Dawley
Sex : male/female
Number of animals : 20
Vehicle :
Doses :
Exposure time : 4 hour(s)
Method : other
Year : 1979
GLP : no
Test substance : other TS

Method : Ten male and ten female rats were exposed by whole body inhalation to vapors of the test substance at a nominal concentration of 19.4 mg/L (measured concentration of 5.2 mg/L). Animals were housed five per wire cage during the exposure. Exposure concentration was determined by gas chromatography. Animals were observed for 14 days after the exposure sacrificed and necropsied.
Remark : This study is considered supporting information.
Result : No animal died during the study. Clinical signs were limited to watering eyes and ruffled fur and were cleared after day 2 of the study. Some males showed hair loss on the muzzle.

Body weights (mean)

	Males wt (g)		Females wt (g)	
Day	Test	Control	Test	Control
Start	187	188	189	187
Day 7	224	218	203	197
Day 14	260	267	213	206

Test substance : Methylformate. Prod. Nr 04837Purity 98%
Reliability : (2) valid with restrictions
23.05.2001 (6)

Type : other
Value :
Species : other
Strain : no data
Sex : no data
Number of animals :
Vehicle :
Doses :
Exposure time :
Method :
Year : 1941
GLP : no
Test substance :

Method : Results of the exposure of unspecified (presumably rats) experimental animals to the vapors of methyl formate are

experimental animals to the vapors of methyl formate are presented in this brief report of experimental findings. No experimental details were presented.

Remark : This study is considered supporting

Result : The following results are provided:

Kills most animals in a short time	50,000 ppm
Dangerous to life in 30 to 60 minutes	15,000 - 25,000 ppm
Maximum concentration tolerated for 60 min without serious disturbances	5,000 ppm
Maximum concentration for prolonged (8 hours) exposure without serous disturbances	1,500-2000 ppm

The conclusions also stares that narcosis and irritation were identified as effects of acute vapor esposure

Test substance : Methyl formate, purity unspecified

Conclusion : The acute LC50 is greater than 5000 ppm for 1 hour and 2000 ppm for 8 hours.

Reliability : (4) not assignable

23.05.2001

5.1.3 ACUTE DERMAL TOXICITY

Type : LD50

Value : > 4000 ml/kg bw

Species : rat

Strain :

Sex :

Number of animals :

Vehicle :

Doses :

Method :

Year : 1978

GLP :

Test substance :

Method : Rats were treated and observed for 14 days, no other information

Remark : This result is supported by a 1990 screening-level dermal toxicity study of methyl formate sponsored by Hoechst Celanese in which 0/4 treated rabbits died at a dermal dose of 5,000 mg/kg (BioDynamics Inc, Acute Dermal Toxicity, Rabbits C-1160, sponsored by Hoechst Celanese, 2/28/1990)

Result : The LD50 was found to be > 4000 mg/kg.

The following clinical signs were observed:
Slight apathy
Staggering
Spastic gait
irregular breathing

Test substance : Methyl Formate, purity 98%

Reliability : (4) not assignable
11.09.2001 (6)

5.1.4 ACUTE TOXICITY, OTHER ROUTES

5.4 REPEATED DOSE TOXICITY

Type :
Species : rat
Sex : no data
Strain : Wistar
Route of admin. : drinking water
Exposure period : 1.5 years
Frequency of treatm. : Continuous
Post exposure period : none
Doses : 1% (= 274 mg/animal formate or 185 mg/animal calculated to formic acid according to the authors)
Control group : no data specified
Method :
Year :
GLP : no
Test substance :

Method : Six animals per group
Remark : The results are only available as a brief keynote summary.
Result : No toxicity detected
Test substance : Sodium formate in the drinking water at 1%
Conclusion :

Sodium formate at 1% in the drinking water did not produce clinically adverse effects in rats after administration for approximately 18 months. The NOEL cannot be determined since pathological investigations had not been conducted

Reliability : (4) not assignable
19.11.2001 (27)

Type :
Species : rat
Sex : male/female
Strain : Wistar
Route of admin. : drinking water
Exposure period : Lifelong
Frequency of treatm. : Daily
Post exposure period :
Doses : 200 mg/kg/day
Control group : yes, concurrent vehicle
NOAEL : = 200 mg/kg
Method :
Year :
GLP : no
Test substance :

Method :

The study design encompassed both a five-generation and chronic study in Wistar rats with calcium formate at 0.2% in drinking water. Eight males and 24 females were in the

drinking water. Eight males and 24 females were in the original test group with four controls of each sex. Both microscopic and pathologic investigations were done upon natural death of the animals.

An additional series of experiments using 0.4% calcium formate in the drinking water was also in progress and was in the second year and second generation at the time of this publication, histopathology results were not available for this dose level

Remark :

Limitations to this study include the lack of data presentation for the 0.4% dose group, the limited description of the pathology and histopathology organ list and the modest size of the concurrent control group. In addition, this study does not take into account the effect of the methanol produced by hydrolysis of methyl formate

Result :

Bodyweights and bodyweight gains of treated and control animals were similar. Microscopic and histological investigation of lung, spleen, stomach, liver and kidneys showed no suspect findings. Occasional small phagocytic action in reticuloendothelium and reticulo-histocyto elements of lung, spleen and stomach lymph nodes were reported. Two benign spontaneous tumors were seen in old animals and were considered not related to test substance administration.

The study at 0.4% calcium formate had been going on for about two years and it was reported that no disturbances (presumably mortality, body weight, fertility, or developmental toxicity) had been observed up to this point. Pathology and histopathology were in progress pending natural death of the test animals

Test substance :

Calcium Formate, CAS Number 544-17-

Conclusion :

This study shows that the formate portion of methyl formate up to the equivalent of 200 mg/kg as calcium formate has no adverse effect on rats dosed in drinking water

Reliability : (2) valid with restrictions
19.11.2001

5.5 GENETIC TOXICITY 'IN VITRO'

Type : Ames test
System of testing : Salmonella typhimurium TA 1535 TA100 TA1537 TA1538 TA98
Test concentration : 0, 667,1000, 3333, 6667, 10000 micrograms/plate
Cycotoxic concentr. : No appreciable toxicity up to 10000 micrograms per plate
Metabolic activation : with and without
Result :
Method :
Year : 1989
GLP : yes
Test substance :

Method : The S-9 was prepared from Aroclor-induced rats.

Positive controls were:
-With S-9
- 2-Aminoanthracene for all strains
-Without S-9
- Sodium azide for TA100 and TA1535
- 2-Nitrofluorene for TA98 and TA1538
- ICR-191 for TA1537

Triple plate test

One repeat

All strains run with the preincubation method at 667 to 10000 micrograms/plate with a 20 minute preincubation using a sealed tube to prevent loss of test material.

Result : There was no increase in the number of revertants for any strain at any concentration level of test substance. No bacterial toxicity was reported at any concentration. The positive and negative controls responded appropriately.

Source : Hoechst Celanese
Test substance : Methyl formate (C-1160)
Conclusion : This material was not mutagenic in the Ames test under these experimental conditions.
Reliability : (1) valid without restriction
12.07.2001 (28)

Type : Ames test
System of testing : Salmonella typhimurium TA 1535 TA100 TA1537 TA98
Test concentration : 20 to 5000 ug/plate
Cycotoxic concentr. : no cytotoxicity reported
Metabolic activation : with and without
Result :
Method : OECD Guide-line 471
Year : 1989
GLP : no
Test substance :

Method : The S-9 was prepared from Aroclor-induced rats.

Posiitive controls were:
-With S-9
- 2-Aminoanthracene for all strains
-Without S-9
- MNNG for TA100 and TA1535
- 4-Nitro-o-phenylendiame for TA98
- 9-Aminoacridine chloride for TA1537

Triple plate test

All strains run with the plate-incorporation method and the preincubation method at 20 to 5000 micrograms/plate. Strain 1535 also run with plate incorporation technigue at five concentrations from 100 to 1000 micrograms/plate.

Result : There was no increase in the number of revertants for any strain at any concentration level of test substance. No bacterial toxicity was reported at any concentration. The

bacterial toxicity was reported at any concentration. The positive and negative controls responded appropriately.

Source : BASF AG Ludwigshafen
Test substance : Pure methyl formate, purity 98.4%
Conclusion : This material was not mutagenic in the Ames test under these experimental conditions.
Reliability : (2) valid with restrictions
09.07.2001 (7)

5.6 GENETIC TOXICITY 'IN VIVO'

24.05.2001

5.7 CARCINOGENICITY

5.8.1 TOXICITY TO FERTILITY

5.8.2 DEVELOPMENTAL TOXICITY/TERATOGENICITY

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I U C L I D

Data Set

Existing Chemical	:	ID: 141-53-7
CAS No.	:	141-53-7
EINECS Name	:	sodium formate
EC No.	:	205-488-0
TSCA Name	:	Formic acid, sodium salt
Molecular Formula	:	CH2O2.Na

Producer related part

Company	:	Celanese Ltd
Creation date	:	25.05.2001

Substance related part

Company	:	Celanese Ltd
Creation date	:	25.05.2001
Status	:	
Memo	:	
Printing date	:	02.03.2003
Revision date	:	
Date of last update	:	02.03.2003
Number of pages	:	27
Chapter (profile)	:	Chapter: 1.0.1, 1.2, 2.1, 2.2, 2.3, 2.4, 2.5, 2.6.1, 3.1.1, 3.1.2, 3.3.1, 3.3.2, 3.5, 4.1, 4.2, 4.3, 4.4, 5.1.1, 5.1.2, 5.1.3, 5.1.4, 5.4, 5.5, 5.6, 5.7, 5.8.1, 5.8.2
Reliability (profile)	:	Reliability: without reliability, 1, 2, 3, 4
Flags (profile)	:	Flags: without flag, confidential, non confidential, WGK (DE), TA-Luft (DE), Material Safety Dataset, Risk Assessment, Directive 67/548/EEC, SIDS

1.0.1 APPLICANT AND COMPANY INFORMATION

Type	:	lead organisation
Name	:	American Chemistry Council, Formates Panel
Contact person	:	
Date	:	
Street	:	1300 Wilson Boulevard
Town	:	22209 Arlington, VA
Country	:	United States
Phone	:	
Telefax	:	
Telex	:	
Cedex	:	
Email	:	
Homepage	:	

25.05.2001

Type	:	cooperating company
Name	:	BASF Corporation
Contact person	:	
Date	:	
Street	:	
Town	:	
Country	:	
Phone	:	
Telefax	:	
Telex	:	
Cedex	:	
Email	:	
Homepage	:	

19.12.2001

Type	:	cooperating company
Name	:	Bayer Corporation
Contact person	:	
Date	:	
Street	:	
Town	:	
Country	:	
Phone	:	
Telefax	:	
Telex	:	
Cedex	:	
Email	:	
Homepage	:	

19.12.2001

Type	:	cooperating company
Name	:	Celanese Ltd
Contact person	:	
Date	:	
Street	:	

Town	:	
Country	:	
Phone	:	
Telefax	:	
Telex	:	
Cedex	:	
Email	:	
Homepage	:	

19.12.2001

Type	:	cooperating company
Name	:	GEO Specialty Chemicals
Contact person	:	
Date	:	
Street	:	
Town	:	
Country	:	
Phone	:	
Telefax	:	
Telex	:	
Cedex	:	
Email	:	
Homepage	:	

19.12.2001

Type	:	cooperating company
Name	:	Hercules Inc
Contact person	:	
Date	:	
Street	:	
Town	:	
Country	:	
Phone	:	
Telefax	:	
Telex	:	
Cedex	:	
Email	:	
Homepage	:	

19.12.2001

1.2 SYNONYMS AND TRADENAMES

Ameisensaeure, Natriumsalz

25.05.2001

Formic acid, sodium salt

25.05.2001

Natriumformiat

25.05.2001

Sodium methanoate

25.05.2001

2.1 MELTING POINT

Value	:	= 253 °C
Sublimation	:	
Method	:	
Year	:	
GLP	:	no
Test substance	:	
Reliability	:	(2) valid with restrictions

25.05.2001 (24)

2.2 BOILING POINT

Value	:	> 300 °C at
Decomposition	:	yes
Method	:	
Year	:	
GLP	:	
Test substance	:	
Result	:	Material decomposes into sodium oxylate and hydrogen and then inot sodium carbonate
Test substance	:	Sodium Formate, CAS Number 141-53-
Reliability	:	(2) valid with restrictions Handbook value

02.03.2003 (22)

2.3 DENSITY

2.4 VAPOUR PRESSURE

Value	:	= 0 at °C
Remark	:	This material is a solid salt and as such is considered to have negligible vapor pressure. It should be kept in mind, however, that it is in equilibrium with formic acid in solution and volatilization from solution is therefore pH dependent.
Conclusion		Material considered non-volatile as a dry solid.
Reliability	:	(4) not assignable

13.11.2001 (24)

2.5 PARTITION COEFFICIENT

Partition coefficient	:	octanol-water

Log pow	:	ca. -4.27 at °C
pH value	:	
Method	:	other (calculated)
Year	:	
GLP	:	
Test substance	:	

Method	:	Estimated using KOWIN v 1.66.
Test substance	:	Sodium Formate, CAS Number 141-53-7

02.03.2003 (7)

2.6.1 SOLUBILITY IN DIFFERENT MEDIA

Solubility in	:	
Value	:	= 550 g/l at 20 °C
pH value	:	ca. 9 - 10
concentration	:	50 g/l at 20 °C
Temperature effects	:	
Examine different pol.	:	
pKa	:	at 25 °C
Description	:	
Stable	:	

Source	:	Huels AG Marl
Reliability	:	(2) valid with restrictions

25.05.2001 (24) (27)

3.1.1 PHOTODEGRADATION

Type : other
Light source :
Light spectrum : nm
Relative intensity : based on intensity of sunlight

Remark : Since this material is not volatile, the only potential photolytic reaction that needs to be considered is direct photolysis at the earths surface. Direct photolysis is not possible because this material does not have a chromophore absorbing at a wavelength of 290 nm or above, and the presence of such a chromophore is a necessary condition for photolysis.
Reliability : (4) not assignable
14.11.2001 (18)

3.1.2 STABILITY IN WATER

Type : abiotic
t1/2 pH4 : at °C
t1/2 pH7 : at °C
t1/2 pH9 : at °C

Remark : Disassociates in water to sodium ion and formate ion. Both of these are considered stable in water. A carboxylic acid is generally the final product of hydrolysis reactions

No testing is required because the material is a salt that is known to dissociate (hydrolyze) in water upon dissolution. Testing is considered impossible based on chemical principles as the anticipated concentration of undissociated material is near zero.
Reliability : (4) not assignable
20.02.2003 (17)

3.3.1 TRANSPORT BETWEEN ENVIRONMENTAL COMPARTMENTS

3.3.2 DISTRIBUTION

Media : air - biota - sediment(s) - soil - water
Method : Calculation according Mackay, Level III
Year : 2001

Remark : Assumptions used in model:

Molecular Wt: 68.01
Henry's LC : 7.53e-007 atm-m3/mole (Henrywin program)
Vapor Press : 7.53e-008 mm Hg (Mpbpwin program)
Liquid VP : 9.87e-007 mm Hg (super-cooled)
Melting Pt : 138 deg C (Mpbpwin program)
Log Kow : -4.27 (Kowwin program)

Log Kow : -4.27 (Kowwin program)
Soil Koc : 2.2e-005 (calc by model)

Half-Lives (hr), (based upon user-entry)*
Air: 504
Water: 120
Soil: 120
Sediment: 1440

* This calculation was conducted using a water half-life of 120 hours based on actual data. The soil half-life was estimated at 120 hours on the basis of the water value. Air half-life was set at 504 hours which is the model calculated result for formic acid. This was done presuming that volatilized material would exist primarily as formic acid.

Result :

	Concentration (percent)	Half-Life (hr)	Emissions (kg/hr)
Air	7.11	1e+005	1000
Water	48.7	360	1000
Soil	44.1	360	1000
Sediment	0.0811	1.44e+003	0

	Fugacity (atm)	Reaction (kg/hr)	Advection (kg/hr)	Reaction (percent)	Advection (percent)
Air	7.03e-011	51.4	374	1.71	12.5
Water	1.03e-011	1.07e+003	186	35.7	6.19
Soil	4.67e-010	1.32e+003	0	43.9	0
Sed	8.56e-012	0.149	0.0062	0.005	0.0002

Persistence Time: 150 hr
Reaction Time: 185 hr
Advection Time: 807 hr
Percent Reacted: 81.3
Percent Advected: 18.7

Half-Lives (hr), (based upon user-entry):
Air: 504
Water: 120
Soil: 120
Sediment: 1440

Advection Times (hr):
Air: 100
Water: 1000
Sediment: 5e+004

Advection Time: 1.19e+003 hr

Advection Time: 1.19e+003 hr
Percent Reacted: 68.8
Percent Advecte

Test substance : Sodium Formate CAS Number 141-53-7
Reliability : (2) valid with restrictions
01.03.2003 (8)

3.5 BIODEGRADATION

Type : Aerobic
Inoculum : activated sludge, domestic
Concentration : 20 mg/l related to DOC (Dissolved Organic Carbon) related to
Contact time :
Degradation : = 92 (±) % after 21 day(s)
Result : readily biodegradable
Deg. product :
Method :
Year : 1981
GLP : No
Test substance :

Method : OECD Guide–line 301 E "Ready biodegradability: Modified OECD Screening Test"
Source : Huels AG Marl
Test substance : Sodium Formate, CAS Number 141-53-7
Reliability : (2) valid with restrictions
15.11.2001 (13)

Type : Aerobic
Inoculum : domestic sewage
Concentration : 300 mg/l related to DOC (Dissolved Organic Carbon) related to
Contact time : 9 day(s)
Degradation : = 100 (±) % after 9 day(s)
Result : inherently biodegradable
Deg. product :
Method :
Year : 1985
GLP :
Test substance :

Method : OECD Guide–line 302 B "Inherent biodegradability: Modified"
Remark : Inoculum: activated sludge, domestic
Source : Huels AG Marl
Test substance : Sodium Formate, CAS Number 141-53-7
Conclusion : inherently biodegradable
Reliability : (4) not assignable
19.12.2001 (12)

Type : Aerobic
Inoculum : domestic sewage
Concentration : 10 mg/l related to DOC (Dissolved Organic Carbon) related to
Contact time :
Degradation : = 97.5 (±) % after

Result	:	inherently biodegradable
Method	:	OECD Guide–line 303 A "Simulation Test – Aerobic Sewage"
Remark	:	The 97,5 % loss of DOC refers to an average retention time of 3 hours.
Source	:	Huels AG Marl
Test substance	:	Sodium Formate, CAS Number 141-53-7
Reliability	:	(4) not assignable

19.12.2001 (13)

4.1 ACUTE/PROLONGED TOXICITY TO FISH

Type	:	flow through
Species	:	Pimephales promelas (Fish, fresh water)
Exposure period	:	96 hour(s)
Unit	:	mg/l
NOEC	:	= 954 measured/nominal
LC0	:	= 954 measured/nominal
LC50	:	> 1000 calculated
Limit test	:	
Analytical monitoring	:	yes
Method	:	EPA OTS 797.1400
Year	:	1990
GLP	:	yes
Test substance	:	
Method	:	The study was conducted using a flow-through design at 5 nominal concentrations (63, 125, 250, 500 and 1000 mg/L) test material. Actual concentrations were measured (duplicate) at the beginning and end of the 96-hour exposure period and the means were: 58, 116, 223, 461 and 954 mg/L. Dilution water was blended soft water with a hardness of 40-48 mg/L, alkalinity of 52-56 mg/L, and a pH of 7.4 to 7.5. Twenty fish (mean weight 0.23 g) per concentration were exposed using a flow rate of 6.4 volume replacements per day for the 30-liter aquaria. Fish were observed daily for mortality and compound related sub-lethal effects. Temperature, oxygen levels and pH were measured at 0, 48 and 96 hours. Water temperature varied from 21 to 22 deg. C. Dissolved oxygen levels were above 8.4 mg/L in the control, low, mid and high concentration levels at 0, 48 and 96 hours.
Result	:	No mortality or sub-lethal effects were observed at any concentration. Oxygen, temperature and pH were within the protocol specified limits. The measure concentrations were similar to the target (nominal) concentrations.
Source	:	Celanese Ltd
Test substance	:	Sodium formate, described as white granules, received from Hoechst Celanese Corporation coded C-01261. Purity not specified.
Conclusion	:	Under these conditions, the LC50, LC0 and NOEC were all greater than 954 mg/L. The LC50 is greater than 1000 mg/L
Reliability	:	(1) valid without restriction

28.01.2003 (3)

Type	:	flow through
Species	:	Salmo gairdneri (Fish, estuary, fresh water)
Exposure period	:	96 hour(s)
Unit	:	mg/l
NOEC	:	> 887 measured/nominal
LC0	:	> 887 measured/nominal
LC50	:	> 1000 calculated
Limit test	:	
Analytical monitoring	:	yes
Method	:	EPA OTS 797.1400
Year	:	1990

GLP : yes
Test substance :

Method : The study was conducted using a flow-through design at 5 nominal concentrations (63, 125, 250, 500 and 1000 mg/L) test material. Actual concentrations were measured (duplicate) at the beginning and end of the 96-hour exposure period and the means were: 54, 105, 215, 443 and 887 mg/L. Dilution water was blended soft water with a hardness of 48 mg/L, alkalinity of 56-58 mg/L, temperature from 12-13 degrees and a pH of 7.7 to 7.8. Twenty fish (mean weight 0.70 g) per concentration were exposed using a flow rate of 6.4 volume replacements per day for the 30-liter aquaria. Fish were observed daily for mortality and compound related sub-lethal effects. Temperature, oxygen levels and pH were measured at 0, 48 and 96 hours.
Result : No mortality or sub-lethal effects were observed at any concentration. Oxygen, temperature and pH were within the protocol specified limits. The measured concentrations were similar to the target (nominal) concentrations.
Source : Celanese Ltd
Test substance : Sodium formate, described as white granules, received from Hoechst Celanese Corporation coded C-01261. Purity not specified.
Conclusion : Under these conditions, the LC50, LC0 and NOEC were all greater than 887 mg/L. The LC50 is greater than 1000 mg/L
Reliability : (1) valid without restriction
01.03.2003 (1)

Type : static
Species : Leuciscus idus (Fish, fresh water)
Exposure period : 48 hour(s)
Unit : mg/l
LC50 : > 1000 measured/nominal
Method :
Year :
GLP : no
Test substance :

Method : other: Bestimmung der Wirkung von Wasserinhaltsstoffen auf Fische, DIN 38412 Teil 15 (Determination of the effect of substances contained in water on fish, DIN 38412 part of 15)
Source : Huels AG Marl
Test substance : Sodium Formate, CAS Number 141-53-7
Reliability : (4) not assignable
15.11.2001 (14)

Type : static
Species : Lepomis macrochirus (Fish, fresh water)
Exposure period : 24 hour(s)
Unit : mg/l
LC50 : = 5000 measured/nominal
Method :
Year : 1965
GLP :
Test substance :

Method : other: Standard method for the determination of the fish toxicity of pure substances after Freeman
Source : Huels AG Marl
Test substance : Sodium Formate, CAS Number 141-53-7
Reliability : (4) not assignable
Rated as 4 since relies on secondary (IUCLID) reference.

15.11.2001 (10) (11)

4.2 ACUTE TOXICITY TO AQUATIC INVERTEBRATES

Type : flow through
Species : Daphnia magna (Crustacea)
Exposure period : 48 hour(s)
Unit : mg/l
NOEC : = 120 measured/nominal
EC0 : = 247 measured/nominal
EC50 : > 1070 measured/nominal
Analytical monitoring : yes
Method :
Year :
GLP : yes
Test substance :

Method : The study was conducted using a flow-through design at 5 nominal concentrations (60, 120, 250, 500 and 1000 mg/L) test material. Actual concentrations were measured (duplicate) at the beginning and end of the 96-hour exposure period and the means were: 74, 122, 247, 447 and 1070mg/L. Dilution water was blended well water/RO water with a hardness of 178 mg/L, alkalinity of 210 mg/L, and a pH of 7.8. Twenty first-instar daphnids per concentration were exposed (four replicate chambers of five daphnids at each concentration plus control) using a flow rate of 6.1 volume replacements per day for the 1-liter test chambers containing five daphnids each. Daphnids were observed daily for mortality and compound related sub-lethal effects. Temperature, oxygen levels, pH and test material concentrations were measured at 0 and 48 hours. Temperature (19 deg C) and dissolved oxygen (8.6 to 8.8 mg/L) were determined at the start and completion of the test.

Result : The mortality and extent of sublethal effects are shown in the table.

Nom. Conc	Meas Conc	MORTALITY 24 hr	MORTALITY 48 hr	Other Effects
0	0	1	1	none
60	74	1	1	none
120	122	0	0	none
250	247	0	0	very few
599	447	1	1	few
1000	1070	1	1	many

Test substance : Sodium formate, described as white granules, received from Hoechst Celanese Corporation coded C-01261. Purity not specified.

Conclusion : Under these conditions, the EC50 for daphnids was greater than 1070 mg/L, the NOEC was 122 mg/L.

than 1070 mg/L, the NOEC was 122 mg/L.

Reliability : (1) valid without restriction
28.02.2003 (2)

4.3 TOXICITY TO AQUATIC PLANTS E.G. ALGAE

Species : Selenastrum capricornutum (Algae)
Endpoint : growth rate
Exposure period : 96 hour(s)
Unit : mg/l
NOEC : = 125 measured/nominal
EC10 : = 99 calculated
EC50 : = 790 calculated
Limit test :
Analytical monitoring : yes
Method : other
Year :
GLP : yes
Test substance :

Method : Two preliminary toxicity tests were conducted to set concentration levels for the definitive test. In the first 96-hour preliminary test, test concentrations of 1, 10 or 100 mg/L produced growth inhibitions of 0, 18 or 50%, respectively. The second preliminary test was started as a definitive test with triplicate cultures at concentrations of 20, 40, 80, 160 or 320 mg/L. Algal cells counts in this study wer 110, 110, 110, 110 or 86 % of the control population. Thus it was determined that there was an insufficient inhibitory response to define the IC50 and a final definitive test was set up. Algal media (prepared from reverse osmosis water) was inoculated
with 1 million cells of test organism into triplicate 250 ml flasks, closed with a foam plug, containing 100 ml algal growth media. Dilutions of test material in growth media were prepared from a 1000 mg/L stock of test material in growth media. Flasks were incubated and agitated (100 rpm) in random positions for 96 hours under 4300 Lux lighting at 24 degrees C. Cell counts were conducted daily for each test replicate using a hemacytometer and compound microscope. Concentration of test material in the media was determined at the beginning and end of the incubation period and mean concentrations reported. Cell counts for each replicate and controls were subjected to analysis of variance (ANOVA) followed by Dunnett's test accepting $p < 0.05$ as significant. IC50 values were calculated from a regression plot. Two regression plots were constructed using either the mean cell count or the log of the cell count. The regression equation giving the best fit was used to determine the IC50.
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Remark : Supported by a 1984 Huels study reported in IUCLID 2000, in which the EC50 for Scenedesmus subspicatus was reported to be greater than or equal to 1000 mg/L.
.

Result : Measured concentrations were very close to nominal concentrations, the concentration at termination was similar to the starting concentration and no loss of test material

to the starting concentration and no loss of test material was apparent. Concentrations above 250 mg/L were inhibitory and the data are shown in the table.

pH varied from 6.9 to 7.4 at initiation and 7.8 to 8.1 at 96-hours. It was not concentration dependent.

Mean cells counts were as follows:

Nomin Conc	Meas Conc	TIME (hours) 24	48	72	96
0(mg/L)	<5	2.9	12	45	140
63	58.3	2.0	8.2*	40	140
125	121	1.1*	8.3*	30*	110
250	243	1.3*	6.8*	28*	93*
500	498	0.78*	4.6*	27*	88*
1000	1001	0.93*	3.5*	8*	61*

Counts are in units of 10,000 cells/ml
* Denotes significant inhibition at p<0.0

A quadratic equation was developed using percent difference in cell count from control versus ln concentration. From this equation, the EC50 was calculated to be 790 mg/L and the EC10 as 99 mg/L (based on nominal concentrations). The NOEC is considered to be 125 mg/L.

Test substance : Sodium formate, described as white granules, received from Hoechst Celanese Corporation coded C-01261. Purity not specified.

Conclusion : Under these conditions, the 96-hour EC50 for algal growth was 790 mg/L and the NOEC was estimated to be 125 mg/L. The EC10 was calculated to be 99 mg/L from thje regression equation.

Reliability : (1) valid without restriction
28.02.2003 (4)

4.4 TOXICITY TO MICROORGANISMS E.G. BACTERIA

5.1.1 ACUTE ORAL TOXICITY

Type	:	LD50
Value	:	> 3000 mg/kg bw
Species	:	rat
Strain	:	
Sex	:	
Number of animals	:	
Vehicle	:	
Doses	:	
Method	:	OECD Guide-line 401 "Acute Oral Toxicity"
Year	:	1989
GLP	:	no
Test substance	:	as prescribed by 1.1 - 1.4
Remark	:	Information obtained from the IUCLID 2000 document. This is listed as an unpublished study by Hules dated 1989. The full report was not available for review.
Source	:	Huels AG Marl
Test substance	:	Sodium Formate, CAS Number 141-53-7
Reliability	:	(4) not assignable Assigned as 4 since it relies on a secondary source (IUCLID 2000)

15.11.2001 (16)

Type	:	LD50
Value	:	= 4700 mg/kg bw
Species	:	mouse
Strain	:	C57BL
Sex	:	
Number of animals	:	
Vehicle	:	
Doses	:	
Method	:	
Year	:	1982
GLP	:	no data
Test substance	:	
Remark	:	C57BL/6Cs folic acid deficient (FAD) mice were used in this study. 12 weeks prior to LD50 determination, 6 mice were fed a diet supplemented with 3 mg of folic acid/kg diet. 6 mice received a diet without folic acid supplements. FAD–mice fed with a supplemented diet showed a slightly higher LD50 (4700 mg/kg) than mice fed a diet without folic acid supplements (LD50 3700 mg/kg).
Source	:	Huels AG Marl
Test substance	:	Sodium Formate, CAS Number 141-53-7
Reliability	:	(2) valid with restrictions

15.11.2001 (25)

Type	:	LD50
Value	:	= 11200 mg/kg bw
Species	:	mouse
Strain	:	

Sex	:	
Number of animals	:	
Vehicle	:	
Doses	:	
Method	:	
Year	:	1969
GLP	:	no
Test substance	:	
Method	:	Details not provided except that it was part of a series of studies of formic acid and four formate salts and that 54 animals were used to determint the LD50
Result	:	The LD50 range for sodium formate was given as 9,600 to 12,80
Source	:	Huels G AG, Literature
Test substance	:	Sodium Formate, CAS Number 141-53-
Reliability	:	(2) valid with restrictions Assigned as 2 since it was published with the acute toxicity of several other formates and it fits the expected pattern

19.12.2001 (20)

5.1.2 ACUTE INHALATION TOXICITY

Type	:	LC0
Value	:	> .67 mg/l
Species	:	rat
Strain	:	Sprague-Dawley
Sex	:	male/female
Number of animals	:	
Vehicle	:	
Doses	:	
Exposure time	:	4 hour(s)
Method	:	other
Year	:	1990
GLP	:	yes
Test substance	:	
Method	:	The solid test material was milled to a fine powder and placed in a glass fluidizing bed. The material was aerosolized using a flow of 30 liters per minute and the dust from the bed was swept at a rate of 5 L/min into a 100 liter plexiglass exposure chamber. The flow rate was 35 L/min, providing an air change every 2.9 minutes. This was considered the maximum level of dust practically attainable with the equipment. It was determined gravimetrically to contain 0.67 mg/L (nominal concentration based on material loss was 10 mg/L) and have a MMAD of 5.4 microns with an Average Geometric Standard Deviation of 2.4. This aerosol was considered respirable. Five animals (males, 9 weeks of age, weight range 321-344 g; females 10 weeks of age, weight range 223-254 g) of each sex were exposed for 4 hours. Animals remained in the chamber for 30 minutes after the test material was cleared from the breathing air. Animals

test material was cleared from the breathing air. Animals were doubly housed during the acclimation and post-exposure 14-day observation period and singly housed during the exposure. Animals were observed at 0, 15, 30, 45, 60, 120, 180 and 240 minutes during the 4-hour exposure, then examined daily for 14 days. Surviving animals were sacrificed after 14 days and submitted to a gross necropsy. The chamber temperature was 25 degrees and the relative humidity ranges for 17% to 6% with the lower values in the latter part of the study (considered a result of the dessicant activity of fine particles of sodium formate) Chamber concentration of test material was measured at nine intervals during the study and ranged from 0.5 to 0.86 mg/L.

Result : There were no deaths during the exposure or the 14-day observation period. Adverse clinical sighs were minimal and consisted of decreased activity and eyes partly or fully closed during the exposure and lacrimation and nasal discharge but generally fully recovered within a week. There was a slight and transient reduction in body weight gain (or weight loss) following the exposure but all animals continued to gain weight a few days after the exposure period:

MEAN BODY WEIGHTS (grams) Exposure 0.67 mg/L (4 hours)

DAY	MALES	FEMALES
1	337	235
2	333	230
5	344	236
8	365	244
15	414	255

There were no treatment-related findings at gross necropsy.

Source : Celanese Ltd

Test substance : C-1261 (Sodium Formate), purity 99% active ingredient. The test material was milled by Sturtevant Inc (Boston) on 8 November 1989 and then sent to BioDynamics.

Conclusion : Exposure of rats to the highest practical aerosol concentration of test material, with a large portion in the respirable range, was not associated with adverse effect other than eye and nasal irritation. The acute inhalation LC50 is greater than 0.67 mg/L for a four-hour inhalation exposure.

01.03.2003 (6)

5.1.3 ACUTE DERMAL TOXICITY

5.1.4 ACUTE TOXICITY, OTHER ROUTES

5.4 REPEATED DOSE TOXICITY

Type	:	
Species	:	rat
Sex	:	male/female
Strain	:	Wistar
Route of admin.	:	drinking water
Exposure period	:	Lifetime
Frequency of treatm.	:	Continuous
Post exposure period	:	
Doses	:	1.0%
Control group	:	
Method	:	
Year	:	
GLP	:	no
Test substance	:	

Method :

The study design encompassed both a five-generation and chronic study in Wistar rats with sodium formate at 1.0% in drinking water. Eight males and 24 females were in the original test group with four controls of each sex. Both microscopic and pathologic investigations were to be done upon natural death of the animals. At the time of this report the study had completed 1.5 years. Studies with calcium formate had been completed and were reported

Remark :

Almost no specific details were given of the results of the 1% sodium formate multigeneration study. The indication in the summary was that adverse effects were not observed in the ongoing sodium formate drinking-water study. Due to the lack of details it cannot be confirmed that this was actually the case. In addition the pathological evaluation of the animals had not been conducted.

A group of dogs was also administered 5 grams sodium formate per day in food. Adverse effects were not reported except that some of the dogs refused to eat the dosed food after a few days

Result :

Specific results for the sodium formate portion of these rat chronic studies were not given except in the summary where it was mentioned that formate levels up to 1 gram per kilogram per day (the approximate dose level of the sodium formate study) were not harmful to health. Update results for these studies could not be found in the open literature

Test substance :

Sodium Formate, CAS Number 141-53-

Conclusion :

Sodium formate at 1% in the drinking water did not produce clinically adverse effects in rats after administration for approximately 18 months. The NOEL cannot be determined since pathological investigations had not been conducted

Reliability : (4) not assignable

18.11.2001 (19)

5.5 GENETIC TOXICITY 'IN VITRO'

Type	:	Salmonella typhimurium reverse mutation assay
System of testing	:	Salmonella typhimurium TA 98, TA 100, TA 1535, TA 1537, TA1538
Test concentration	:	up to 5000 ug test substance/plate
Cycotoxic concentr.	:	
Metabolic activation	:	with and without
Result	:	negative
Method	:	other: according to Ames, B.N. et al., Mutat. Res. 31, 347-364
Year	:	1975
GLP	:	no
Test substance	:	as prescribed by 1.1 - 1.4
Reliability	:	(2) valid with restrictions

21.09.2001 (15)

Type	:	Chromosomal aberration test
System of testing	:	CHO-K1 cells
Test concentration	:	270, 360, 450, 540, 630 ug/ml (6-14 mM)
Cycotoxic concentr.	:	
Metabolic activation	:	with and without
Result	:	negative
Method	:	
Year	:	
GLP	:	
Test substance	:	

Method :

The study was conducted basically in accord with the OECD 473 guideline "In Vitro Mammalian Chromosome Aberration Test". The only significant variation from this guideline was there were no positive controls reported. As the test materials produced positive results at acidic pH levels, the sensitivity of the procedure was demonstrated.

The procedure was to expose the cells (two or more replicates) in Ham's F12 medium (with 10% fetal calf serum) to various concentrations of test material for 24 hours in the presence or absence of rat-liver S9 prepared from rats pretreated with phenobarbital and 5,6-benzoflavone. At the end of the exposure period, chromosome preparations were made using an air-drying method. Two hundred metaphases were evaluated per concentration level. Cytotoxicity was assessed by counting surviving cells at the end of the exposure period.

Initially cells were exposed to four concentrations of formic acid in the presence or absence of S9 and evaluated for aberrant cells. These results and the design and results of other studies are provided in "results"

Remark :

This study appears to be a well conducted investigation of the effect of pH on clastogenicity in general and specifically a study of the clastogenicity of formic acid, acetic acid, lactic acid and the sodium salt of these three acids. The procedure closely followed OEDC guideline 473 and the results were published in a peer-reviewed journal. The reliability is further enhanced by the similar results on all three acids and the methodical approach to the

on all three acids and the methodical approach to the problem and conduct of the studies

Result :

The following dose related increase in aberrant cells was reported:

Conc (mM)	% Aberrant cells (-S9)	(+S9)
6	-	1.0
8	2.0	2.0
10	4.0	20.5
12	15.9	toxic
14	toxic	-

In a second set of experiments the initial pH of the medium was adjusted to pH 5.8 or 6.0 with 14 or 12 mM formic acid it the absence or presence of S9 mix, respectively. These media were then neutralized with 1 M NaOH to pH 6.4 and a second group to pH 7.2. Results were as follows (cell data were read from a graph and are approximate)

Activation	%Aberrant cells pH6.0	pH6.4	pH7.2
-S9	12	4	0
+S9	33	2	3

In a third set of studies, the concentration of the buffer system was increased by supplementation with 34 mM sodium bicarbonate in the absence of S9. Under these conditions, there was no clastogenic activity of 10 or 20 mM formic acid; however, at 25mM 12% aberrant cells were reported and at 30 mM the formic acid was cytotoxic. The 25 and 30 mM concentrations also resulted in acidic pH levels.

Similar studies were also conduced with acetic acid and lactic acid with the same results.

Test substance : Sodium formate produced by the neutralization of formic acid with sodium hydroxide or sodium bicarbonate.

Conclusion :

It was concluded that formic acid it not itself clastogenic to these cells but that the acidic conditions were responsible for the chromosome aberrations observed. It can be further concluded the sodium formate (the product of neutralization of formic acid with sodium hydroxide or sodium bicarbonate) is not clastogenic

Reliability : (1) valid without restriction
28.01.2003 (21)

Type : Mouse lymphoma assay
System of testing : mouse lymphoma cell line L5178Y TK+/–
Test concentration : Dose range: 4857-8714 mg/l with metabolic activation; 3571-10000 mg/l without metabolic activation.

Cycotoxic concentr.	:	
Metabolic activation	:	with and without
Result	:	positive
Method	:	
Year	:	
GLP	:	
Test substance	:	
Remark	:	This positive result is considered suspicious as no colony sizing data were given. The current OECD 476 (adopted 21 July 1977) guideline requires colony sizing to confirm the positive result. Likewise, the 1994 Mammalian cell gene mutation assays working group report (Mutat Res 1994 Jun;312(3):235-9) states that "Ability to recover small colonies must be convincingly demonstrated when using the L5178Y TK mouse lymphoma assay". In addition, the 1997 report by Coombs et al (The use of L5178Y mouse lymphoma cells to assess the mutagenic, clastogenic and aneugenic properties of chemicals. Mutagenesis 1995 Sep;10(5):403-8) also emphasizes the importance of colony sizing to the acceptability of mouse lymphoma results.
Conclusion	:	No firm conclusion about the mutagenic potential can be drawn from this test
Reliability	:	(3) invalid

15.11.2001 (9)

5.6 GENETIC TOXICITY 'IN VIVO'

Type	:	Drosophila SLRL test
Species	:	Drosophila melanogaster
Sex	:	male
Strain	:	other: Oregon-K
Route of admin.	:	oral feed
Exposure period	:	entire larval stage
Doses	:	0.1% as formic acid
Result	:	negative
Method	:	
Year	:	1969
GLP	:	no
Test substance	:	
Method	:	Oregon-K strain of Drosophila melanogaster were treated using dosed feed with 0.1 % formic acid, or sodium formate produced by neutralization of 0.1% formic acid with glycine-NaOH buffer. The Mueller-5 technique was used to determine sex-linked lethals (M Demerec, Induction of mutations in Drosophila by debenzanthracene, Genetics 33:337-48, 1948). About 50 treated males were mated with M-5 virgins and every third day the males were transferred to two fresh virgins in order to produce three successive broods. .
Remark	:	This study was similar in conduct to the current OECD 477 guideline regarding basic methodology; however, it is not clear that higher levels of sodium formate could not have been used to provide a more robust test of sodium formate genotoxicity.

genotoxicity.
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Result :

Oregon-K strain of Drosophila melanogaster were treated using dosed feed with 0.1 % formic acid, or sodium formate produced by neutralization of 0.1% formic acid with glycine-NaOH buffer. The Mueller-5 technique was used to determine sex-linked lethals (M Demerec, Induction of mutations in Drosophila by debenzanthracene, Genetics 33:337-48, 1948). About 50 treated males were mated with M-5 virgins and every third day the males were transferred to two fresh virgins in order to produce three successive broods.
.

After feeding formic acid or sodium formate over the entire larval stage, treated males mated with females gave the following results:

Formic acid

Brood	# Chromosomes Tested	% Sex-linked lethals
1	786	1.15
2	522	1.34
3	571	1.11

Sodium Formate (only one brood tested)

Brood	# Chromosomes Tested	% Sex-linked lethals
2	544	0.38

Controls

Brood	# Chromosomes Tested	% Sex-linked lethals
all	2584	0.15

The sodium formate sex-linked lethal was not different from the control while the formic acid results were stated as bring significantly different from control as determined by the rank-correlation method

Test substance :

Sodium formate produced by neutralization of 0.1% formic acid with glycine-NaOH buffer

Conclusion :

Sodium formate produced by neutralization of formic acid is not positive in the Drosophila SLRL test under these conditions; formic acid, at the same molar concentration produced positive results.

Reliability : (2) valid with restrictions
15.11.2001 (26)

5.7 CARCINOGENICITY

5.8.1 TOXICITY TO FERTILITY

5.8.2 DEVELOPMENTAL TOXICITY/TERATOGENICITY

Species	:	rat
Sex	:	
Strain	:	Sprague-Dawley
Route of admin.	:	other: In vitro incubation using whole-embryo culture
Exposure period	:	48 hr
Frequency of treatm.	:	
Duration of test	:	48 hrs
Doses	:	200, 400, 800, 1200, 1600 ug/ml
Control group	:	
Method	:	other: In vitro, whole embryo culture
Year	:	1993
GLP	:	no
Test substance	:	
Remark	:	Other in vitro studies of sodium formate and formic acid on developing embryos have been published and are includid in the formic acid IUCLID document. This study was selected as representative. High concentrations of sodium formate have effects on the embryo in vitro. The significance of this to in vivo developmental toxicity after exposure to formate is not known
Result	:	The effect of the pH (8.13, 7.75, 7.00, 6.50 and 6.00) on the in vitro teratogenicity of sodium formate (0.2, 0.4, 0.8, 1.2 and 1.6 mg/ml) was investigated in rat embryo cultures (Sprague-Dawley rats, day 9.5 of gestation). Numerous embryonic developmental parameters showed that even the decreasing pH had an influence on embryonic development in this test system. In the highest concentration, the parameters crown-rump length (CRL), head length (HL), somite number (SN), developmental score (DS) and protein concentration were significantly reduced in the incubation medium regardless of the pH. At a test substance concentration of 0.8 and 1.2 mg/ml, these parameters were significantly reduced at a low pH. At a test substance concentration of 0.4 and 0.2 mg/ml, CRL, HL and the protein concentration were still significantly reduced at a pH of 6.5 in the medium. To sum up, a dependence of the embryonic developmental parameters and of embryolethality both on the formate concentration and on the pH in the incubation medium was demonstrated in this test system
Test substance	:	Sodium Formate, CAS Number 141-53-
Reliability	:	(2) valid with restrictions

18.11.2001 (5)

Species	:	hen
Sex	:	
Strain	:	
Route of admin.	:	other

Exposure period	:	
Frequency of treatm.	:	
Duration of test	:	
Doses	:	5 mg, 10 mg or 20 mg/egg
Control group	:	other: negative and positive (0.025 mg hydrocortisone /egg)
Method	:	Sodium formate at 5, 10 or 20 mg/Egg was injected into fertilized eggs
Result	:	Sodium formate did not cause deviations in chicken embryos under these conditions
Conclusion	:	Sodium formate was not teratogenic under these condition
Reliability	:	(2) valid with restrictions

18.11.2001 (19)

9. References

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I U C L I D

Data Set

Existing Chemical	:	ID: 544-17-2
CAS No.	:	544-17-2
EINECS Name	:	calcium diformate
EC No.	:	208-863-7
TSCA Name	:	Formic acid, calcium salt
Molecular Formula	:	CH2O2.1/2Ca

Producer related part

Company	:	Toxicology and Regulatory Affairs
Creation date	:	24.10.2002

Substance related part

Company	:	Toxicology and Regulatory Affairs
Creation date	:	24.10.2002
Status	:	
Memo	:	
Printing date	:	03.03.2003
Revision date	:	
Date of last update	:	02.03.2003
Number of pages	:	22
Chapter (profile)	:	Chapter: 1.0.1, 1.2, 2.1, 2.2, 2.3, 2.4, 2.5, 2.6.1, 3.1.1, 3.1.2, 3.3.1, 3.3.2, 3.5, 4.1, 4.2, 4.3, 4.4, 5.1.1, 5.1.2, 5.1.3, 5.1.4, 5.4, 5.5, 5.6, 5.7, 5.8.1, 5.8.2
Reliability (profile)	:	Reliability: without reliability, 1, 2, 3, 4
Flags (profile)	:	Flags: without flag, confidential, non confidential, WGK (DE), TA-Luft (DE), Material Safety Dataset, Risk Assessment, Directive 67/548/EEC, SIDS

1.0.1 APPLICANT AND COMPANY INFORMATION

Type	:	lead organisation
Name	:	American Chemistry Council, Formates Panel
Contact person	:	
Date	:	
Street	:	1300 Wilson Boulevard
Town	:	22209 Arlington, VA
Country	:	United States
Phone	:	
Telefax	:	
Telex	:	
Cedex	:	
Email	:	
Homepage	:	
Source	:	Bayer Corporation Pittsburgh Toxicology and Regulatory Affairs Freeburg IL

06.12.2000

Type	:	cooperating company
Name	:	BASF Corporation
Contact person	:	
Date	:	
Street	:	
Town	:	
Country	:	
Phone	:	
Telefax	:	
Telex	:	
Cedex	:	
Email	:	
Homepage	:	
Source	:	Bayer Corporation Pittsburgh Toxicology and Regulatory Affairs Freeburg IL

19.12.2001

Type	:	cooperating company
Name	:	Bayer Corporation
Contact person	:	
Date	:	
Street	:	100 Bayer Road
Town	:	15205-9741 Pittsburgh, PA
Country	:	United States
Phone	:	
Telefax	:	
Telex	:	
Cedex	:	
Email	:	
Homepage	:	
Source	:	Bayer Corporation Pittsburgh Toxicology and Regulatory Affairs Freeburg IL

06.12.2000

Type	:	cooperating company
Name	:	Celanese Ltd
Contact person	:	
Date	:	
Street	:	
Town	:	
Country	:	
Phone	:	
Telefax	:	
Telex	:	
Cedex	:	
Email	:	
Homepage	:	

Source : Bayer Corporation Pittsburgh
Toxicology and Regulatory Affairs Freeburg IL
19.12.2001

Type	:	cooperating company
Name	:	GEO Specialty Chemicals
Contact person	:	
Date	:	
Street	:	
Town	:	
Country	:	
Phone	:	
Telefax	:	
Telex	:	
Cedex	:	
Email	:	
Homepage	:	

Source : Toxicology and Regulatory Affairs Freeburg IL
19.12.2001

Type	:	cooperating company
Name	:	Hercules Incorporated
Contact person	:	
Date	:	
Street	:	1313 North Market Street
Town	:	19894-001 Wilmington, DE
Country	:	
Phone	:	
Telefax	:	
Telex	:	
Cedex	:	
Email	:	
Homepage	:	

Source : Toxicology and Regulatory Affairs Freeburg IL
20.12.2001

1.2 SYNONYMS AND TRADENAMES

Calcium formate

Source : Bayer Corporation Pittsburgh
Toxicology and Regulatory Affairs Freeburg IL
Flag : Critical study for SIDS endpoint
05.11.2001

Formic acid, calcium salt

Source : Bayer Corporation Pittsburgh
Toxicology and Regulatory Affairs Freeburg IL

05.11.2001

2.1 MELTING POINT

Value : > 300 °C
Sublimation :
Method : other: Handbook value
Year :
GLP :
Test substance :

Source : Bayer Corporation Pittsburgh
Toxicology and Regulatory Affairs Freeburg IL
Reliability : (2) valid with restrictions
11.12.2000 (13)

Value : >= 800 °C
Decomposition : yes, at °C

Source : Bayer AG Leverkusen
Bayer Corporation Pittsburgh
Toxicology and Regulatory Affairs Freeburg IL
11.12.2000 (1)

2.2 BOILING POINT

Value : > 300 °C at

Remark : According to the SIDS Manual, boiling points over 300 need not be specified. As this material has a melting point greater than 300 deg. C, the boiling point must be greater than 300 deg C.
Source : Toxicology and Regulatory Affairs Freeburg IL
02.03.2003

2.3 DENSITY

Type : relative density
Value : 2.02 at 19 °C
Method : other: Handbook value
Year :
GLP :
Test substance :

Source : Bayer Corporation Pittsburgh
Toxicology and Regulatory Affairs Freeburg IL
Reliability : (2) valid with restrictions
16.11.2001 (14)

Type : bulk density
Value : 1150 kg/m3 at °C

Source : Bayer AG Leverkusen
Bayer Corporation Pittsburgh
Toxicology and Regulatory Affairs Freeburg IL

11.12.2000 (1)

2.4 VAPOUR PRESSURE

Remark	:	This material is a solid salt and as such is considered to have negligible vapor pressure. It should be kept in mind, however, that it is in equilibrium with formic acid in solution and volatilization from solution is therefore pH dependent
Source	:	Toxicology and Regulatory Affairs Freeburg IL
Conclusion		Material considered to be non-volatile as a dry solid.

20.12.2001

2.5 PARTITION COEFFICIENT

Partition coefficient	:	
Log pow	:	-2.47 at °C
pH value	:	
Method	:	other (calculated):KOWWIN (v1.65)
Year	:	1999
GLP	:	no
Test substance	:	
Remark	:	n.a. (salt) This value is also pH dependent due to equlibrium with formic acid which has a log Kow of about -0.50
Source	:	Bayer AG Leverkusen Bayer Corporation Pittsburgh Toxicology and Regulatory Affairs Freeburg IL
Reliability	:	(2) valid with restrictions

20.12.2001 (1)

2.6.1 SOLUBILITY IN DIFFERENT MEDIA

Solubility in	:	
Value	:	160 g/l at 20 °C
pH value	:	
concentration	:	at °C
Temperature effects	:	
Examine different pol.	:	
pKa	:	at 25 °C
Description	:	
Stable	:	
Source	:	Bayer AG Leverkusen Bayer Corporation Pittsburgh Toxicology and Regulatory Affairs Freeburg IL
Reliability	:	(4) not assignable

16.11.2001 (1)

Remark	:	Listed in the Merch Index as "Soluble in water"
Source	:	Toxicology and Regulatory Affairs Freeburg IL
Reliability	:	(2) valid with restrictions

16.11.2001 (14)

Solubility in	:	
Value	:	ca. 255 g/l at 25 °C
pH value	:	
concentration	:	at °C
Temperature effects	:	
Examine different pol.	:	
pKa	:	at 25 °C
Description	:	
Stable	:	

Method	:	Estimation using EPIWIN 3.05 with default inputs
Remark	:	There will be a pH dependency on the Calcium solubility. At basic pH levels the calcium is expected to partially precipitate from solution as calcium hydroxide.
Result	:	Water solubility estimated at 1.96 moles per liter. Based on a molecular weight of 130 this is 255 g/L.
Source	:	Toxicology and Regulatory Affairs Freeburg IL
Test substance	:	Calcium Formate, CAS Number 544-17-2
Reliability	:	(2) valid with restrictions

16.11.2001 (7)

3.1.1 PHOTODEGRADATION

Type	:	other
Light source	:	
Light spectrum	:	nm
Relative intensity	:	based on intensity of sunlight
Remark	:	Since this material is not volatile, the only potential photolytic reaction that needs to be considered is direct photolysis at the earths surface. Direct photolysis is not possible because this material does not have a chromophore absorbing at a wavelength of 290 nm or above, and the presence of such a chromophore is a necessary condition for photolysis.
Source	:	Toxicology and Regulatory Affairs Freeburg IL
Reliability	:	(4) not assignable

14.11.2001 (9)

3.1.2 STABILITY IN WATER

Type	:	abiotic
t1/2 pH4	:	at °C
t1/2 pH7	:	at °C
t1/2 pH9	:	at °C
Remark	:	Disassociates in water to clacium ion and formate ion. Both of these are considered stable in water. A carboxylic acid is generally the final product of hydrolysis reactions. No testing is required because the material is a salt that is known to dissociate (hydrolyze) in water upon dissolution. Testing is considered impossible based on chemical principles as the anticipated concentration of undissociated material is near zero.
Source	:	Toxicology and Regulatory Affairs Freeburg IL
Reliability	:	(4) not assignable

20.02.2003 (9)

3.3.1 TRANSPORT BETWEEN ENVIRONMENTAL COMPARTMENTS

3.3.2 DISTRIBUTION

Media : air - biota - sediment(s) - soil - water
Method : Calculation according Mackay, Level III
Year : 1999

Remark : PROPERTIES OF: Calcium formate

Molecular weight: 130.11
Aqueous solub (mg/l): 1E+006
Vapour pressure (Pa): 3.41305
(atm) 3.36842E-005
(mm Hg) 0.0256
Henry 's law c (Atm-m3/mol): 4.38264E-009
Air-water partition coef: 1.79237E-007
Octanol-water part coef(Kow): 0.00338844
Log Kow: -2.47

Biomass:water part coef: 0.800678
Temperature [deg C] 25

Biodeg rate c(h^-1),T1/2 biomass (h), in 2000 mg/L MLSS (h)
-Primary tank 0.04 15.99 10000.00
-Aeration tank 0.04 15.99 10000.00
-Settling tank 0.04 15.99 10000.00

Result :

	Concentration (percent)	Half-Life (hr)	Emissions (kg/hr)
Air	0.141	1e+005	1000
Water	45.4	360	1000
Soil	54.4	360	1000
Sed	0.0757	1.44e+003	0

	Fugacity (atm)	Reaction (percent)	Advection (percent)
Air	3.31e-012	0.000408	0.588
Water	9.6e-014	6.6	19
Soil	4.26e-012	43.8	0
Sed	8e-014	0.0152	0.000633

Persistence Time: 419 hr
Reaction Time: 521 hr
Advection Time: 2.14e+003 hr
Percent Reacted: 80.4
Percent Advected: 19.6

Half-Lives (hr), (Biowin (Ultimate) and Aopwin):
Air: 1e+005
Water: 360
Soil: 360
Sediment: 1440
-Biowin estimate: 2.912 (weeks)

Advection Times (hr):

Advection Times (hr):
Air: 100
Water: 1000
Sed

Source : Toxicology and Regulatory Affairs Freeburg IL
Reliability : (2) valid with restrictions
20.12.2001 (12)

3.5 BIODEGRADATION

Type : aerobic
Inoculum : predominantly domestic sewage
Contact time :
Degradation : > 75 (±) % after 20 day(s)
Result :
Deg. product :
Method : OECD Guide-line 301 D "Ready Biodegradability: Closed Bottle Test"
Year : 1974
GLP : no
Test substance :

Remark : test concentration: 24 mg/l related to TS
Source : Bayer AG Leverkusen
Bayer Corporation Pittsburgh
Toxicology and Regulatory Affairs Freeburg IL
Test substance : Sodium Formate, CAS Number 141-53-7
Reliability : (4) not assignable
Assigned score of 4 (not assignable) since not enough information was available to evaluate the adequacy of this study.
16.11.2001 (1)

4.1 ACUTE/PROLONGED TOXICITY TO FISH

Type	:	static
Species	:	Brachydanio rerio (Fish, fresh water)
Exposure period	:	96 hour(s)
Unit	:	mg/l
LC0	:	>= 1000 measured/nominal
Limit test	:	
Analytical monitoring	:	no
Method	:	other: Letale Wirkung beim Zebrabaerbling, UBA-Verfahrensvorschlag, Mai 1984, Letale Wirkung beim Zebrabaerbling Brachydanio rerio LC0, LC50, LC100, 48-96h
Year	:	1988
GLP	:	no
Test substance	:	other TS: calcium formate: technical grade
Method	:	Translation: Lethal effect with the Zebra barbling, UBA suggested procedure, May 1984, lethal effect with the Zebra barbling Brachydanio rerio LC0, LC50, LC100, 48-96h
Remark	:	Water parameters were not available
Result	:	10 Zebrafish were tested at each of the following concentrations: 12.5, 100, 1000 mg/l. There was no mortality at any concentration. The parameters were checked every 24 hrs.
Source	:	Bayer AG Leverkusen Bayer Corporation Pittsburgh Toxicology and Regulatory Affairs Freeburg IL
Test condition	:	Dechlorinated tap water Water hardness: approx. 15 degrees dh Ca: Mg: 4:1 Acid capacity Ks 4.3: 0.1 ±0.02 mmol/l pH: 6.3-6.8 Oxygen saturation greater than or equal to 90%
Reliability	:	(1) valid without restriction
Flag	:	Critical study for SIDS endpoint

28.01.2003 (3)

Type	:	other
Species	:	
Exposure period	:	96 hour(s)
Unit	:	g/l
LC50	:	= 1540
Method	:	other: Calculated (ECOSAR Program) (v0.99e)
Year	:	1999
GLP	:	no
Test substance	:	other TS: molecular structure
Remark	:	The LC50 value is greater than the water solubility (160 g/l).
Source	:	Bayer Corporation Pittsburgh Toxicology and Regulatory Affairs Freeburg IL
Test substance	:	Calcium Formate, CAS Number 544-17-2
Reliability	:	(2) valid with restrictions

16.11.2001 (12)

Type	:	static
Species	:	Leuciscus idus (Fish, fresh water)
Exposure period	:	48 hour(s)
Unit	:	mg/l
LC0	:	>= 1000
Limit test	:	
Analytical monitoring	:	no
Method	:	other: Bestimmung der akuten Wirkung von Stoffen auf Fische. Arbeitskreis "Fischtest" im Hauptausschuss "Detergentien" (15.10.73)
Year	:	1974
GLP	:	no
Test substance	:	
Method	:	Translation: Determination of the acute effect of materials on fish. Working group "fish tests" in the main committee " Detergents " (15.10.73)
Source	:	Bayer AG Leverkusen Bayer Corporation Pittsburgh Toxicology and Regulatory Affairs Freeburg IL
Reliability	:	(4) not assignable

16.11.2001 (1)

4.2 ACUTE TOXICITY TO AQUATIC INVERTEBRATES

Type	:	other
Species	:	other: Daphnid
Exposure period	:	48 hour(s)
Unit	:	g/l
EC50	:	= 1210 calculated
Method	:	other: Calculated (ECOSAR Program) (v0.99e)
Year	:	
GLP	:	no
Test substance	:	other TS: molecular structure
Method	:	Calculated using ECOSAR program with log Ko/w = -2.47
Remark	:	The EC50 value is greater than the water solubility (160 g/l).
Source	:	Bayer AG Leverkusen Bayer Corporation Pittsburgh Toxicology and Regulatory Affairs Freeburg IL
Reliability	:	(2) valid with restrictions

28.01.2003 (12)

4.3 TOXICITY TO AQUATIC PLANTS E.G. ALGAE

Species	:	other algae: Green
Endpoint	:	other
Exposure period	:	96 hour(s)
Unit	:	g/l
EC50	:	= 584 calculated
Method	:	other: Calculated (ECOSAR Program) (v0.99e)
Year	:	1999
GLP	:	no

Test substance	:	other TS: molecular structure
Remark	:	Calculated using ECOSAR program with log Ko/w = -2.47 The EC50 value is greater than the water solubility (160 g/l).
Source	:	Bayer Corporation Pittsburgh Toxicology and Regulatory Affairs Freeburg IL
Reliability	:	(2) valid with restrictions

28.01.2003 (12)

4.4 TOXICITY TO MICROORGANISMS E.G. BACTERIA

Type	:	aquatic
Species	:	activated sludge
Exposure period	:	3 hour(s)
Unit	:	mg/l
EC50	:	> 10000
Analytical monitoring	:	no
Method	:	other: Test for Inhibition of Oxygen Consumption by Activated Sludge, ISO 8192
Year	:	1988
GLP	:	no
Test substance	:	
Source	:	Bayer AG Leverkusen Bayer Corporation Pittsburgh Toxicology and Regulatory Affairs Freeburg IL
Test condition	:	direct weight

25.05.1994 (1)

5.1.1 ACUTE ORAL TOXICITY

Type : LD50
Value : = 3050 mg/kg bw
Species : rat
Strain :
Sex : male
Number of animals : 60
Vehicle : water
Doses : 1000, 2000, 3100, 3500, 3800, 4000 mg/kg
Method : other: Fink and Hund, Arzneim. - Forsch. 15, 1965, p. 624
Year :
GLP : no
Test substance : as prescribed by 1.1 - 1.4

Remark : Observation period after dosing was 14 days.

Stastical Method: Fink and Hund, Medical Research 15, 1965, 624.

Result : Mortality and necropsy data by dose/sex: (only male rats used)

dose (g/kg)	deaths	animals with symptoms	animals used
1.0	0	0	10
2.0	1	10	10
3.1	4	10	10
3.5	6	10	10
3.8	8	10	10
4.0	10	10	10

Source : Bayer AG Leverkusen
Bayer Corporation Pittsburgh
Toxicology and Regulatory Affairs Freeburg IL
Reliability : (2) valid with restrictions
Flag : Critical study for SIDS endpoint
27.01.2003 (8)

Type : LD50
Value : ca. 2560 mg/kg bw
Species : rat
Strain : no data
Sex :
Number of animals :
Vehicle : CMC
Doses :
Method :
Year : 1979
GLP :
Test substance :

Remark : The information presented is all that is available for this study. This study is considered supporting.

Result : Clinical observations were reduced activity, reduced grip strength, cyanosis, reduced pain reflex, disturbances of co-ordination, and anomalies of position. Dose-response information is not available.

Animals dying showed hemorrhage of the stomach and

Animals dying showed hemorrhage of the stomach and intestinal mucosa. Surviving animals were without adverse necropsy findings at the end of the 14-day observation period.

Source : Bayer AG Leverkusen
Bayer Corporation Pittsburgh
Toxicology and Regulatory Affairs Freeburg IL

Test substance : Calcium Formate, CAS Number 544-17-2

Reliability : (2) valid with restrictions

27.01.2003 (4)

Type : LD50
Value : = 2650 mg/kg bw
Species : rat
Strain :
Sex :
Number of animals :
Vehicle :
Doses :

Remark : The information presented is all that is available for this study. This study is considered supporting.

Source : Bayer AG Leverkusen
Bayer Corporation Pittsburgh
Toxicology and Regulatory Affairs Freeburg IL

Reliability : (4) not assignable

27.01.2003 (11)

Type : LD50
Value : = 1920 mg/kg bw
Species : mouse
Strain :
Sex :
Number of animals :
Vehicle :
Doses :

Remark : The information presented is all that is available for this study. This study is considered supporting.

Source : Bayer AG Leverkusen
Bayer Corporation Pittsburgh
Toxicology and Regulatory Affairs Freeburg IL

Reliability : (4) not assignable

27.01.2003 (10)

5.1.2 ACUTE INHALATION TOXICITY

5.1.3 ACUTE DERMAL TOXICITY

5.1.4 ACUTE TOXICITY, OTHER ROUTES

Type : LD50
Value : = 154 mg/kg bw

Species	:	mouse
Strain	:	
Sex	:	
Number of animals	:	
Vehicle	:	
Doses	:	
Route of admin.	:	i.v.
Exposure time	:	
Source	:	Bayer AG Leverkusen Bayer Corporation Pittsburgh Toxicology and Regulatory Affairs Freeburg IL
Reliability	:	(4) not assignable

16.11.2001 (10)

5.4 REPEATED DOSE TOXICITY

Type	:	
Species	:	rat
Sex	:	male/female
Strain	:	Wistar
Route of admin.	:	drinking water
Exposure period	:	Lifelong
Frequency of treatm.	:	Daily
Post exposure period	:	
Doses	:	200 mg/kg/day
Control group	:	yes, concurrent vehicle
NOAEL	:	= 200 mg/kg
Method	:	other
Year	:	
GLP	:	no
Test substance	:	
Method	:	The study design encompassed both a five-generation and chronic study in Wistar rats with calcium formate at 0.2% in drinking water. Eight males and 24 females were in the original test group with four controls of each sex. Both microscopic and pathologic investigations were done upon natural death of the animals. An additional series of experiments using 0.4% calcium formate in the drinking water was also in progress and was in the second year and second generation at the time of this publication, histopathology results were not available for this dose level.
Remark	:	Limitations to this study include the lack of data presentation for the 0.4% dose group, the limited description of the pathology and histopathology organ list and the modest size of the concurrent control group
Result	:	Bodyweights and bodyweight gains of treated and control animals were similar. Microscopic and histological investigation of lung, spleen, stomach, liver and kidneys showed no suspect findings. Occasional small phagocytic action in reticuloendothelium and reticulo-histocyto elements of lung, spleen and stomach lymph nodes were reported. Two benign spontaneous tumors were seen in old

reported. Two benign spontaneous tumors were seen in old animals and were considered not related to test substance administration.

The study at 0.4% calcium formate had been going on for about two years and it was reported that no disturbances (presumably mortality, body weight, fertility, or developmental toxicity) had been observed up to this point. Pathology and histopathology were in progress pending natural death of the test animals.

Source : Bayer Corporation Pittsburgh
Toxicology and Regulatory Affairs Freeburg IL

Test substance : Calcium Formate, CAS Number 544-17-2

Reliability : (2) valid with restrictions

18.11.2001 (10)

5.5 GENETIC TOXICITY 'IN VITRO'

Type : Ames test

System of testing : Salmonella typhimurium TA 1535, TA 100, TA 1537, TA 98

Test concentration : up to 12,500 ug test substance per plate

Cycotoxic concentr. : greater than 12,500 ug/plate in all strains

Metabolic activation : with and without

Result : negative

Method : OECD Guide-line 471

Year : 1983

GLP : yes

Test substance : other TS: purity > 99%

Method : Number of replicates:
Four plates per strain and dose, both with and without S9 mix

Chemical used to induce liver for S9 preparation:
2-aminoanthracene

Source : Bayer AG Leverkusen
Bayer Corporation Pittsburgh
Toxicology and Regulatory Affairs Freeburg IL

Test condition : The following concentrations of calcium formate were tested:
20, 100, 500, 2500, and 12,500 ug/plate.

Positive controls: Sodium azide (only TA 1535)
Nitrofurantoin (only TA 100)
4-Nitro-1,2-phenylene diamine
(only TA 1537 and TA 98)
2-Aminoanthracene

Solvents used: Deionized water was used with calcium formate and DMSO was used with the positive controls.

S9 mix was used for the stimulation of mammalian metabolism. It was made from the livers of adult male Sprague Dawley rats.

Reliability : (1) valid without restriction

27.01.2003 (2)

5.6 GENETIC TOXICITY 'IN VIVO'

5.7 CARCINOGENICITY

Species	:	rat
Sex	:	male/female
Strain	:	Wistar
Route of admin.	:	drinking water
Exposure period	:	3 years
Frequency of treatm.	:	daily
Post exposure period	:	no
Doses	:	0.2% (3 years), 0.4 % (2 years, pathology not reported)
Result	:	
Control group	:	yes, concurrent vehicle
Method	:	
Year	:	
GLP	:	
Test substance	:	

Method :

The study design encompassed both a five-generation and chronic study in Wistar rats with calcium formate at 0.2% in drinking water. Eight males and 24 females were in the original test group with four controls of each sex. Both microscopic and pathologic investigations were done upon natural death of the animals.

An additional series of experiments using 0.4% calcium formate in the drinking water was also in progress and was in the second year and second generation at the time of this publication, histopathology results were not available for this dose level

Remark :

Limitations to this study include the lack achieving a maximum tolerated dose, the modest size of the male F1 group, and the size of the concurrent control group

No of animals: 8 males and 24 females per dose in the F1 group

Result :

Bodyweights and bodyweight gains of treated and control animals were similar. Microscopic and histological investigation of lung, spleen, stomach, liver and kidneys showed no suspect findings. Occasional small phagocytic action in reticuloendothelium and reticulo-histocyto elements of lung, spleen and stomach lymph nodes were reported. Two benign spontaneous tumors were seen in old animals and were considered not related to test substance administration.

The study at 0.4% calcium formate had been going on for about two years and it was reported that no disturbances (presumably mortality, body weight, fertility, or developmental toxicity) had been observed up to this point. Pathology and histopathology were in progress pending

natural death of the test animals

Source : Bayer AG Leverkusen
Bayer Corporation Pittsburgh
Toxicology and Regulatory Affairs Freeburg IL

Test substance : Calcium Formate, CAS Number 544-17-2

Conclusion :

Signs of a chronic intoxication could not be detected by macroscopic or histopathological examinations. There was no increased tumor-rate

Reliability : (2) valid with restrictions

18.11.2001 (10)

5.8.1 TOXICITY TO FERTILITY

Type : Fertility
Species : rat
Sex : male/female
Strain : Wistar
Route of admin. : drinking water
Exposure period : 2-5 generations
Frequency of treatm. : daily
Premating exposure period
Male : 6 weeks
Female : 6 weeks
Duration of test : lifelong
No. of generation studies :
Doses : 0.2 % (5 generations); or 0.4 % (2 generations)
Control group : yes, concurrent vehicle
NOAEL parental : 200 mg/kg bw
NOAEL F1 offspring : 200 ml/kg bw
Method : other
Year :
GLP : no
Test substance : no data

Method :

The study design encompassed both a five-generation and chronic study in Wistar rats with calcium formate at 0.2% in drinking water. Eight males and 24 females were in the first generation group with four controls of each sex. The fertility of treated animals after 6, 7 or 10 weeks of administration was compared with the fertility of control after 8 weeks of study start. The text of this report indicates that a study with 0.4% calcium formate using the same protocol is in progress and in the second generation with no "disturbances" observed. Thus, it appears that 0.4% calcium formate does not have an adverse effect on fertility. As data were not provided, however, the 0.2% level is considered the reproductive NOEL in this study

Remark :

Limitations to this study include the lack of data presentation for the 0.4% dose group; not achieving maternal toxicity at the high dose level; and lack of details concerning reproductive parameters evaluated beyond number, weight and length of pups

No. of animals: 8 males and 24 females per dose level

Result :

Numbers of offspring, body weights and body lengths were not different for treated animals as compared with controls. No maternal toxicity was observed, no adverse effects on the offspring were observed on examination

Source : Bayer AG Leverkusen
Bayer Corporation Pittsburgh
Toxicology and Regulatory Affairs Freeburg IL

Test substance : Calcium Formate, CAS Number 544-17-2

Conclusion :

No reduction of fertility; no maternal toxicity; no embryotoxic or teratogenic effects were observed under these conditions. The NOEL for reproduction is 0.2% in drinking water or ca. 200 mg/kg

Reliability : (2) valid with restrictions

18.11.2001 (10)

5.8.2 DEVELOPMENTAL TOXICITY/TERATOGENICITY

Species : rat
Sex : female
Strain : Wistar
Route of admin. : drinking water
Exposure period : Continuous during entire period of gestation and at least six weeks prior to gestation.
Frequency of treatm. : daily
Duration of test :
Doses : 200 mg/kg/day
Control group : yes, concurrent vehicle
NOAEL maternal tox. : 200 mg/kg bw
NOAEL teratogen. : 200 mg/kg bw
Method : other
Year :
GLP : no
Test substance :

Method :

The study design encompassed both a five-generation and chronic study in Wistar rats with calcium formate at 0.2% in drinking water. Eight males and 24 females were in the first generation group with four controls of each sex. The fertility of treated animals after 6, 7 or 10 weeks of administration was compared with the fertility of control after 8 weeks of study start. A portion of the pups were sacrificed shortly after birth for evaluation of developmental toxicity. The text of this report indicates that a study with 0.4% calcium formate using the same protocol is in progress and in the second generation with no "disturbances" observed. Thus, it appears that 0.4% calcium formate does not have an adverse effect on developmental toxicity. As data were not provided, however, the 0.2% level is considered the developmental NOEL in this study

Remark : Limitations to this study include the lack of data presentation for the 0.4% dose group, not achieving maternal toxicity at the high dose level, and lack of details

toxicity at the high dose level, and lack of details concerning evaluation of the pups for major malformations and variations.

Alhtough the lack of maternal toxicity can be considered a deficiency, escessive dietary calcium is known to be fetotoxic in mice.

The dietary level uesd produced a dose of about 200 mg/kg-day calcium. Although there are no data to indicate that this dose produced hypercelcemia in the dams or offspring, it is known that significant hypercalcemia induces fetotoxicity (Liebgott B, Srebrolow G. Fetal toxicity caused by excessive maternal dietary calcium. J Can Dent Assoc 1989 Feb;55(2):129-33.). The mechanism is postulated to be suppression of para-thyroid hormone in the conceptus. Therefore, high levels of calcium formate will not serve as a robust model for formate developmental toxicity due to the disturbance of fetal calcium levels.

Result :

No statisical difference in organ and bone abnormalitites.
Growth of treated offspring was similar to controls

Source : Bayer Corporation Pittsburgh
Toxicology and Regulatory Affairs Freeburg IL

Test substance :

Calcium Formate, CAS Number 544-17-

Conclusion :

No reduction of fertility, maternal toxicity, embryotoxic or teratogenic effects were observed under these conditions.
The NOEL for developmental and maternal toxicity is 0.2% in drinking water or ca. 200 mg/kg

Reliability : (2) valid with restrictions
02.03.2003 (10)

9. References

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F007 10-06-2002
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F003 2.5
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F007 14-03-2002
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F003 2.5
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F005 1
F006 02-12-2002
F007 11-03-2002
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F003 2.4
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F005 9
F006 02-12-2002
F007 06-06-2002
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F003 2.4
F004 7
F005 7
F006 02-12-2002
F007 24-05-2000
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F003 2.4
F004 6
F005 6
F006 02-12-2002
F007 24-05-2000
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F002 1
F003 2.4
F004 5
F005 5
F006 02-12-2002
F007 24-01-2000
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F003 2.4
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F005 2
F006 02-12-2002
F007 04-05-2000
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F003 2.14
F004 6
F005 6
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F007 11-03-2002
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F003 2.14
F004 3
F005 3
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F007 11-03-2002
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F007 06-06-2002
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F003 2.1
F004 7
F005 7
F006 02-12-2002
F007 28-06-2002
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F003 2.10

F004 3
F005 3
F006 02-12-2002
F007 24-01-2000
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F003 2.11
F004 1
F005 1
F006 02-12-2002
F007 24-01-2000
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F003 2.13
F004 1
F005 1
F006 02-12-2002
F007 11-03-2002
EOB
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B051 DS_COMPONENT_TAB
F001 7822
F002 0
F003 64-18-6
F012 N
F010 02-12-2002
F004 492035623
F005 03-12-2002
F006 492035623
F007 03-12-2002
F008 Master überarbeitet
F009 A35-01
EOR
F001 7822
F002 1
F003 64-18-6
F012 N
F010 10-10-2002
F004 491000046
F005 12-11-1992
F006 491000046
F007 12-11-1992
F008 master
F009 A35-01
EOB
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B201 PC_MELTING_TAB
F001 7822
F002 1
F003 14-11-2001
F004 MEYERU
F015 A36-005
F007 A02-03
F008 8
EOR

F001 7822
F002 4
F003 14-11-2001
F004 MEYERU
F015 A36-005
F007 A02-03
F008 8.4
EOR
F001 7822
F002 6
F003 06-06-2002
F004 KONRAD
F015 A36-002
F007 A02-03
F008 -50.8
F010 A30-02
F011 A30-02
F012 P01-04
F013 2002
F014 A03-03
F020 A01-03
EOR
F001 7822
F002 7
F003 28-06-2002
F004 KONRAD
F015 A36-003
F007 A02-03
F008 -13.4
F010 A30-02
F011 A30-02
F012 P01-03: according to the European Pharmacopeia 1997 edition
F013 2002
F014 A03-01
F020 A01-03
EOR
F001 7822
F002 8
F003 02-12-2002
F004 IUC4
F015 A36-005
F007 A02-03
F008 8
EOB
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B202 PC_BOILING_TAB
F001 7822
F002 1
F003 04-05-2000
F004 KONRAD
F016 A36-005
F007 A02-03
F008 101
EOR
F001 7822
F002 2
F003 11-03-2002

F004 KONRAD
F016 A36-005
F007 A02-03
F008 100.6
F010 1013.25
F011 P02-01
EOR
F001 7822
F002 3
F003 24-01-2000
F004 KONRAD
F016 A36-005
F007 A02-03
F008 100.8
EOR
F001 7822
F002 5
F003 06-06-2002
F004 KONRAD
F016 A36-002
F007 A02-03
F008 107.3
F010 1013.25
F011 P02-01
F012 A30-02
F013 P03-03: Directive 92/69/ECC, part A.2 and A.4
F014 2002
F015 A03-03
F018 A01-03
EOR
F001 7822
F002 6
F003 02-12-2002
F004 IUC4
F016 A36-005
F007 A02-03
F008 101
EOB
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B203 PC_DENSITY_TAB
F001 7822
F002 1
F003 04-05-2000
F004 KONRAD
F016 A36-005
F007 P05-02
F008 A02-03
F009 1.22
F011 P18-01
F012 20
EOR
F001 7822
F002 2
F003 11-03-2002
F004 KONRAD
F016 A36-005
F007 P05-03

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F008 A02-03
F009 1.2223
F012 20
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F001 7822
F002 3
F003 24-05-2000
F004 KONRAD
F016 A36-005
F007 P05-03
F008 A02-03
F009 1.22
F012 20
EOR
F001 7822
F002 5
F003 02-12-2002
F004 IUC4
F016 A36-002
F007 P05-03
F008 A02-03
F009 1.1952
F012 20
F013 P04-04
F014 2002
F015 A03-03
F018 A01-03
EOR
F001 7822
F002 6
F003 02-12-2002
F004 IUC4
F016 A36-005
F007 P05-03
F008 A02-03
F009 1.2
EOB
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B204 PC_VAPOUR_TAB
F001 7822
F002 1
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F007 A02-03
F008 42
F010 P02-01
F011 20
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F002 2
F003 04-05-2000
F004 KONRAD
F015 A36-005
F007 A02-03
F008 170
F010 P02-01
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F003 24-01-2000
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F015 A36-005
F007 A02-03
F008 44
F010 P02-01
F011 20
EOR
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F002 6
F003 24-05-2000
F004 KONRAD
F015 A36-005
F007 A02-03
F008 46.7
F010 P02-01
F011 20
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F002 7
F003 24-05-2000
F004 KONRAD
F015 A36-005
F007 A02-03
F008 72
F010 P02-01
F011 30
EOR
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F002 9
F003 06-06-2002
F004 KONRAD
F015 A36-002
F007 A02-03
F008 24.2
F010 P02-01
F011 20
F012 P06-05
F013 2002
F014 A03-03
F017 A30-02
F018 A01-03
EOR
F001 7822
F002 10
F003 22-01-2003
F004 ABGABE_ECB_KO
F015 A36-005
F007 A02-03
F008 46
F010 P02-01
EOB
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B205 PC_PARTITION_TAB
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F004 KONRAD
F014 A36-005
F020 C15-001
EOR
F001 7822
F002 3
F003 14-03-2002
F004 ABGABE_ECB
F014 A36-003
F007 A02-03
F008 -.492
F011 P07-04: pro-logP (CompuDrug Ltd.)
F012 1989
F013 A03-01
F020 C15-001
EOR
F001 7822
F002 4
F003 14-03-2002
F004 ABGABE_ECB
F014 A36-003
F007 A02-03
F008 -.54
F010 20
F011 P07-05: flask method
F012 1951
F013 A03-01
F016 A01-02
F020 C15-001
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F001 7822
F002 5
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F014 A36-005
F008 -.54
F020 C15-001
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F002 7
F003 07-06-2002
F004 KONRAD
F014 A36-002
F007 A02-03
F008 -2.1
F010 23
F011 P07-06
F012 2002
F013 A03-03
F016 A01-03
F020 C15-001
F017 A02-03
F019 7

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F003 02-12-2002
F004 IUC4
F014 A36-005
F007 A02-03
F008 -.54
F020 C15-001
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B206 PC_WATER_SOL_TAB
F001 7822
F002 1
F003 11-03-2002
F004 KONRAD
F023 A36-005
F011 20
F013 2.2
F015 10
F016 P08-01
F017 20
F019 P14-01
F030 C14-001
EOR
F001 7822
F002 3
F003 11-03-2002
F004 KONRAD
F023 A36-005
F011 25
F019 P14-01
F030 C14-001
EOR
F001 7822
F002 5
F003 07-06-2002
F004 KONRAD
F023 A36-003
F019 P14-01
F020 P09-03: Standard Operation Procedure PCE/006/04 from GKA Analytik, BASF AG
F021 2002
F022 A03-03
F025 A01-03
F030 C14-001
F026 Because of complete miscibility, the dependence on temperature is
*    negligible and therefore not investigated.
F028 C47-002
EOR
F001 7822
F002 6
F003 02-12-2002
F004 IUC4
F023 A36-005
F019 P14-01
F030 C14-001
EOB
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B207 PC_FLASH_TAB
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F002 1
F003 14-03-2002
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F013 A36-003
F007 A02-03
F008 48
F009 P10-01
F010 P11-02: DIN 51 755
F011 1986
F012 A03-01
F015 A01-01
EOR
F001 7822
F002 2
F003 02-12-2002
F004 IUC4
F013 A36-005
F007 A02-03
F008 69
EOB
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B208 PC_AUTO_FLAMM_TAB
F001 7822
F002 1
F003 04-05-2000
F004 KONRAD
F015 A36-005
F008 480
F012 P13-03: DIN 51 794
EOR
F001 7822
F002 3
F003 14-03-2002
F004 ABGABE_ECB
F015 A36-003
F007 A02-03
F008 505
F012 P13-03: DIN 51 794
F013 1980
F014 A03-01
F017 A01-01
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F001 7822
F002 4
F003 02-12-2002
F004 IUC4
F015 A36-005
F007 A02-03
F008 520
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B210 PC_EXPL_TAB
F001 7822
F002 3
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F003 24-01-2000
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F011 A36-003
F007 P22-05
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B211 PC_OXID_TAB
F001 7822
F002 1
F003 24-01-2000
F004 KONRAD
F011 A36-003
F007 P20-02
EOB
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B014 PC_VISCOSITY_TAB
F001 7822
F002 1
F003 11-03-2002
F004 KONRAD
F005 A36-005
F010 1.8
F012 C23-001
F013 20
EOB
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B212 PC_OTHER_TAB
F001 7822
F002 3
F003 11-03-2002
F004 KONRAD
F008 A36-003
F009 Explosion limits
EOR
F001 7822
F002 5
F003 11-03-2002
F004 KONRAD
F008 A36-005
F009 Stability and reactivity
EOR
F001 7822
F002 6
F003 11-03-2002
F004 KONRAD
F008 A36-005
F009 Appearance
EOR
F001 7822
F002 7
F003 02-12-2002
F004 IUC4
F009 Appearance
EOR
F001 7822
F002 8
F003 02-12-2002

F004 IUC4
F008 A36-005
F009 Relative vapour density
EOR
F001 7822
F002 9
F003 02-12-2002
F004 IUC4
F008 A36-005
F009 Realtive density of the vapour/air-mixture
EOR
F001 7822
F002 10
F003 02-12-2002
F004 IUC4
F008 A36-005
F009 Explosion limits
EOB
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B301 EN_PHOTODEGRADATION_TAB
F001 7822
F002 1
F003 22-01-2003
F004 ABGABE_ECB_KO
F008 F01-04
F034 F06-03
F038 A02-03
F040 50
F041 .9
F042 F05-05
EOR
F001 7822
F002 2
F003 22-01-2003
F004 ABGABE_ECB_KO
F008 F01-04
F034 F06-03
EOR
F001 7822
F002 3
F003 22-01-2003
F004 ABGABE_ECB_KO
F008 F01-01
F034 F06-03
F035 500000
F036 F07-02
F038 A02-03
F040 50
F041 35.7
F042 F05-01
EOR
F001 7822
F002 4
F003 22-01-2003
F004 ABGABE_ECB_KO
F008 F01-02: water / air
EOR

F001 7822
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F003 22-01-2003
F004 ABGABE_ECB_KO
F008 F01-02
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F001 7822
F002 6
F003 22-01-2003
F004 ABGABE_ECB_KO
F045 A36-003
F008 F01-04
EOR
F001 7822
F002 7
F003 22-01-2003
F004 ABGABE_ECB_KO
F045 A36-003
F008 F01-04
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B302 EN_STABILITY_IN_WATER_TAB
F001 7822
F002 3
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F004 ABGABE_ECB_KO
F040 A36-002
F007 A01-03
F008 F08-01
F009 F09-09
F010 2002
F039 A03-03
F042 E34-02
EOB
C
B304 EN_MONITORING_TAB
F001 7822
F002 1
F003 22-01-2003
F004 ABGABE_ECB_KO
F007 F19-03
F008 F35-08: food / rain
EOR
F001 7822
F002 2
F003 22-01-2003
F004 ABGABE_ECB_KO
F007 F19-03
F008 F35-08: industrial effluent (paper manufacture)
EOR
F001 7822
F002 3
F003 22-01-2003
F004 ABGABE_ECB_KO
F007 F19-03
F008 F35-08: sewage & effluents (oxidation pond water)
EOR

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F001 7822
F002 4
F003 22-01-2003
F004 ABGABE_ECB_KO
F007 F19-03
F008 F35-08: surface water (lake)
EOR
F001 7822
F002 5
F003 22-01-2003
F004 ABGABE_ECB_KO
F007 F19-03
F008 F35-08: surface water (Ohio river)
EOR
F001 7822
F002 6
F003 22-01-2003
F004 ABGABE_ECB_KO
F007 F19-03
F008 F35-08: industrial influent/effluent (kraft pulp)
EOR
F001 7822
F002 7
F003 22-01-2003
F004 ABGABE_ECB_KO
F007 F19-03
F008 F35-02
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F001 7822
F002 8
F003 22-01-2003
F004 ABGABE_ECB_KO
F007 F19-03
F008 F35-08
EOR
F001 7822
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F003 22-01-2003
F004 ABGABE_ECB_KO
F009 A36-005
F007 F19-03
F008 F35-01
EOR
F001 7822
F002 10
F003 13-01-2003
F004 IUC4
F009 A36-005
F007 F19-03
F008 F35-08: dry deposition
EOB
C
B305 EN_TRANSPORT_TAB
F001 7822
F002 1
F003 22-01-2003
F004 ABGABE_ECB_KO
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F007 F20-03
F008 F22-03
F009 F21-01
EOR
F001 7822
F002 3
F003 22-01-2003
F004 ABGABE_ECB_KO
F011 A36-002
F007 F20-01
F008 F22-04
F009 F21-01: OECD-Guideline for the Testing of Chemicals, Proposal for a new
*    Guideline 121. Estimation of the Adsorption Coefficient (Koc) on Soil and
*    on Sewage Sludge using High-Performance Liquid Chromatography (HPLC),
*    January 2001
F010 2002
EOR
F001 7822
F002 4
F003 22-01-2003
F004 ABGABE_ECB_KO
F007 F20-03
F008 F22-03
EOB
C
B306 EN_DISTRIBUTION_TAB
F001 7822
F002 3
F003 22-01-2003
F004 ABGABE_ECB_KO
F010 A36-003
F007 F24-02
F008 F23-01
EOB
C
B308 EN_BIODEGRADATION_TAB
F001 7822
F002 3
F003 22-01-2003
F004 ABGABE_ECB_KO
F008 F25-01
F009 F26-25: dilution method; (BOD of THOD)
F011 F27-0156: fresh-water
F012 20
F013 F28-02
F014 F29-03
F015 A02-03
F017 40.5
F018 5
F019 F05-01
EOR
F001 7822
F002 4
F003 22-01-2003
F004 ABGABE_ECB_KO
F008 F25-01
F009 F26-25: respirometric dilution method; (BOD of THOD)
```

F011 F27-0156: sewage, domestic
F015 A02-06
F017 80
F018 5
F019 F05-01
EOR
F001 7822
F002 5
F003 22-01-2003
F004 ABGABE_ECB_KO
F008 F25-01
F009 F26-25: dilution method; (BOD of THOD)
F011 F27-0156: salt water, synthetic
F012 40
F013 F28-02
F014 F29-03
F015 A02-03
F017 51.7
F018 5
F019 F05-01
EOR
F001 7822
F002 7
F003 22-01-2003
F004 ABGABE_ECB_KO
F008 F25-01
F009 F26-25: closed bottle-test; (BOD of THOD)
F011 F27-0156: freshwater, adapted
F015 A02-03
F017 51
F018 5
F019 F05-01
EOR
F001 7822
F002 8
F003 22-01-2003
F004 ABGABE_ECB_KO
F008 F25-01
F009 F26-25: closed bottle-test; (BOD of THOD)
F011 F27-0156: salt water, synthetic
F015 A02-03
F017 62
F018 5
F019 F05-01
EOR
F001 7822
F002 9
F003 22-01-2003
F004 ABGABE_ECB_KO
F008 F25-01
F009 F26-25: method according to Warburg; (BOD of THOD)
F011 F27-0137
F012 500
F013 F28-02
F014 F29-03
F015 A02-03
F017 70

F018 1
F019 F05-01
EOR
F001 7822
F002 10
F003 22-01-2003
F004 ABGABE_ECB_KO
F047 A36-003
F007 A01-03: formic acid, purity: 99 %
F008 F25-01
F009 F26-25: Directive 79/831/EEC, Annex V, Part C3
F010 1984
F011 F27-0166: effluent of a municipal wastewater treatment plant
F012 72
F013 F28-02
F014 F29-03
F017 98
F018 14
F019 F05-01
F020 F30-03
F021 A02-06
F023 0
F024 1
F025 F31-01
F028 12
F029 7
F030 F31-01
F033 26
F034 10
F035 F31-01
F038 93
F039 13
F040 F31-01
F043 98
F044 14
F045 F31-01
F058 88
F059 1
F060 F31-01
F063 94
F064 13
F065 F31-01
F046 A03-01
F049 20
F050 F28-02
F051 F29-02
F052 14
F053 F05-01
F055 E34-03
F066 E36-002
EOR
F001 7822
F002 11
F003 22-01-2003
F004 ABGABE_ECB_KO
F047 A36-003
F007 A01-03: formic acid, purity: 99 %

F008 F25-01
F009 F26-25: Directive 79/831/EEC, Annex V, Part C3
F010 1984
F011 F27-0166: effluent of a municipal wastewater treatment plant
F012 77
F013 F28-02
F014 F29-03
F017 99
F018 11
F019 F05-01
F020 F30-03
F023 4
F024 6
F025 F31-01
F028 13
F029 7
F030 F31-01
F033 38
F034 8
F035 F31-01
F038 100
F039 9
F040 F31-01
F043 99
F044 11
F045 F31-01
F058 17
F059 1
F060 F31-01
F063 98
F064 3
F065 F31-01
F046 A03-01
F049 20
F050 F28-02
F051 F29-02
F052 11
F053 F05-01
F066 E36-002
EOR
F001 7822
F002 12
F003 22-01-2003
F004 ABGABE_ECB_KO
F047 A36-003
F007 A01-03: mixture of formic acid and citric acid (1:1)
F008 F25-01
F009 F26-25: Directive 79/831/EEC, Annex V, Part C3
F010 1984
F011 F27-0166: effluent of a municipal wastewater treatment plant
F012 64
F013 F28-02
F014 F29-03
F017 99
F018 4
F019 F05-01
F020 F30-03

F023 0
F024 1
F025 F31-01
F028 67
F029 2
F030 F31-01
F033 98
F034 3
F035 F31-01
F038 99
F039 4
F040 F31-01
F058 17
F059 1
F060 F31-01
F063 98
F064 3
F065 F31-01
F046 A03-01
F049 22
F050 F28-02
F051 F29-02
F052 4
F053 F05-01
F066 E36-002
EOR
F001 7822
F002 13
F003 05-12-2002
F004 IUC4
F047 A36-005
F008 F25-01
F011 F27-0166: Bacteria from undiluted night soil
EOR
F001 7822
F002 14
F003 22-01-2003
F004 ABGABE_ECB_KO
F047 A36-005
F008 F25-02
F011 F27-0166: anoxic marine sediment
EOR
F001 7822
F002 15
F003 22-01-2003
F004 ABGABE_ECB_KO
F008 F25-01
F009 F26-25: closed bottle-test; (BOD of THOD)
F011 F27-0156: fresh-water non-adapted
F015 A02-03
F017 48
F018 5
F019 F05-01
EOB
C
B310 EN_BIOACCUMULATION_TAB
F001 7822

F002 1
F003 22-01-2003
F004 ABGABE_ECB_KO
F009 F34-06
EOR
F001 7822
F002 2
F003 22-01-2003
F004 ABGABE_ECB_KO
F009 F34-06
F016 A02-06
F017 .22
EOB
C
B401 EC_FISHTOX_TAB
F001 7822
F002 1
F003 22-01-2003
F004 ABGABE_ECB_KO
F007 A01-02
F008 E01-03: no data
F009 E02-0070
F010 E03-05: Freeman, L.: Sewage Ind. Wastes 25 (7), 845
F011 1953
F012 24
F013 E04-02
F014 E05-02
F021 A02-03
F022 175
F031 A03-02
F032 A03-01
EOR
F001 7822
F002 2
F003 22-01-2003
F004 ABGABE_ECB_KO
F007 A01-02
F008 E01-03: no data
F009 E02-0068
F010 E03-05: Freeman, L.: Sewage Ind. Wastes 25 (7), 845
F011 1953
F012 24
F013 E04-02
F014 E05-02
F021 A02-03
F022 5000
F031 A03-02
F032 A03-02
EOR
F001 7822
F002 4
F003 22-01-2003
F004 ABGABE_ECB_KO
F007 A01-02
F008 E01-05
F009 E02-0075
F010 E03-05: German Industrial Standard DIN 38412, Part 15

F012 48
F013 E04-02
F014 E05-02
F015 A02-03
F016 100
F021 A02-03
F022 122
F031 A03-01
F032 A03-03
EOR
F001 7822
F002 5
F003 22-01-2003
F004 ABGABE_ECB_KO
F033 A36-002
F007 A01-03: formic acid, purity: 95.3 %
F008 E01-05
F009 E02-0075
F010 E03-05: closely followed German Industrial Standard DIN 38 412, Part 15
F011 1982
F012 96
F013 E04-02
F014 E05-02
F015 A02-03
F016 22
F021 A02-04
F022 46
F023 100
F031 A03-01
F032 A03-01
F043 E35-02
F045 E35-02
EOR
F001 7822
F002 6
F003 22-01-2003
F004 ABGABE_ECB_KO
F033 A36-005
F009 E02-0033
F012 24
F013 E04-02
F014 E05-02
F024 A02-03
F025 45
EOB
C
B402 EC_DAPHNIATOX_TAB
F001 7822
F002 3
F003 22-01-2003
F004 ABGABE_ECB_KO
F008 E06-0010
F011 48
F012 E04-02
F013 E05-02
F020 A02-03
F021 120

EOR
F001 7822
F002 4
F003 22-01-2003
F004 ABGABE_ECB_KO
F008 E06-0030: Artemia salina (Naupliuslarven)
F011 24
F012 E04-02
F013 E05-02
F026 LC50
F027 A02-03
F028 410
EOR
F001 7822
F002 5
F003 22-01-2003
F004 ABGABE_ECB_KO
F008 E06-0010
F009 E07-04: inhibition of swimming ability (immobilisation)
F011 48
F012 E04-02
F013 E05-02
F020 A02-03
F021 151.2
EOR
F001 7822
F002 6
F003 22-01-2003
F004 ABGABE_ECB_KO
F032 A36-002
F007 A01-03: formic acid, purity: 95.5 %
F008 E06-0010
F009 E07-04: Directive 79/831/EEC, Annex V, Part C
F010 1984
F011 48
F012 E04-02
F013 E05-02
F017 A02-03
F018 25
F020 A02-03
F021 32.19
F023 A02-03
F024 50
F030 A03-01
F031 A03-01
F042 E01-05
F044 E35-02
F045 E35-02
F046 E35-02
EOB
C
B403 EC_ALGAETOX_TAB
F001 7822
F002 3
F003 22-01-2003
F004 ABGABE_ECB_KO
F008 E08-0053

F009 E09-04: cell multiplication inhibition test
F012 96
F013 E04-02
F014 E05-02
F030 TGK
F031 A02-03
F032 100
EOR
F001 7822
F002 4
F003 22-01-2003
F004 ABGABE_ECB_KO
F036 A36-002
F007 A01-03: formic acid, purity: 95.5 %
F008 E08-0055
F009 E09-04: closely following German Industrial Standard DIN 38412, Part 9
F011 E10-02
F012 72
F013 E04-02
F014 E05-02
F024 A02-03
F025 21.1
F027 A02-03
F028 32.6
F030 EC90
F031 A02-03
F032 43.3
F034 A03-01
F035 A03-01
F049 E35-02
F050 E35-02
F051 E35-02
EOR
F001 7822
F002 5
F003 22-01-2003
F004 ABGABE_ECB_KO
F036 A36-004
F007 A01-03: formic acid, purity: 95.5 %
F008 E08-0055
F009 E09-04: closely following German Industrial Standard DIN 38412, Part 9
F012 72
F013 E04-02
F014 E05-02
F027 A02-03
F028 22.5
F030 EC20
F031 A02-03
F032 1.04
F033 15.7
F034 A03-01
F035 A03-01
F050 E35-02
F051 E35-02
F038 EC90
F052 E35-02
F039 A02-03

F040 43.6
EOB
C
B404 EC_BACTOX_TAB
F001 7822
F002 4
F003 22-01-2003
F004 ABGABE_ECB_KO
F009 E11-0055
F012 24
F013 E04-02
F014 E05-02
F024 NOEC
F025 A02-03
F026 1000
EOR
F001 7822
F002 5
F003 22-01-2003
F004 ABGABE_ECB_KO
F034 A36-002
F007 A01-03: formic acid, purity: 95.5 %
F008 E29-01
F009 E11-0109
F010 E12-06: following German Industrial Standard DIN 38412, Part 8 (draft)
F012 17
F013 E04-02
F014 E05-02
F018 A02-03
F019 33.9
F021 A02-03
F022 46.7
F024 EC90
F025 A02-03
F026 59.5
F032 A03-01
F033 A03-01
F037 E35-02
F038 E35-02
F039 E35-02
EOR
F001 7822
F002 6
F003 22-01-2003
F004 ABGABE_ECB_KO
F034 A36-003
F007 A01-03: formic acid, purity: 99 %
F008 E29-01
F009 E11-0007
F010 E12-06: following OECD Guide-line 209
F011 1984
F012 30
F013 E04-03
F014 E05-02
F024 EC20
F025 A02-04
F026 988

F032 A03-01
F033 A03-01
F039 E35-02
EOR
F001 7822
F002 7
F003 05-12-2002
F004 IUC4
F034 A36-005
F009 E11-0142
F014 E05-02
F024 EC95
F025 A02-06
F026 184
EOB
C
B407 EC_SOILDWELLINGTOX_TAB
F001 7822
F002 1
F003 05-12-2002
F004 IUC4
F033 A36-005
F009 E20-0036: Doryalismus
F015 E33-03: mg/L
F016 A02-01
F017 46
EOB
C
B409 EC_OTHER_SPEC_TAB
F001 7822
F002 1
F003 22-01-2003
F004 ABGABE_ECB_KO
F008 E26-08: Rotschulter-Staerling
F009 E27-03: acute toxicity test
F014 E32-01
F027 LD50
F028 A02-04
F029 111
EOR
F001 7822
F002 2
F003 22-01-2003
F004 ABGABE_ECB_KO
F007 A01-02
F008 E26-08: redwinged blackbird
F009 E27-03
F011 E28-02: mortality and repellency
F027 LD50
F028 A02-05
F029 111
F031 A03-02
EOB
C
B412 EC_OTHER_TAB
F001 7822
F002 1

F003 22-01-2003
F004 ABGABE_ECB_KO
F009 Aedes aegyptii (insect larva): LC50 = 400 mg/l (4 h), or LC50 = 0.04 %
* v/v (4 h) respectively; 22 - 24 °C.
EOB
C
B501 TO_ACUTE_ORAL_TAB
F001 7822
F002 1
F003 06-09-1995
F004 HEDSET
F007 A01-02
F008 T01-03
F009 T02-24
F010 T03-03: no data
F012 A02-03
F013 1830
F015 T04-01
F016 A03-01
EOR
F001 7822
F002 2
F003 06-09-1995
F004 HEDSET
F007 A01-02
F008 T01-03
F009 T02-24
F010 T03-03: no data
F012 A02-03
F013 1210
F015 T04-01
F016 A03-01
EOR
F001 7822
F002 3
F003 06-09-1995
F004 HEDSET
F007 A01-02
F008 T01-03
F009 T02-18
F010 T03-03: no data
F012 A02-03
F013 1100
F015 T04-01
F016 A03-01
EOR
F001 7822
F002 4
F003 05-09-1995
F004 HEDSET
F007 A01-03
F008 T01-05
F009 T02-07
F010 T03-03: no data
F012 A02-03
F013 4000
F015 T04-01

F016 A03-01
EOR
F001 7822
F002 5
F003 05-09-1995
F004 HEDSET
F007 A01-03
F008 T01-03
F009 T02-18
F010 T03-03: no data
F012 A02-03
F013 11200
F015 T04-01
F016 A03-01
EOR
F001 7822
F002 6
F003 05-09-1995
F004 HEDSET
F007 A01-03
F008 T01-03
F009 T02-18
F010 T03-03: no data
F012 A02-03
F013 1920
F015 T04-01
F016 A03-01
EOR
F001 7822
F002 8
F003 07-12-1995
F004 HEDSET
F007 A01-02
F008 T01-03
F009 T02-18
F010 T03-03: no data
F012 A02-03
F013 700
F015 T04-01
F016 A03-02
EOR
F001 7822
F002 9
F003 26-03-2002
F004 KONRAD
F007 A01-01
F008 T01-03
F009 T02-24
F010 T03-02
F011 1981
F012 A02-03
F013 730
F015 T04-01
F016 A03-02
EOR
F001 7822
F002 11

F003 07-12-1995
F004 HEDSET
F007 A01-02
F008 T01-03
F009 T02-24
F010 T03-03: no data
F012 A02-03
F013 1100
F015 T04-01
F016 A03-02
EOR
F001 7822
F002 12
F003 23-10-1995
F004 HEDSET
F007 A01-03
F008 T01-03
F009 T02-24
F010 T03-03
F012 A02-03
F013 3050
F015 T04-01
F016 A03-01
EOR
F001 7822
F002 13
F003 28-07-1997
F004 SCHULTE
F007 A01-03
F008 T01-04
F009 T02-23
F010 T03-03
F012 A02-04
F013 4000
F015 T04-01
F016 A03-02
EOR
F001 7822
F002 14
F003 29-07-1997
F004 SCHULTE
F007 A01-03
F008 T01-04
F009 T02-26
F010 T03-03
F016 A03-02
EOB
C
B502 TO_ACUTE_INHAL_TAB
F001 7822
F002 1
F003 26-03-2002
F004 KONRAD
F007 A01-01
F008 T05-03
F009 T02-24
F010 T06-03: BASF-Test

F011 1980
F012 A02-03
F013 7.4
F015 T07-01
F016 4
F017 T08-01
F018 A03-01
EOR
F001 7822
F002 2
F003 06-09-1995
F004 HEDSET
F007 A01-02
F008 T05-03
F009 T02-24
F010 T06-03: no data
F012 A02-03
F013 15
F015 T07-01
F016 15
F017 T08-02
F018 A03-02
EOR
F001 7822
F002 3
F003 07-12-1995
F004 HEDSET
F007 A01-02
F008 T05-03
F009 T02-18
F010 T06-03: no data
F012 A02-03
F013 6.2
F015 T07-01
F016 15
F017 T08-02
F018 A03-02
EOR
F001 7822
F002 4
F003 06-09-1995
F004 HEDSET
F007 A01-01
F008 T05-05: IRT
F009 T02-24
F010 T06-03: in Anlehnung an die von H.F. Smith et al.: Am. Ind. Hyg. Ass.J.
*   23, 95-107 (1962) beschriebene Methode durchgefuehrt
F011 1962
F016 50
F017 T08-02
F018 A03-01
EOR
F001 7822
F002 5
F003 05-09-1995
F004 HEDSET
F007 A01-03

F008 T05-05: IRT
F009 T02-24
F010 T06-03: in Anlehnung an die von H.F. Smith et al: Am. Ind. Hyg. Ass. J.
* 23, 95-107 (1962) beschriebene Methode durchgefuehrt
F011 1962
F016 7
F017 T08-01
F018 A03-01
EOR
F001 7822
F002 6
F003 05-09-1995
F004 HEDSET
F007 A01-03
F008 T05-05: IRT
F009 T02-24
F010 T06-03: BASF-Test
F016 7
F017 T08-01
F018 A03-01
EOR
F001 7822
F002 7
F003 05-09-1995
F004 HEDSET
F007 A01-03
F008 T05-05: IRT
F009 T02-24
F010 T06-03: BASF-Test
F016 7
F017 T08-01
F018 A03-01
EOR
F001 7822
F002 8
F003 06-09-1995
F004 HEDSET
F007 A01-02
F008 T05-05: IRT
F009 T02-24
F010 T06-02
F011 1981
F016 10
F017 T08-02
F018 A03-02
EOR
F001 7822
F002 9
F003 16-05-2000
F004 CREUTZIGER
F007 A01-03
F008 T05-05: IRT
F009 T02-24
F010 T06-03: IRT
F011 1981
F016 116
F017 T08-02

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F018 A03-01
F021 T24-03
F022 6
EOB
C
B504 TO_ACUTE_OTHER_TAB
F001 7822
F002 1
F003 07-12-1995
F004 HEDSET
F007 A01-02
F008 T10-07
F009 T02-18
F010 T11-02
F011 other: no data
F013 A02-03
F014 940
F016 T12-01
F019 A03-01
EOR
F001 7822
F002 2
F003 07-12-1995
F004 HEDSET
F007 A01-02
F008 T10-07
F009 T02-18
F010 T11-03
F011 other: no data
F013 A02-03
F014 145
F016 T12-01
F019 A03-01
EOR
F001 7822
F002 3
F003 06-09-1995
F004 HEDSET
F007 A01-02
F008 T10-09: MLD
F009 T02-23
F010 T11-03
F011 other: no data
F013 A02-03
F014 239
F016 T12-01
F019 A03-01
EOR
F001 7822
F002 4
F003 28-07-1997
F004 SCHULTE
F007 A01-03
F008 T10-05
F009 T02-23
F010 T11-06
F011 other
```

F013 A02-04
F014 300
F016 T12-01
F019 A03-02
EOR
F001 7822
F002 5
F003 29-07-1997
F004 SCHULTE
F007 A01-03
F008 T10-08
F009 T02-23
F010 T11-06
F011 other
F019 A03-02
EOB
C
B505 TO_SKIN_IRRITATION_TAB
F001 7822
F002 1
F003 26-03-2002
F004 KONRAD
F007 A01-02
F008 T02-23
F009 T14-06: no data
F012 T46-01
F013 A03-01
EOR
F001 7822
F002 2
F003 06-09-1995
F004 HEDSET
F007 A01-02
F008 T02-23
F009 T14-06: 610 mg offen
F013 A03-01
EOR
F001 7822
F002 3
F003 23-10-1995
F004 HEDSET
F007 A01-02
F008 T02-19: no data
F009 T14-06
F012 T46-02
F013 A03-02
EOB
C
B506 TO_EYE_IRRITATION_TAB
F001 7822
F002 1
F003 06-09-1995
F004 HEDSET
F007 A01-02
F008 T02-23
F009 T16-04: Applikation auf die Cornea
F012 T46-04

F013 A03-02
EOR
F001 7822
F002 2
F003 06-09-1995
F004 HEDSET
F007 A01-02
F008 T02-19: keine Angabe
F009 T16-04: no data
F012 T46-04
F013 A03-01
EOR
F001 7822
F002 4
F003 26-03-2002
F004 KONRAD
F007 A01-02
F008 T02-23
F009 T16-04: no data
F012 T46-04
F013 A03-01
EOB
C
B507 TO_SENSITIZATION_TAB
F001 7822
F002 1
F003 25-03-2002
F004 KONRAD
F007 A01-02
F008 T18-13
F009 T02-13
F010 T20-03: no data
F014 A03-02
EOR
F001 7822
F002 2
F003 19-06-2002
F004 KONRAD
F015 A36-002
F007 A01-03
F008 T18-01
F009 T02-10
F010 T20-02
F011 1992
F012 T47-01
F013 T21-02
F014 A03-03
F018 T53-001
F019 7.5
F020 T49-002
F021 T54-002
F022 T53-001
F023 7.5
F024 T49-002
F025 T54-002
F026 T53-001
F027 7.5

F028 T49-002
F029 T54-002
F030 T52-007
EOB
C
B508 TO_REPEATED_DOSE_TAB
F001 7822
F002 1
F003 11-09-1995
F004 HEDSET
F007 A01-02
F008 T02-24
F009 T23-47
F010 T24-04
F011 T25-09
F012 T26-16: no data
F014 5-6 Wochen
F015 kontinuierlich im Futter
F016 keine Angaben
F017 0.5 und 1.0% (=2500 mg/kg/d nach Angabe der Autoren, keine Angaben ob 0.5
* oder 1.0%)
F018 T27-04
F029 A03-01
EOR
F001 7822
F002 2
F003 11-09-1995
F004 HEDSET
F007 A01-02
F008 T02-24
F009 T23-47
F010 T24-03
F011 T25-02
F012 T26-16: no data
F014 bis zu 27 Wochen
F015 kontinuierlich im Trinkwasser
F016 keine Angaben
F017 8.2, 10.25, 90, 160, 360 mg/kg/d
F018 T27-02
F029 A03-01
EOR
F001 7822
F002 3
F003 06-09-1995
F004 HEDSET
F007 A01-03
F008 T02-24
F009 T23-46
F010 T24-03
F011 T25-02
F012 T26-16: no data
F014 lebenslang (2-3 Jahre)
F015 kontinuierlich im Trinkwasser
F016 keine
F017 0.2 und 0.4% (=150-200 mg/kg/d in der niedrigen Dosierung nach Angabe der
* Autoren)
F018 T27-04

F029 A03-01
EOR
F001 7822
F002 4
F003 06-09-1995
F004 HEDSET
F007 A01-03
F008 T02-24
F009 T23-46
F010 T24-04
F011 T25-02
F012 T26-16: no data
F014 1.5 Jahre
F015 kontinuierlich im Trinkwasser
F016 keine
F017 1% (= 274 mg/Tier Formiat bzw. 185 mg/Tier berechnet auf Ameisensaeure
* nach Angabe der Autoren)
F018 T27-02
F029 A03-01
EOR
F001 7822
F002 5
F003 06-09-1995
F004 HEDSET
F007 A01-02
F008 T02-24
F009 T23-46
F010 T24-02
F011 T25-08
F012 T26-16
F014 3-8 Tage
F015 6 h tgl.
F016 keine Angabe
F017 0.037 mg/l (20 ppm)
F018 T27-05
F029 A03-02
EOR
F001 7822
F002 6
F003 06-09-1995
F004 HEDSET
F007 A01-02
F008 T02-07
F009 T23-47
F010 T24-04
F011 T25-09
F012 T26-16: no data
F014 keine Angabe
F015 taeglich
F016 keine Angabe
F017 500 mg/Tier (?)
F018 T27-02
F029 A03-01
EOR
F001 7822
F002 7
F003 26-03-2002

F004 KONRAD
F007 A01-03
F008 T02-24
F009 T23-16
F010 T24-03
F011 T25-08
F012 T26-16
F014 13 weeks
F015 5 days/week, 6 hours/day
F016 none
F017 0.015; 0.030; 0.061; 0.122; 0.244 mg/l (8, 16, 32, 64, 128 ppm) as vapour
F018 T27-04
F020 .06
F022 T28-04
F025 .12
F027 T28-04
F029 A03-03
EOR
F001 7822
F002 8
F003 11-09-1995
F004 HEDSET
F007 A01-02
F008 T02-18
F009 T23-03
F010 T24-04
F011 T25-08
F012 T26-16
F014 13 Wochen
F015 5 Tage pro Woche, 6 Stunden pro Tag
F016 keine
F017 0.015; 0.030; 0.061; 0.122; 0.244 mg/l (8, 16, 32, 64, 128 ppm)
F018 T27-04
F020 .06
F022 T28-04
F025 .12
F027 T28-04
F029 A03-02
EOR
F001 7822
F002 9
F003 11-09-1995
F004 HEDSET
F007 A01-02
F008 T02-24
F009 T23-16
F010 T24-03
F011 T25-08
F012 T26-16
F014 12 Tage
F015 5 Tage pro Woche, 6 Stunden pro Tag
F016 1 Tag
F017 0.06; 0.12; 0.24; 0.48; 0.95 mg/l (31; 62.5; 125; 250; 500 ppm)
F018 T27-04
F020 .06
F022 T28-04
F025 .12

F027 T28-04
F029 A03-01
EOR
F001 7822
F002 10
F003 11-09-1995
F004 HEDSET
F007 A01-02
F008 T02-24
F009 T23-47
F010 T24-04
F011 T25-02
F012 T26-16: no data
F014 6 Wochen
F015 kontinuierlich im Trinkwasser
F016 keine Angaben
F017 0.5 und 1.0% (ca. 2500 mg/kg/d nach Angabe der Autoren, keine Angabe ob
* 0.5 oder 1.0%)
F018 T27-04
F029 A03-01
EOR
F001 7822
F002 11
F003 11-09-1995
F004 HEDSET
F007 A01-02
F008 T02-18
F009 T23-03
F010 T24-03
F011 T25-08
F012 T26-16
F014 12 Tage
F015 5 Tage pro Woche, 6 Stunden pro Tag
F016 1 Tag
F017 0.06; 0.12; 0.24; 0.48; 0.95 mg/l (31; 62.5; 125; 250; 500 ppm)
F018 T27-04
F020 .06
F022 T28-04
F025 .12
F027 T28-04
F029 A03-01
EOR
F001 7822
F002 12
F003 11-09-1995
F004 HEDSET
F007 A01-02
F008 T02-18
F009 T23-44
F010 T24-04
F011 T25-01
F012 T26-16
F014 50 Tage
F015 2 mal pro Woche
F016 keine
F017 keine Angaben
F018 T27-04

F029 A03-01
EOB
C
B509 TO_GENETIC_IN_VITRO_TAB
F001 7822
F002 1
F003 06-09-1995
F004 HEDSET
F007 A01-02
F008 T30-01
F009 T31-18
F011 Salmonella typhimurium TA98, TA100, TA1535, TA1537
F012 T32-03
F014 A03-02
F015 keine Angaben
EOR
F001 7822
F002 2
F003 26-03-2002
F004 KONRAD
F007 A01-03
F008 T30-01
F009 T31-18: Haworth, S. et al.: Environ. Mutagen. 5, Suppl. 1, 3-142
F010 1983
F011 Salmonella typhimurium TA97, TA98, TA100, TA1535
F012 T32-03
F014 A03-01
F015 10, 33, 100, 333, 1000, 3333 ug/Platte
EOR
F001 7822
F002 3
F003 06-09-1995
F004 HEDSET
F007 A01-02
F008 T30-19: SOS-Chromotest
F009 T31-18: Quillardet, P. und Hofnung, M.: Mutation Research 147, 65-78
F010 1985
F011 Escherichia coli PQ37
F012 T32-03
F013 T33-02
F014 A03-02
F015 bis zur Loeslichkeitsgrenze, maximal jedoch 100 mM (3-5 Konzentrationen)
EOR
F001 7822
F002 4
F003 06-09-1995
F004 HEDSET
F007 A01-02
F008 T30-08
F009 T31-18
F011 Escherichia coli Sd-4
F012 T32-04
F013 T33-03
F014 A03-01
F015 50, 60, 65, 70, 75 ug/ml
EOR
F001 7822

F002 5
F003 26-03-2002
F004 KONRAD
F007 A01-02
F008 T30-06
F009 T31-18
F011 CHO-K1-cells
F012 T32-03
F013 T33-02
F014 A03-02
F015 270, 360, 450, 540, 630 ug/ml (6-14 mM)
EOR
F001 7822
F002 6
F003 07-12-1995
F004 HEDSET
F007 A01-02
F008 T30-13
F009 T31-18: no data
F011 L5178Y Mauslymphomzellen
F012 T32-01
F014 A03-02
F015 keine Angaben
EOR
F001 7822
F002 7
F003 06-09-1995
F004 HEDSET
F007 A01-02
F008 T30-01
F009 T31-18: in Anlehnung an Ames, B.N. et al.: Mutation Research 31, 347-364
F010 1975
F011 TA100
F012 T32-03
F013 T33-02
F014 A03-02
F015 keine Angaben
EOR
F001 7822
F002 9
F003 08-09-1995
F004 HEDSET
F007 A01-02
F008 T30-15
F009 T31-18
F011 Chinese hamster V79 Zellen
F012 T32-03
F013 T33-02
F014 A03-02
F015 18.4, 27.6, 46.0, 92.0 ug/ml (0.4, 0.6, 1.0, 2.0 mM)
EOR
F001 7822
F002 11
F003 11-09-1995
F004 HEDSET
F007 A01-02
F008 T30-15

F009 T31-18
F011 Humanlymphozyten
F012 T32-04
F013 T33-02
F014 A03-02
F015 29 - 460 ug/ml (0.63 - 10 mM)
EOR
F001 7822
F002 12
F003 23-10-1995
F004 HEDSET
F007 A01-03
F008 T30-01
F009 T31-18: Ames, B.N. et al.: Mutation Research 31, 347-364
F010 1975
F011 Salmonella typhimurium TA98, TA100, TA1535, TA1537
F012 T32-03
F013 T33-02
F014 A03-03
F015 20, 100, 250, 500, 1000, 2000, 2500, 4000, 8000, 12500 ug/plate
EOR
F001 7822
F002 13
F003 25-03-2002
F004 KONRAD
F008 T30-10
F011 CHO cells
EOR
F001 7822
F002 14
F003 18-07-2002
F004 BATTAM
F007 A01-03
F008 T30-10
F009 T31-48
F011 CHO K1 Cells
F012 T32-03
F013 T33-02
F014 A03-03
F015 31.25 - 500 µg/ml
F018 without S-9 no cytotoxicity; with S-9 decreased number of colonies from
*   200 µg/ml onward, and reduced cell density from 300 µg/ml onward (only in
*   the 2nd experiment)
EOB
C
B510 TO_GENETIC_IN_VIVO_TAB
F001 7822
F002 1
F003 06-09-1995
F004 HEDSET
F007 A01-02
F008 T34-03
F009 T02-03
F010 T23-48: Oregon-K
F011 T37-15: Demerec, M.: Genetics 33, 337-348
F012 1948
F013 T24-03

F014 T25-11: inhalation and oral feed
F015 24 h (inhal.); Larvenstadium u. 24 h nach dem Schluepfen (Futter)
F016 keine Angabe
F017 A03-01
EOB
C
B511 TO_CARCINOGENICITY_TAB
F001 7822
F002 1
F003 06-09-1995
F004 HEDSET
F007 A01-02
F008 T02-18
F009 T23-44
F010 T24-04
F011 T38-01
F012 T39-05
F014 50 Tage
F015 2 mal pro Woche
F016 keine
F017 keine Angaben
F018 T27-05
F019 A03-01
EOR
F001 7822
F002 2
F003 06-09-1995
F004 HEDSET
F007 A01-03
F008 T02-24
F009 T23-46
F010 T24-03
F011 T38-02
F012 T39-05: no data
F014 lebenslang (2-3 Jahre)
F015 kontinuierlich im Trinkwasser
F016 keine
F017 0.2 und 0.4 % (= 150 - 200 mg/kg/d nach Angabe der Autoren)
F018 T27-04
F019 A03-01
EOR
F001 7822
F002 3
F003 11-09-1995
F004 HEDSET
F007 A01-03
F008 T02-24
F009 T23-46
F010 T24-04
F011 T38-02
F012 T39-05: no data
F014 1.5 Jahre
F015 kontinuierlich im Trinkwasser
F016 keine
F017 1% (= 274 mg/Tier Formiat bzw. 185 mg/Tier berechnet auf Ameisensaeure
* nach Angabe der Autoren)
F018 T27-02

F019 A03-01
EOB
C
B512 TO_REPRODUCTION_TAB
F001 7822
F002 1
F003 06-09-1995
F004 HEDSET
F007 A01-03
F008 T41-01
F009 T02-24
F010 T23-46
F011 T24-03
F012 T25-02
F036 bis zur 5. (0.2%) bzw. 2. (0.4%) Generation
F013 T40-05: no data
F015 kontinuierlich im Trinkwasser
F016 keine Angaben
F017 keine Angaben
F018 ueber mehrere Generationen
F019 0.2 und 0.4% (150-200 mg/kg/d nach Angabe der Autoren)
F020 T27-04
F035 A03-01
EOR
F001 7822
F002 2
F003 08-09-1995
F004 HEDSET
F007 A01-02
F008 T41-01
F009 T02-24
F010 T23-16
F011 T24-03
F012 T25-08
F036 13 Wochen
F013 T40-05
F015 5 Tage pro Woche, 6 Stunden pro Tag
F016 no mating
F017 no mating
F018 13 Wochen
F019 0.015, 0.061, 0.244 mg/l (8, 32, 128 ppm)
F020 T27-04
F035 A03-03
EOR
F001 7822
F002 3
F003 08-09-1995
F004 HEDSET
F007 A01-02
F008 T41-01
F009 T02-18
F010 T23-03
F011 T24-03
F012 T25-08
F036 13 Wochen
F013 T40-05
F015 5 Tage pro Woche, 6 Stunden pro Tag

F016 no mating
F017 no mating
F018 13 Wochen
F019 0.015, 0.061, 0.244 mg/l (8, 32, 128 ppm)
F020 T27-04
F035 A03-03
EOB
C
B513 TO_DEVELOPMENTAL_TAB
F001 7822
F002 2
F003 23-10-1995
F004 HEDSET
F007 A01-03
F008 T02-18
F009 T23-10
F010 T24-04
F011 T25-11: in vitro Inkubation in WEC (whole embryo culture)
F012 T44-03
F014 5 h
F015 5 h Inkubation
F016 Einzeldosis
F017 45 ug/ml (1 mM)
F018 T27-07
F029 A03-02
EOR
F001 7822
F002 3
F003 30-10-1995
F004 HEDSET
F007 A01-03
F008 T02-24
F009 T23-42
F010 T24-04
F011 T25-11: in vitro Inkubation in WEC (whole embryo culture)
F012 T44-03
F014 48 h
F015 48 h Inkubation
F016 Einzeldosis
F017 200, 400, 800, 1200, 1600 ug/ml
F018 T27-04
F029 A03-02
EOR
F001 7822
F002 4
F003 30-10-1995
F004 HEDSET
F007 A01-03
F008 T02-24
F009 T23-42
F010 T24-04
F011 T25-11: in vitro Inkubation in WEC (whole embryo culture)
F012 T44-03
F014 24 bzw. 48 h
F015 24 bzw. 48 h Inkubation
F016 Einzeldosis
F017 200, 400, 800, 1200, 1600, 2000 ug/ml (Natriumformiat) bzw. 140, 270,

*   540, 810, 1080 ug/ml (Ameisensaeure)
F018 T27-04
F029 A03-02
EOR
F001 7822
F002 5
F003 30-10-1995
F004 HEDSET
F007 A01-03
F008 T02-18
F009 T23-10
F010 T24-04
F011 T25-11: in vitro Inkubation in WEC (whole embryo culture)
F012 T44-03
F014 24 h
F015 24 h Inkubation
F016 Einzeldosis
F017 400, 800, 1600, 2000, 3000 ug/ml (Natriumformiat) bzw. 270, 540, 810,
*   1600, 2000 ug/ml (Ameisensaeure)
F018 T27-04
F029 A03-02
EOR
F001 7822
F002 6
F003 30-10-1995
F004 HEDSET
F007 A01-03
F008 T02-18
F009 T23-10
F010 T24-04
F011 T25-11: in vitro Inkubation in WEC (whole embryo culture)
F012 T44-03: Cockroft, D.L., in: Copp, A.J. und Cockroft, D.L. (eds.):
*   Postimplantation Mammalian Embryos - A Practical Approach. IRL Press,
*   Oxford, pp.15-40
F013 1990
F014 12 h
F015 12 h Inkubation
F016 Einzeldosis
F017 180, 360, 540, 900, 1800 ug Formiat/ml (4, 8, 12, 20, 40 mM)
F018 T27-07
F029 A03-02
EOR
F001 7822
F002 7
F003 30-10-1995
F004 HEDSET
F007 A01-03
F008 T02-18
F009 T23-10
F010 T24-01
F011 T25-03
F012 T44-03
F014 bis zum 10. bzw. 18. Tag der Traechtigkeit
F015 8. Tag der Traechtigkeit
F016 Einzeldosis
F017 750 mg/kg/d
F018 T27-05

F029 A03-02
EOR
F001 7822
F002 8
F003 29-07-1997
F004 SCHULTE
F007 A01-03
F008 T02-24
F009 T23-47
F010 T24-04
F011 T25-11: in vitro Whole Embryo Culture
F012 T44-03: no data
F014 48 hours
F015 48 h incubation
F016 single dose
F017 0-2 mg/ml
F018 T27-07
F029 A03-02
EOR
F001 7822
F002 9
F003 29-07-1997
F004 SCHULTE
F007 A01-03
F008 T02-24
F009 T23-42
F010 T24-04
F011 T25-11: in vitro Whole Embryo Culture
F012 T44-03: New, D.A.T., The Mammalian Fetus in Vitro, 15-65, CR Austin (ed),
*   Chapman and Hall, London
F013 1973
F014 48 h
F015 48 h incubation
F016 single dose
F017 0.141-1.055 ul/ml (3.74-27.96 umol/ml)
F018 T27-07
F029 A03-02
EOR
F001 7822
F002 10
F003 16-05-2000
F004 CREUTZIGER
F007 A01-03
F008 T02-24
F009 T23-42
F010 T24-01
F012 T44-03: in vitro incubation in whole embryo culture (WEC)
F013 1998
F014 48 hours
F015 day 9 of gestation
F017 1.51 mg/ml
F018 T27-07
F029 A03-02
EOB
C
B515 TO_HUMAN_EXPERIENCE_TAB
F001 7822

F002 1
F003 26-03-2002
F004 ADOLPH
F010 4251
F011 C10-014: corrosiveness and irritation, oesophagus
EOR
F001 7822
F002 2
F003 26-03-2002
F004 ADOLPH
F010 1100
F011 C10-014: review, general
EOR
F001 7822
F002 3
F003 26-03-2002
F004 ADOLPH
F010 2701
F011 C10-014: kinetics, elimination
EOR
F001 7822
F002 4
F003 26-03-2002
F004 ADOLPH
F010 2201
F011 C10-014: kinetics, inhalation
EOR
F001 7822
F002 5
F003 26-03-2002
F004 ADOLPH
F010 3101
F011 C10-014: acute toxicity
EOR
F001 7822
F002 6
F003 26-03-2002
F004 ADOLPH
F010 3106
F011 C10-014: acute toxicity
EOR
F001 7822
F002 7
F003 26-03-2002
F004 ADOLPH
F010 3102
F011 C10-014: acute toxicity
EOR
F001 7822
F002 8
F003 26-03-2002
F004 ADOLPH
F010 3103
F011 C10-014: acute toxicity
EOR
F001 7822
F002 9

F003 26-03-2002
F004 ADOLPH
F010 3104
F011 C10-014: acute toxicity
EOR
F001 7822
F002 10
F003 26-03-2002
F004 ADOLPH
F010 3105
F011 C10-014: acute toxicity
EOR
F001 7822
F002 11
F003 26-03-2002
F004 ADOLPH
F010 3107
F011 C10-014: acute toxicity
EOR
F001 7822
F002 12
F003 26-03-2002
F004 ADOLPH
F010 4101
F011 C10-014: corrosiveness, skin
EOR
F001 7822
F002 13
F003 26-03-2002
F004 ADOLPH
F010 4201
F011 C10-014: irritation, eye
EOR
F001 7822
F002 14
F003 26-03-2002
F004 ADOLPH
F010 2702
F011 C10-014: kinetics, elimination
EOR
F001 7822
F002 15
F003 26-03-2002
F004 ADOLPH
F010 2703
F011 C10-014: kinetics, elimination
EOR
F001 7822
F002 17
F003 26-03-2002
F004 ADOLPH
F010 4102
F011 C10-014: corrosiveness, skin
EOR
F001 7822
F002 19
F003 26-03-2002

F004 ADOLPH
F010 2704
F011 C10-014: kinetics, elimination
EOR
F001 7822
F002 20
F003 26-03-2002
F004 ADOLPH
F010 2705
F011 C10-014: kinetics, elimination
EOR
F001 7822
F002 21
F003 26-03-2002
F004 ADOLPH
F010 2707
F011 C10-014: kinetics, elimination
EOR
F001 7822
F002 22
F003 26-03-2002
F004 ADOLPH
F010 3108
F011 C10-014: acute toxicity
EOR
F001 7822
F002 23
F003 27-03-2002
F004 ADOLPH
F010 3109
F011 C10-014: acute toxicity
EOR
F001 7822
F002 24
F003 26-03-2002
F004 ADOLPH
F010 2706
F011 C10-014: kinetics, elimination
EOR
F001 7822
F002 25
F003 26-03-2002
F004 ADOLPH
F010 3110
F011 C10-014: acute toxicty
EOR
F001 7822
F002 26
F003 26-03-2002
F004 ADOLPH
F008 A36-005
F010 2801
F011 C10-014: kinetics
EOR
F001 7822
F002 28
F003 27-03-2002

F004 ADOLPH
F010 2708
F011 C10-014: kinetics, elimination
EOR
F001 7822
F002 29
F003 27-03-2002
F004 ADOLPH
F010 2802
F011 C10-014: kinetics
EOR
F001 7822
F002 31
F003 27-03-2002
F004 ADOLPH
F010 4103
F011 C10-014: corrosiveness, skin
EOR
F001 7822
F002 32
F003 18-12-2002
F004 ADOLPH
F010 3111
F011 C10-014: acute toxicity
EOB
C
B514 TO_OTHER_TAB
F001 7822
F002 1
F003 08-09-1995
F004 HEDSET
F007 T45-09
EOR
F001 7822
F002 2
F003 06-09-1995
F004 HEDSET
F007 T45-09
EOR
F001 7822
F002 3
F003 06-09-1995
F004 HEDSET
F007 T45-09
EOR
F001 7822
F002 4
F003 06-09-1995
F004 HEDSET
F007 T45-09
EOR
F001 7822
F002 5
F003 06-09-1995
F004 HEDSET
F007 T45-09
EOR

F001 7822
F002 6
F003 06-09-1995
F004 HEDSET
F007 T45-09
EOR
F001 7822
F002 7
F003 06-09-1995
F004 HEDSET
F007 T45-09
EOR
F001 7822
F002 8
F003 06-09-1995
F004 HEDSET
F007 T45-09
EOR
F001 7822
F002 9
F003 06-09-1995
F004 HEDSET
F007 T45-05
EOR
F001 7822
F002 10
F003 06-09-1995
F004 HEDSET
F007 T45-05
EOR
F001 7822
F002 11
F003 06-09-1995
F004 HEDSET
F007 T45-05
EOR
F001 7822
F002 12
F003 06-09-1995
F004 HEDSET
F007 T45-09
EOR
F001 7822
F002 13
F003 06-09-1995
F004 HEDSET
F007 T45-09
EOR
F001 7822
F002 14
F003 06-09-1995
F004 HEDSET
F007 T45-09
EOR
F001 7822
F002 15
F003 06-09-1995

F004 HEDSET
F007 T45-09
EOR
F001 7822
F002 16
F003 06-09-1995
F004 HEDSET
F007 T45-05
EOR
F001 7822
F002 17
F003 06-09-1995
F004 HEDSET
F007 T45-03
EOR
F001 7822
F002 18
F003 06-09-1995
F004 HEDSET
F007 T45-01
EOR
F001 7822
F002 19
F003 06-09-1995
F004 HEDSET
F007 T45-12: Wirkungsmechanismus
EOR
F001 7822
F002 20
F003 06-09-1995
F004 HEDSET
F007 T45-12: Cancerogenitaet in vitro
EOR
F001 7822
F002 21
F003 07-12-1995
F004 HEDSET
F007 T45-12: Review
EOR
F001 7822
F002 22
F003 06-09-1995
F004 HEDSET
F007 T45-12: Review
EOR
F001 7822
F002 23
F003 06-09-1995
F004 HEDSET
F007 T45-12: Review
EOR
F001 7822
F002 24
F003 07-12-1995
F004 HEDSET
F007 T45-12: Human data
EOR

F001 7822
F002 25
F003 18-06-1993
F004 HEDSET
F007 T45-12: Human data
EOR
F001 7822
F002 26
F003 06-09-1995
F004 HEDSET
F007 T45-12: Human data
EOR
F001 7822
F002 27
F003 06-09-1995
F004 HEDSET
F007 T45-12: Human data
EOR
F001 7822
F002 28
F003 06-09-1995
F004 HEDSET
F007 T45-12: Human data
EOR
F001 7822
F002 29
F003 06-09-1995
F004 HEDSET
F007 T45-12: Human data
EOR
F001 7822
F002 30
F003 06-09-1995
F004 HEDSET
F007 T45-12: Human data
EOR
F001 7822
F002 31
F003 06-09-1995
F004 HEDSET
F007 T45-12: Human data
EOR
F001 7822
F002 32
F003 06-09-1995
F004 HEDSET
F007 T45-12: Human data
EOR
F001 7822
F002 33
F003 06-09-1995
F004 HEDSET
F007 T45-12: Human data
EOR
F001 7822
F002 34
F003 06-09-1995

F004 HEDSET
F007 T45-12: Human data
EOR
F001 7822
F002 36
F003 08-09-1995
F004 HEDSET
F007 T45-12: QSAR
EOR
F001 7822
F002 37
F003 08-09-1995
F004 HEDSET
F007 T45-10
EOR
F001 7822
F002 39
F003 08-09-1995
F004 HEDSET
F007 T45-12
EOR
F001 7822
F002 40
F003 08-09-1995
F004 HEDSET
F007 T45-12
EOR
F001 7822
F002 41
F003 08-09-1995
F004 HEDSET
F007 T45-12: skin irritation test in vitro
EOR
F001 7822
F002 42
F003 08-09-1995
F004 HEDSET
F007 T45-12: acute toxicity in vitro
EOR
F001 7822
F002 43
F003 08-09-1995
F004 HEDSET
F007 T45-03
EOR
F001 7822
F002 44
F003 08-09-1995
F004 HEDSET
F007 T45-07
EOR
F001 7822
F002 45
F003 08-09-1995
F004 HEDSET
F007 T45-12
EOR

F001 7822
F002 46
F003 08-09-1995
F004 HEDSET
F007 T45-12: review
EOR
F001 7822
F002 47
F003 11-09-1995
F004 HEDSET
F007 T45-12: Huehnereitest
EOR
F001 7822
F002 48
F003 07-12-1995
F004 HEDSET
F007 T45-12: blood levels
EOR
F001 7822
F002 49
F003 07-12-1995
F004 HEDSET
F007 T45-12: blood levels
EOR
F001 7822
F002 50
F003 29-07-1997
F004 SCHULTE
F007 T45-03
EOR
F001 7822
F002 51
F003 28-07-1997
F004 SCHULTE
F007 T45-12: review
EOR
F001 7822
F002 52
F003 29-07-1997
F004 SCHULTE
F007 T45-12: Occupational Regulation
EOR
F001 7822
F002 53
F003 28-07-1997
F004 SCHULTE
F007 T45-10
EOR
F001 7822
F002 54
F003 29-07-1997
F004 SCHULTE
F007 T45-11
EOR
F001 7822
F002 55
F003 15-05-2000

F004 CREUTZIGER
F007 T45-12: review
EOR
F001 7822
F002 56
F003 15-05-2000
F004 CREUTZIGER
F007 T45-12
EOR
F001 7822
F002 57
F003 15-05-2000
F004 CREUTZIGER
F007 T45-12: review - safety assessment
EOR
F001 7822
F002 58
F003 16-05-2000
F004 CREUTZIGER
F007 T45-12: Mitoses
EOR
F001 7822
F002 59
F003 16-05-2000
F004 CREUTZIGER
F007 T45-12: final report on the safety assessment of formic acid
EOB
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B601 TEXT_TAB
F002 7822
F010 2.1
F004 1
F005 RE
F006 BASF AG, Safety data sheet FORMIC ACID 99-100%, 05.12.2001
F007 BASF AG, Safety data sheet FORMIC ACID 99-100%, 05.12.2001
F020 1549491
EOR
F002 7822
F010 2.1
F004 1
F005 RL
F006 Manufacturer / producer data without proof
F007 Manufacturer / producer data without proof
F008 AIDA
F020 1549492
EOR
F002 7822
F010 2.1
F004 4
F005 RE
F006 Celanese Chemical Company, Product Bulletin Formic Acid
F007 Celanese Chemical Company, Product Bulletin Formic Acid
F008 AIDA
F020 1549494
EOR
F002 7822
F010 2.1

F004 4
F005 RL
F006 Manufacturer / producer data without proof
F007 Manufacturer / producer data without proof
F008 AIDA
F020 1549495
EOR
F002 7822
F010 2.1
F004 6
F005 ME
F006 Differential Scanning Calorimetry
F007 Differential Scanning Calorimetry
F008 AIDA
F020 1549497
EOR
F002 7822
F010 2.1
F004 6
F005 RE
F006 BASF AG, GKA Analytik, unpublished results, Study No.
** 02L00109, March 27, 2002
F007 BASF AG, GKA Analytik, unpublished results, Study No.
** 02L00109, March 27, 2002
F008 AIDA
F020 1549498
EOR
F002 7822
F010 2.1
F004 6
F005 RL
F006 guideline study
F007 guideline study
F008 AIDA
F020 1549499
EOR
F002 7822
F010 2.1
F004 6
F005 TS
F006 formic acid, purity 85.3 g/100 g of formic acid and 14.3
** g/100 g of water
F007 formic acid, purity 85.3 g/100 g of formic acid and 14.3
** g/100 g of water
F008 AIDA
F020 1549501
EOR
F002 7822
F010 2.1
F004 7
F005 RE
F006 BASF AG, GKA Analytik, unpublished results, Amendment to
** Final Report, Study No. 02L00109, June 24, 2002
F007 BASF AG, GKA Analytik, unpublished results, Amendment to
** Final Report, Study No. 02L00109, June 24, 2002
F008 AIDA
F020 1549502

EOR
F002 7822
F010 2.1
F004 7
F005 RL
F006 The determinations were not carried out in full compliance
** with the Principles of Good Laboratory Practice.
F007 The determinations were not carried out in full compliance
** with the Principles of Good Laboratory Practice.
F008 AIDA
F020 1549503
EOR
F002 7822
F010 2.1
F004 7
F005 RM
F006 Solidification point
F007 Solidification point
F008 AIDA
F020 1549504
EOR
F002 7822
F010 2.1
F004 7
F005 RS
F006 In order to get additional information on the nature of the
** DSC peaks the test item was observed visually during heating
** in a test tube.
**
** At about -50°C the test item started to melt. A liquid phase
** and a crystalline one coexisted at this t
F007 In order to get additional information on the nature of the
** DSC peaks the test item was observed visually during heating
** in a test tube.
**
** At about -50°C the test item started to melt. A liquid phase
** and a crystalline one coexisted at this temperature. The
** amount of crystals decreased continually until at -10°C a
** homogeneous liquid was obtained. So the peak at -50°C must
** be interpreted as a melting peak. The broad peak following
** the melting peak is caused by the slow dissolution of the
** crystals in the liquid phase.
**
** Additionally the solidification point of the test item was
** determined according to the European Pharmacopeia 1997
** edition. A value of -13.4 °C was obtained. At this
** temperature, however, the test item was not completely
** solidified. The physical state was a suspension of crystals
** in liquid phase. This is in accordance with the visual
** observations.
F008 AIDA
F020 1549505
EOR
F002 7822
F010 2.1
F004 7
F005 TS

F006 The determinations recorded in this amendment were carried
** out with a different batch of 85 % formic acid ("Abmischung
** 10.06.02"). The thermal behaviour of 85 % formic acid,
** however, should not be dependent on the individual batch.
F007 The determinations recorded in this amendment were carried
** out with a different batch of 85 % formic acid ("Abmischung
** 10.06.02"). The thermal behaviour of 85 % formic acid,
** however, should not be dependent on the individual batch.
F008 AIDA
F020 1549507
EOR
F002 7822
F010 2.1
F004 8
F005 RE
F006 NIOSH (National Institute for Occupational Safety and
** Health), Washington, DC:
** http://www.cdc.gov/niosh/ipcs/icstart.html (01 Jun 2002).
F007 NIOSH (National Institute for Occupational Safety and
** Health), Washington, DC:
** http://www.cdc.gov/niosh/ipcs/icstart.html (01 Jun 2002).
F008 AIDA
F020 1549508
EOR
F002 7822
F010 2.1
F004 8
F005 RL
F006 Secondary quotation
F007 Secondary quotation
F008 AIDA
F020 1549509
EOR
F002 7822
F010 2.10
F004 3
F005 RE
F006 BASF AG, Safety Engineering, internal notice, Nov. 02, 1999
F007 BASF AG, Safety Engineering, internal notice, Nov. 02, 1999
F008 AIDA
F020 1549510
EOR
F002 7822
F010 2.10
F004 3
F005 RL
F006 Expert judgement
F007 Expert judgement
F008 AIDA
F020 1549511
EOR
F002 7822
F010 2.10
F004 3
F005 RM
F006 because of chemical structure
F007 because of chemical structure

F008 AIDA
F020 1549512
EOR
F002 7822
F010 2.11
F004 1
F005 RE
F006 BASF AG, Safety Engineering, internal notice, Nov. 02, 1999
F007 BASF AG, Safety Engineering, internal notice, Nov. 02, 1999
F008 AIDA
F020 1549514
EOR
F002 7822
F010 2.11
F004 1
F005 RL
F006 Expert judgement
F007 Expert judgement
F008 AIDA
F020 1549515
EOR
F002 7822
F010 2.11
F004 1
F005 RM
F006 because of chemical structure
F007 because of chemical structure
F008 AIDA
F020 1549516
EOR
F002 7822
F010 2.13
F004 1
F005 RE
F006 BASF AG, Safety data sheet FORMIC ACID 99-100%, 05.12.2001
F007 BASF AG, Safety data sheet FORMIC ACID 99-100%, 05.12.2001
F008 AIDA
F020 1549518
EOR
F002 7822
F010 2.13
F004 1
F005 RL
F006 Manufacturer / producer data without proof
F007 Manufacturer / producer data without proof
F008 AIDA
F020 1549519
EOR
F002 7822
F010 2.14
F004 3
F005 RE
F006 BASF AG, Safety Engineering, unpublished results, SIK-No.
** 80/0258, Apr. 15, 1980
F007 BASF AG, Safety Engineering, unpublished results, SIK-No.
** 80/0258, Apr. 15, 1980
F008 AIDA

F020 1549521
EOR
F002 7822
F010 2.14
F004 3
F005 RL
F006 Study not in accordance with a defined standard method, but
** meets generally accepted scientific principles
F007 Study not in accordance with a defined standard method, but
** meets generally accepted scientific principles
F008 AIDA
F020 1549522
EOR
F002 7822
F010 2.14
F004 3
F005 RS
F006 Explosion limits in air: 13.5 - 36.5 vol.%
F007 Explosion limits in air: 13.5 - 36.5 vol.%
F008 AIDA
F020 1549523
EOR
F002 7822
F010 2.14
F004 3
F005 TS
F006 formic acid, purity 99 %
F007 formic acid, purity 99 %
F008 AIDA
F020 1549525
EOR
F002 7822
F010 2.14
F004 5
F005 RE
F006 BASF AG, Safety data sheet FORMIC ACID 99-100%, 05.12.2001
F007 BASF AG, Safety data sheet FORMIC ACID 99-100%, 05.12.2001
F008 AIDA
F020 1549526
EOR
F002 7822
F010 2.14
F004 5
F005 RL
F006 Manufacturer / producer data without proof
F007 Manufacturer / producer data without proof
F008 AIDA
F020 1549527
EOR
F002 7822
F010 2.14
F004 5
F005 RM
F006 -Hazardous reactions: Exothermic reaction with: alkalies,
** amines or products containing amines.
** -Thermal decomposition products: carbon monoxide
F007 -Hazardous reactions: Exothermic reaction with: alkalies,

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**   amines or products containing amines.
**   -Thermal decomposition products: carbon monoxide
F008 AIDA
F020 1549528
EOR
F002 7822
F010 2.14
F004 5
F005 SO
F006 BASF AG  Ludwigshafen
F007 BASF AG  Ludwigshafen
F008 IUC4
F009 02-12-2002
F020 1549529
EOR
F002 7822
F010 2.14
F004 6
F005 RE
F006 BASF AG, Safety data sheet FORMIC ACID 99-100%, 05.12.2001
F007 BASF AG, Safety data sheet FORMIC ACID 99-100%, 05.12.2001
F008 AIDA
F020 1549530
EOR
F002 7822
F010 2.14
F004 6
F005 RL
F006 Manufacturer / producer data without proof
F007 Manufacturer / producer data without proof
F008 AIDA
F020 1549531
EOR
F002 7822
F010 2.14
F004 6
F005 RS
F006 Form: liquid
**   Colour: colourless - yellow
**   Odour: pungent
F007 Form: liquid
**   Colour: colourless - yellow
**   Odour: pungent
F008 AIDA
F020 1549532
EOR
F002 7822
F010 2.14
F004 7
F005 RE
F006 NIOSH (National Institute for Occupational Safety and
**   Health), Washington, DC:
**   http://www.cdc.gov/niosh/ipcs/icstart.html (01 Jun 2002).
F007 NIOSH (National Institute for Occupational Safety and
**   Health), Washington, DC:
**   http://www.cdc.gov/niosh/ipcs/icstart.html (01 Jun 2002).
F008 IUC4
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F020 1549534
EOR
F002 7822
F010 2.14
F004 7
F005 RS
F006 Form: liquid
** Colour: colourless
** Ordour: Fuming liquid with pungent odour
F007 Form: liquid
** Colour: colourless
** Ordour: Fuming liquid with pungent odour
F008 IUC4
F020 1549535
EOR
F002 7822
F010 2.14
F004 8
F005 RE
F006 NIOSH (National Institute for Occupational Safety and
** Health), Washington, DC:
** http://www.cdc.gov/niosh/ipcs/icstart.html (01 Jun 2002).
F007 NIOSH (National Institute for Occupational Safety and
** Health), Washington, DC:
** http://www.cdc.gov/niosh/ipcs/icstart.html (01 Jun 2002).
F008 IUC4
F020 1549536
EOR
F002 7822
F010 2.14
F004 8
F005 RL
F006 Secondary quotation
F007 Secondary quotation
F008 IUC4
F020 1549537
EOR
F002 7822
F010 2.14
F004 8
F005 RS
F006 Relative vapour density (air=1): 1.6
F007 Relative vapour density (air=1): 1.6
F008 IUC4
F020 1549538
EOR
F002 7822
F010 2.14
F004 9
F005 RE
F006 NIOSH (National Institute for Occupational Safety and
** Health), Washington, DC:
** http://www.cdc.gov/niosh/ipcs/icstart.html (01 Jun 2002).
F007 NIOSH (National Institute for Occupational Safety and
** Health), Washington, DC:
** http://www.cdc.gov/niosh/ipcs/icstart.html (01 Jun 2002).
F008 IUC4

F020 1549539
EOR
F002 7822
F010 2.14
F004 9
F005 RL
F006 Secondary quotation
F007 Secondary quotation
F008 IUC4
F020 1549540
EOR
F002 7822
F010 2.14
F004 9
F005 RS
F006 Realtive density of the vapour/air-mixture at 20 deg.C
** (air=1): 1.03
F007 Realtive density of the vapour/air-mixture at 20 deg.C
** (air=1): 1.03
F008 IUC4
F020 1549541
EOR
F002 7822
F010 2.14
F004 10
F005 RE
F006 NIOSH (National Institute for Occupational Safety and
** Health), Washington, DC:
** http://www.cdc.gov/niosh/ipcs/icstart.html (01 Jun 2002).
F007 NIOSH (National Institute for Occupational Safety and
** Health), Washington, DC:
** http://www.cdc.gov/niosh/ipcs/icstart.html (01 Jun 2002).
F008 IUC4
F020 1549542
EOR
F002 7822
F010 2.14
F004 10
F005 RL
F006 Secondary quotation
F007 Secondary quotation
F008 IUC4
F020 1549543
EOR
F002 7822
F010 2.14
F004 10
F005 RS
F006 Explosion limits in air: 18-51 vol.%
F007 Explosion limits in air: 18-51 vol.%
F008 IUC4
F020 1549544
EOR
F002 7822
F010 2.2
F004 1
F005 RE

F006 BASF AG, Safety data sheet FORMIC ACID 99-100%, 05.12.2001
F007 BASF AG, Safety data sheet FORMIC ACID 99-100%, 05.12.2001
F008 AIDA
F020 1549545
EOR
F002 7822
F010 2.2
F004 1
F005 RL
F006 Manufacturer / producer data without proof
F007 Manufacturer / producer data without proof
F008 AIDA
F020 1549546
EOR
F002 7822
F010 2.2
F004 2
F005 RE
F006 Celanese Chemical Company, Product Bulletin Formic Acid
F007 Celanese Chemical Company, Product Bulletin Formic Acid
F008 AIDA
F020 1549548
EOR
F002 7822
F010 2.2
F004 2
F005 RL
F006 Manufacturer / producer data without proof
F007 Manufacturer / producer data without proof
F008 AIDA
F020 1549549
EOR
F002 7822
F010 2.2
F004 3
F005 RE
F006 Yaws C.L. et al., Chemical Engineering, p. 115 - 118, July
** 1990
F007 Yaws C.L. et al., Chemical Engineering, p. 115 - 118, July
** 1990
F008 AIDA
F020 1549551
EOR
F002 7822
F010 2.2
F004 3
F005 RL
F006 Secondary quotation
F007 Secondary quotation
F008 AIDA
F020 1549552
EOR
F002 7822
F010 2.2
F004 5
F005 ME
F006 The determination of the Normal Boiling Temperature of a

```
**   purified substance can be performed by dynamic vapour
**   pressure measurement according to the Annex to Commission
**   Directive 92/69/ECC (A.2), the OECD Test Guideline 103, the
**   U.S. EPA Pr
F007 The determination of the Normal Boiling Temperature of a
**   purified substance can be performed by dynamic vapour
**   pressure measurement according to the Annex to Commission
**   Directive 92/69/ECC (A.2), the OECD Test Guideline 103, the
**   U.S. EPA Product Properties Test Guidelines OPPTS 830.7220
**   and the Data requirements for biocidial product types FINAL
**   DRAFT-Version 4.3.1 April 2000 (Chapter 2, Part A 3.1).
**   Therefore the Normal Boiling Temperature was deduced from
**   vapour pressure data obtained by a dynamic method according
**   to the Annex to  Commission Directive 92/69/ECC (A.4), the
**   OECD Test Guideline 104, the U.S. EPA Product Properties
**   Test  Guidelines OPPTS 830.7950 and the Data requirements
**   for biocidial product types FINAL DRAFT-Version 4.3.1 April
**   2000 (Chapter 2, Part A 3.2).
F008 AIDA
F020 1549554
EOR
F002 7822
F010 2.2
F004 5
F005 RE
F006 BASF AG, GKA Analytik, unpublished results, Study No.
**   02L00109, March 27, 2002
F007 BASF AG, GKA Analytik, unpublished results, Study No.
**   02L00109, March 27, 2002
F008 AIDA
F020 1549555
EOR
F002 7822
F010 2.2
F004 5
F005 RL
F006 guideline study
F007 guideline study
F008 AIDA
F020 1549556
EOR
F002 7822
F010 2.2
F004 5
F005 RS
F006 measured values:
**
**   temperature (°C)         vapour pressure (hPa)
**    16.9                        20.2
**    24.0                        30.3
**    33.6                        50.4
**    40.1                        70.4
**    47.6                       100.5
**    63.1
F007 measured values:
**
**   temperature (°C)         vapour pressure (hPa)
```

```
**    16.9                        20.2
**    24.0                        30.3
**    33.6                        50.4
**    40.1                        70.4
**    47.6                       100.5
**    63.1                       200.8
**    73.1                       300.8
**    86.7                       501.1
**    96.2                       701.6
**   106.9                      1002.7
**
**   The regression of the results leads with a mean deviation of
**   0.18 % to the following equation:
**
**   ln(p/hPa) = 18.0464 - 3862.50 / (239.9 + t/°C)
**
**   The Normal Boiling Temperature was obtained by
**   extrapolation.
F008 AIDA
F020 1549557
EOR
F002 7822
F010 2.2
F004 5
F005 TS
F006 formic acid, purity 85.3 g/100 g of formic acid and 14.3
**   g/100 g of water
F007 formic acid, purity 85.3 g/100 g of formic acid and 14.3
**   g/100 g of water
F008 AIDA
F020 1549559
EOR
F002 7822
F010 2.2
F004 6
F005 RE
F006 NIOSH (National Institute for Occupational Safety and
**   Health), Washington, DC:
**   http://www.cdc.gov/niosh/ipcs/icstart.html (01 Jun 2002).
F007 NIOSH (National Institute for Occupational Safety and
**   Health), Washington, DC:
**   http://www.cdc.gov/niosh/ipcs/icstart.html (01 Jun 2002).
F008 AIDA
F020 1549560
EOR
F002 7822
F010 2.2
F004 6
F005 RL
F006 Secondary quotation
F007 Secondary quotation
F008 AIDA
F020 1549561
EOR
F002 7822
F010 2.3
F004 1
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F005 RE
F006 BASF AG, Safety data sheet FORMIC ACID 99-100%, 05.12.2001
F007 BASF AG, Safety data sheet FORMIC ACID 99-100%, 05.12.2001
F008 AIDA
F020 1549562
EOR
F002 7822
F010 2.3
F004 1
F005 RL
F006 Manufacturer / producer data without proof
F007 Manufacturer / producer data without proof
F008 AIDA
F020 1549563
EOR
F002 7822
F010 2.3
F004 2
F005 RE
F006 Celanese Chemical Company, Product Bulletin Formic Acid
F007 Celanese Chemical Company, Product Bulletin Formic Acid
F008 AIDA
F020 1549565
EOR
F002 7822
F010 2.3
F004 2
F005 RL
F006 Manufacturer / producer data without proof
F007 Manufacturer / producer data without proof
F008 AIDA
F020 1549566
EOR
F002 7822
F010 2.3
F004 2
F005 RM
F006 Specific gravity 20°C/20°C
F007 Specific gravity 20°C/20°C
F008 AIDA
F020 1549567
EOR
F002 7822
F010 2.3
F004 3
F005 RE
F006 Verschueren K., Handbook of Environmental Data on Organic
** Chemicals, Second Edition, Van Nostrand Reinhold,
** New York, 1983
F007 Verschueren K., Handbook of Environmental Data on Organic
** Chemicals, Second Edition, Van Nostrand Reinhold,
** New York, 1983
F008 AIDA
F020 1549569
EOR
F002 7822
F010 2.3

F004 3
F005 RL
F006 Handbook
F007 Handbook
F008 AIDA
F020 1549570
EOR
F002 7822
F010 2.3
F004 3
F005 RM
F006 Specific gravity 20/4 °C
F007 Specific gravity 20/4 °C
F008 AIDA
F020 1549571
EOR
F002 7822
F010 2.3
F004 5
F005 ME
F006 Pycnometer method
F007 Pycnometer method
F008 AIDA
F020 1549573
EOR
F002 7822
F010 2.3
F004 5
F005 RE
F006 BASF AG, GKA Analytik, unpublished results, Study No.
** 02L00109, March 27, 2002
F007 BASF AG, GKA Analytik, unpublished results, Study No.
** 02L00109, March 27, 2002
F008 AIDA
F020 1549574
EOR
F002 7822
F010 2.3
F004 5
F005 RL
F006 guideline study
F007 guideline study
F008 AIDA
F020 1549575
EOR
F002 7822
F010 2.3
F004 5
F005 RS
F006 D20/4 = 1.19522 +/- 0.00001
F007 D20/4 = 1.19522 +/- 0.00001
F008 AIDA
F020 1549576
EOR
F002 7822
F010 2.3
F004 5

F005 TS
F006 formic acid, purity 85.3 g/100 g of formic acid and 14.3
** g/100 g of water
F007 formic acid, purity 85.3 g/100 g of formic acid and 14.3
** g/100 g of water
F008 AIDA
F020 1549578
EOR
F002 7822
F010 2.3
F004 6
F005 RE
F006 NIOSH (National Institute for Occupational Safety and
** Health), Washington, DC:
** http://www.cdc.gov/niosh/ipcs/icstart.html (01 Jun 2002).
F007 NIOSH (National Institute for Occupational Safety and
** Health), Washington, DC:
** http://www.cdc.gov/niosh/ipcs/icstart.html (01 Jun 2002).
F008 AIDA
F020 1549579
EOR
F002 7822
F010 2.3
F004 6
F005 RL
F006 Secondary quotation
F007 Secondary quotation
F008 AIDA
F020 1549580
EOR
F002 7822
F010 2.3
F004 6
F005 RM
F006 water = 1
F007 water = 1
F008 AIDA
F020 1549581
EOR
F002 7822
F010 2.4
F004 1
F005 RE
F006 BASF AG, Safety data sheet FORMIC ACID 99-100%, 05.12.2001
F007 BASF AG, Safety data sheet FORMIC ACID 99-100%, 05.12.2001
F008 AIDA
F020 1549582
EOR
F002 7822
F010 2.4
F004 1
F005 RL
F006 Manufacturer / producer data without proof
F007 Manufacturer / producer data without proof
F008 AIDA
F020 1549583
EOR

F002 7822
F010 2.4
F004 2
F005 RE
F006 BASF AG, Safety data sheet FORMIC ACID 99-100%, 05.12.2001
F007 BASF AG, Safety data sheet FORMIC ACID 99-100%, 05.12.2001
F008 AIDA
F020 1549585
EOR
F002 7822
F010 2.4
F004 2
F005 RL
F006 Manufacturer / producer data without proof
F007 Manufacturer / producer data without proof
F008 AIDA
F020 1549586
EOR
F002 7822
F010 2.4
F004 5
F005 RE
F006 Celanese Chemical Company, Product Bulletin Formic Acid
F007 Celanese Chemical Company, Product Bulletin Formic Acid
F008 AIDA
F020 1549588
EOR
F002 7822
F010 2.4
F004 5
F005 RL
F006 Manufacturer / producer data without proof
F007 Manufacturer / producer data without proof
F008 AIDA
F020 1549589
EOR
F002 7822
F010 2.4
F004 6
F005 RE
F006 Verschueren K., Handbook of Environmental Data on Organic
** Chemicals, Second Edition, Van Nostrand Reinhold,
** New York, 1983
F007 Verschueren K., Handbook of Environmental Data on Organic
** Chemicals, Second Edition, Van Nostrand Reinhold,
** New York, 1983
F008 AIDA
F020 1549591
EOR
F002 7822
F010 2.4
F004 6
F005 RL
F006 Handbook
F007 Handbook
F008 AIDA
F020 1549592

EOR
F002 7822
F010 2.4
F004 7
F005 RE
F006 Verschueren K., Handbook of Environmental Data on Organic
** Chemicals, Second Edition, Van Nostrand Reinhold,
** New York, 1983
F007 Verschueren K., Handbook of Environmental Data on Organic
** Chemicals, Second Edition, Van Nostrand Reinhold,
** New York, 1983
F008 AIDA
F020 1549594
EOR
F002 7822
F010 2.4
F004 7
F005 RL
F006 Handbook
F007 Handbook
F008 AIDA
F020 1549595
EOR
F002 7822
F010 2.4
F004 9
F005 ME
F006 dynamic
F007 dynamic
F008 AIDA
F020 1549597
EOR
F002 7822
F010 2.4
F004 9
F005 RE
F006 BASF AG, GKA Analytik, unpublished results, Study No.
** 02L00109, March 27, 2002
F007 BASF AG, GKA Analytik, unpublished results, Study No.
** 02L00109, March 27, 2002
F008 AIDA
F020 1549598
EOR
F002 7822
F010 2.4
F004 9
F005 RL
F006 guideline study
F007 guideline study
F008 AIDA
F020 1549599
EOR
F002 7822
F010 2.4
F004 9
F005 RS
F006 measured values:

```
**
**   temperature (°C)         vapour pressure (hPa)
**    16.9                        20.2
**    24.0                        30.3
**    33.6                        50.4
**    40.1                        70.4
**    47.6                       100.5
**    63.1
F007 measured values:
**
**   temperature (°C)         vapour pressure (hPa)
**    16.9                        20.2
**    24.0                        30.3
**    33.6                        50.4
**    40.1                        70.4
**    47.6                       100.5
**    63.1                       200.8
**    73.1                       300.8
**    86.7                       501.1
**    96.2                       701.6
**   106.9                      1002.7
**
**   The regression of the results leads with a mean deviation of
**   0.18 % to the following equation:
**
**   ln(p/hPa) = 18.0464 - 3862.50 / (239.9 + t/°C)
**
**   The Vapour Pressure at 20 °C, 25 °C and 50 °C was calculated
**   from the regression equation.
**
**   temperature (°C)         vapour pressure (hPa)
**   20                          24.2
**   25                          32.0
**   50                         112.5
F008 AIDA
F020 1549600
EOR
F002 7822
F010 2.4
F004 9
F005 TS
F006 formic acid, purity 85.3 g/100 g of formic acid and 14.3
**   g/100 g of water
F007 formic acid, purity 85.3 g/100 g of formic acid and 14.3
**   g/100 g of water
F008 AIDA
F020 1549602
EOR
F002 7822
F010 2.4
F004 10
F005 RE
F006 NIOSH (National Institute for Occupational Safety and
**   Health), Washington, DC:
**   http://www.cdc.gov/niosh/ipcs/icstart.html (01 Jun 2002).
F007 NIOSH (National Institute for Occupational Safety and
**   Health), Washington, DC:
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**   http://www.cdc.gov/niosh/ipcs/icstart.html (01 Jun 2002).
F008 AIDA
F020 1549603
EOR
F002 7822
F010 2.4
F004 10
F005 RL
F006 Secondary quotation
F007 Secondary quotation
F008 AIDA
F020 1549604
EOR
F002 7822
F010 2.5
F004 1
F005 RE
F006 Verschueren K., Handbook of Environmental Data on Organic
**   Chemicals, Second Edition, Van Nostrand Reinhold,
**   New York, 1983
F007 Verschueren K., Handbook of Environmental Data on Organic
**   Chemicals, Second Edition, Van Nostrand Reinhold,
**   New York, 1983
F008 AIDA
F020 1549605
EOR
F002 7822
F010 2.5
F004 1
F005 RL
F006 Handbook
F007 Handbook
F008 AIDA
F020 1549606
EOR
F002 7822
F010 2.5
F004 1
F005 RS
F006 log P oct = -1.55/-0.22 (calculated)
F007 log P oct = -1.55/-0.22 (calculated)
F008 AIDA
F020 1549607
EOR
F002 7822
F010 2.5
F004 3
F005 RE
F006 BASF AG, Laboratory of Environmental Analytic, unpublished
**   calculation, Jan. 09, 1989
F007 BASF AG, Laboratory of Environmental Analytic, unpublished
**   calculation, Jan. 09, 1989
F008 AIDA
F009 02-12-1992
F020 1549609
EOR
F002 7822
```

F010 2.5
F004 3
F005 RL
F006 Calculated value in accordance with generally accepted
** standard methods
F007 Calculated value in accordance with generally accepted
** standard methods
F008 AIDA
F020 1549610
EOR
F002 7822
F010 2.5
F004 4
F005 RE
F006 Collander R., Acta Chem. Scand., Vol. 5, pp 774-780, 1951
F007 Collander R., Acta Chem. Scand., Vol. 5, pp 774-780, 1951
F008 AIDA
F009 02-12-1992
F020 1549612
EOR
F002 7822
F010 2.5
F004 4
F005 RL
F006 Acceptable study, meets basic scientific principles
F007 Acceptable study, meets basic scientific principles
F008 AIDA
F020 1549613
EOR
F002 7822
F010 2.5
F004 5
F005 RE
F006 BASF AG, Safety data sheet FORMIC ACID 99-100%, 05.12.2001
F007 BASF AG, Safety data sheet FORMIC ACID 99-100%, 05.12.2001
F008 AIDA
F020 1549615
EOR
F002 7822
F010 2.5
F004 5
F005 RL
F006 Manufacturer / producer data without proof
F007 Manufacturer / producer data without proof
F008 AIDA
F020 1549616
EOR
F002 7822
F010 2.5
F004 7
F005 ME
F006 shake flask method
F007 shake flask method
F008 AIDA
F020 1549618
EOR
F002 7822

F010 2.5
F004 7
F005 RE
F006 BASF AG, GKA Analytik, unpublished results, Study No.
** 02L00109, March 27, 2002
F007 BASF AG, GKA Analytik, unpublished results, Study No.
** 02L00109, March 27, 2002
F008 AIDA
F020 1549619
EOR
F002 7822
F010 2.5
F004 7
F005 RL
F006 guideline study
F007 guideline study
F008 AIDA
F020 1549620
EOR
F002 7822
F010 2.5
F004 7
F005 RS
F006 log Pow at pH = 5 and T = 23°C +/- 1°C is -1.9
** log Pow at pH = 7 and T = 23°C +/- 1°C is -2.1
** log Pow at pH = 9 and T = 23°C +/- 1°C is -2.3
**
** theoretical value: -0.5 (calculation of log Pow was done
** with EPIWIN-software, Syracuse Research C
F007 log Pow at pH = 5 and T = 23°C +/- 1°C is -1.9
** log Pow at pH = 7 and T = 23°C +/- 1°C is -2.1
** log Pow at pH = 9 and T = 23°C +/- 1°C is -2.3
**
** theoretical value: -0.5 (calculation of log Pow was done
** with EPIWIN-software, Syracuse Research Corp., 1992-94,
** Merrill Lane, Syracuse, N.Y.)
F008 AIDA
F020 1549621
EOR
F002 7822
F010 2.5
F004 7
F005 TS
F006 formic acid, purity 85.3 g/100 g of formic acid and 14.3
** g/100 g of water
F007 formic acid, purity 85.3 g/100 g of formic acid and 14.3
** g/100 g of water
F008 AIDA
F020 1549623
EOR
F002 7822
F010 2.5
F004 8
F005 RE
F006 NIOSH (National Institute for Occupational Safety and
** Health), Washington, DC:
** http://www.cdc.gov/niosh/ipcs/icstart.html (01 Jun 2002).

F007 NIOSH (National Institute for Occupational Safety and
** Health), Washington, DC:
** http://www.cdc.gov/niosh/ipcs/icstart.html (01 Jun 2002).
F008 AIDA
F020 1549624
EOR
F002 7822
F010 2.5
F004 8
F005 RL
F006 Secondary quotation
F007 Secondary quotation
F008 AIDA
F020 1549625
EOR
F002 7822
F010 2.6.1
F004 1
F005 RE
F006 BASF AG, Safety data sheet FORMIC ACID 99-100%, 05.12.2001
F007 BASF AG, Safety data sheet FORMIC ACID 99-100%, 05.12.2001
F008 AIDA
F020 1549626
EOR
F002 7822
F010 2.6.1
F004 1
F005 RL
F006 Manufacturer / producer data without proof
F007 Manufacturer / producer data without proof
F008 AIDA
F020 1549627
EOR
F002 7822
F010 2.6.1
F004 1
F005 RM
F006 Solubility in other solvents: miscible with many organic
** solvents
F007 Solubility in other solvents: miscible with many organic
** solvents
F008 AIDA
F020 1549628
EOR
F002 7822
F010 2.6.1
F004 3
F005 RE
F006 Yaws C.L. et al., Chemical Engineering, p. 115 - 118, July
** 1990
F007 Yaws C.L. et al., Chemical Engineering, p. 115 - 118, July
** 1990
F008 AIDA
F020 1549630
EOR
F002 7822
F010 2.6.1

F004 3
F005 RL
F006 Secondary quotation
F007 Secondary quotation
F008 AIDA
F020 1549631
EOR
F002 7822
F010 2.6.1
F004 5
F005 ME
F006 The water solubility of substances with an expected high
** solubility are normally determined according to flask method
** described in "Annex Commission Directive 92/69/EEC, Part
** A.6", "OECD Guideline No. 105" and "U.S. EPA Product
** Properties T
F007 The water solubility of substances with an expected high
** solubility are normally determined according to flask method
** described in "Annex Commission Directive 92/69/EEC, Part
** A.6", "OECD Guideline No. 105" and "U.S. EPA Product
** Properties Test Guidelines OPPTS 830.7840". To apply this
** method, the preparation of a saturated solution of test item
** in water is required. Since the test item is already an
** aqueous solution, an home-made method described in the
** Standard Operation Procedure PCE/006/04 from GKA Analytik,
** BASF AG (chapter 4: visual method) is applied to investigate
** complete miscibility. Regarding the "Data requirements for
** biocidal product types FINAL DRAFT-Version 4.3.1 April 2000
** (Chapter 2, Part A 3.5)", these experiments were carried out
** in dependence on the pH.
F008 AIDA
F020 1549633
EOR
F002 7822
F010 2.6.1
F004 5
F005 RE
F006 BASF AG, GKA Analytik, unpublished results, Study No.
** 02L00109, March 27, 2002
F007 BASF AG, GKA Analytik, unpublished results, Study No.
** 02L00109, March 27, 2002
F008 AIDA
F020 1549634
EOR
F002 7822
F010 2.6.1
F004 5
F005 RL
F006 Study performed in the sense of GLP
F007 Study performed in the sense of GLP
F008 AIDA
F020 1549635
EOR
F002 7822
F010 2.6.1
F004 5
F005 RS

F006 The test item is miscible in buffer pH 5 at T = (20.1°C +/-
** 0.1°C) in any ratio.
** The test item is miscible in buffer pH 7 at T = (20.1°C +/-
** 0.1°C) in any ratio.
** The test item is miscible in buffer pH 9 at T = (20.1°C +/-
** 0.1°C) in any rati
F007 The test item is miscible in buffer pH 5 at T = (20.1°C +/-
** 0.1°C) in any ratio.
** The test item is miscible in buffer pH 7 at T = (20.1°C +/-
** 0.1°C) in any ratio.
** The test item is miscible in buffer pH 9 at T = (20.1°C +/-
** 0.1°C) in any ratio.
F008 AIDA
F020 1549636
EOR
F002 7822
F010 2.6.1
F004 5
F005 TS
F006 formic acid, purity 85.3 g/100 g of formic acid and 14.3
** g/100 g of water
F007 formic acid, purity 85.3 g/100 g of formic acid and 14.3
** g/100 g of water
F008 AIDA
F020 1549638
EOR
F002 7822
F010 2.6.1
F004 6
F005 RE
F006 NIOSH (National Institute for Occupational Safety and
** Health), Washington, DC:
** http://www.cdc.gov/niosh/ipcs/icstart.html (01 Jun 2002).
F007 NIOSH (National Institute for Occupational Safety and
** Health), Washington, DC:
** http://www.cdc.gov/niosh/ipcs/icstart.html (01 Jun 2002).
F008 AIDA
F020 1549639
EOR
F002 7822
F010 2.6.1
F004 6
F005 RL
F006 Secondary quotation
F007 Secondary quotation
F008 AIDA
F020 1549640
EOR
F002 7822
F010 2.7
F004 1
F005 RE
F006 BASF AG, Safety Engineering, unpublished results, SIK-No.
** 86/0236, Feb. 27, 1986
F007 BASF AG, Safety Engineering, unpublished results, SIK-No.
** 86/0236, Feb. 27, 1986
F008 AIDA

F020 1549641
EOR
F002 7822
F010 2.7
F004 1
F005 RL
F006 National standard specification without detailed
** documentation
F007 National standard specification without detailed
** documentation
F008 AIDA
F020 1549642
EOR
F002 7822
F010 2.7
F004 1
F005 TS
F006 formic acid, purity 99 %
F007 formic acid, purity 99 %
F008 AIDA
F020 1549644
EOR
F002 7822
F010 2.7
F004 2
F005 RE
F006 NIOSH (National Institute for Occupational Safety and
** Health), Washington, DC:
** http://www.cdc.gov/niosh/ipcs/icstart.html (01 Jun 2002).
F007 NIOSH (National Institute for Occupational Safety and
** Health), Washington, DC:
** http://www.cdc.gov/niosh/ipcs/icstart.html (01 Jun 2002).
F008 AIDA
F020 1549645
EOR
F002 7822
F010 2.7
F004 2
F005 RL
F006 Secondary quotation
F007 Secondary quotation
F008 AIDA
F020 1549646
EOR
F002 7822
F010 2.8
F004 1
F005 RE
F006 BASF AG, Safety data sheet FORMIC ACID 99-100%, 05.12.2001
F007 BASF AG, Safety data sheet FORMIC ACID 99-100%, 05.12.2001
F008 AIDA
F020 1549647
EOR
F002 7822
F010 2.8
F004 1
F005 RL

F006 Manufacturer / producer data without proof
F007 Manufacturer / producer data without proof
F008 AIDA
F020 1549648
EOR
F002 7822
F010 2.8
F004 1
F005 RM
F006 Ignition temperature
F007 Ignition temperature
F008 AIDA
F020 1549649
EOR
F002 7822
F010 2.8
F004 3
F005 RE
F006 BASF AG, Safety Engineering, unpublished results, SIK-No.
** 80/0258, Apr. 15, 1980
F007 BASF AG, Safety Engineering, unpublished results, SIK-No.
** 80/0258, Apr. 15, 1980
F008 AIDA
F020 1549651
EOR
F002 7822
F010 2.8
F004 3
F005 RL
F006 National standard specification without detailed
** documentation
F007 National standard specification without detailed
** documentation
F008 AIDA
F020 1549652
EOR
F002 7822
F010 2.8
F004 3
F005 RM
F006 Ignition temperature
F007 Ignition temperature
F008 AIDA
F020 1549653
EOR
F002 7822
F010 2.8
F004 3
F005 TS
F006 formic acid, purity 99 %
F007 formic acid, purity 99 %
F008 AIDA
F020 1549655
EOR
F002 7822
F010 2.8
F004 4

F005 RE
F006 NIOSH (National Institute for Occupational Safety and
** Health), Washington, DC:
** http://www.cdc.gov/niosh/ipcs/icstart.html (01 Jun 2002).
F007 NIOSH (National Institute for Occupational Safety and
** Health), Washington, DC:
** http://www.cdc.gov/niosh/ipcs/icstart.html (01 Jun 2002).
F008 AIDA
F020 1549656
EOR
F002 7822
F010 2.8
F004 4
F005 RL
F006 Secondary quotation
F007 Secondary quotation
F008 AIDA
F020 1549657
EOR
F002 7822
F010 2.8
F004 4
F005 RM
F006 Auto-ignition temperature
F007 Auto-ignition temperature
F008 AIDA
F020 1549658
EOR
F002 7822
F010 3.1.1
F004 1
F005 RE
F006 Anbar,M., Neta,P., Int. J. of Appl. Radiation and Isotopes
** 18, 493-523, (1967)
F007 Anbar,M., Neta,P., Int. J. of Appl. Radiation and Isotopes
** 18, 493-523, (1967)
F008 AIDA
F020 1549659
EOR
F002 7822
F010 3.1.1
F004 1
F005 RM
F006 Rate Constant: 2.5*10^9 M^-1 sec^-1
F007 Rate Constant: 2.5*10^9 M^-1 sec^-1
F008 AIDA
F020 1549660
EOR
F002 7822
F010 3.1.1
F004 1
F005 TC
F006 pH=7; temperature 15-25 deg C
F007 pH=7; temperature 15-25 deg C
F008 AIDA
F020 1549662
EOR

F002 7822
F010 3.1.1
F004 2
F005 RE
F006 Dorfman,L.M., Adams,G.E., 'Reactivity of the hydroxyl
** radical in aqueous solution', NSRD-NBS-46, Washington,
** DC: National Bureau of Standards, 51, (1973)
F007 Dorfman,L.M., Adams,G.E., 'Reactivity of the hydroxyl
** radical in aqueous solution', NSRD-NBS-46, Washington,
** DC: National Bureau of Standards, 51, (1973)
F008 AIDA
F020 1549663
EOR
F002 7822
F010 3.1.1
F004 2
F005 RM
F006 Rate Constant: 0.28*10^10 l/mol*sec
F007 Rate Constant: 0.28*10^10 l/mol*sec
F008 AIDA
F020 1549664
EOR
F002 7822
F010 3.1.1
F004 2
F005 TC
F006 OH formed by pulsed radiolysis; neutral pH
F007 OH formed by pulsed radiolysis; neutral pH
F008 AIDA
F020 1549666
EOR
F002 7822
F010 3.1.1
F004 3
F005 RE
F006 Atkinson,R., Gas-phase tropospheric chemistry of organic
** compounds: a review. Atmospheric environment 24A, 1-41,
** (1990)
F007 Atkinson,R., Gas-phase tropospheric chemistry of organic
** compounds: a review. Atmospheric environment 24A, 1-41,
** (1990)
F008 AIDA
F020 1549667
EOR
F002 7822
F010 3.1.1
F004 3
F005 RM
F006 Rate Constant: 4.5*10^-13 cm^3/mol*sec
F007 Rate Constant: 4.5*10^-13 cm^3/mol*sec
F008 AIDA
F020 1549668
EOR
F002 7822
F010 3.1.1
F004 3
F005 TC

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F006 gas-phase reaction with OH-radicals; 25 deg C
F007 gas-phase reaction with OH-radicals; 25 deg C
F008 AIDA
F020 1549670
EOR
F002 7822
F010 3.1.1
F004 4
F005 RE
F006 Wallington,T.J. et al., Journal Phys. Chem.92, 5024-5028,
**   (1988)
F007 Wallington,T.J. et al., Journal Phys. Chem.92, 5024-5028,
**   (1988)
F008 AIDA
F020 1549671
EOR
F002 7822
F010 3.1.1
F004 4
F005 RM
F006 Gas and Solution-Phase Rate Constants: K(gas)= 3.7*10^-3
**   cm^3/mol*sec; K(solution)= 2.2*10^-13 cm^3/mol*sec.
F007 Gas and Solution-Phase Rate Constants: K(gas)= 3.7*10^-3
**   cm^3/mol*sec; K(solution)= 2.2*10^-13 cm^3/mol*sec.
F008 AIDA
F020 1549672
EOR
F002 7822
F010 3.1.1
F004 5
F005 RE
F006 Dagaut,P. et al., Int. J. Chem. Kinet.20, 331-338, (1988)
F007 Dagaut,P. et al., Int. J. Chem. Kinet.20, 331-338, (1988)
F008 AIDA
F020 1549674
EOR
F002 7822
F010 3.1.1
F004 5
F005 RM
F006 Rate Constant (298 K): K= (10.37 +/- 0.04)*10^-12 cm^3/mol*
**   sec.
F007 Rate Constant (298 K): K= (10.37 +/- 0.04)*10^-12 cm^3/mol*
**   sec.
F008 AIDA
F020 1549675
EOR
F002 7822
F010 3.1.1
F004 6
F005 RE
F006 Chin, M.; Wine, P.H. (1994): A temperature-dependent
**   competitive kinetics study of the aqueous-phase reactions of
**   OH radicals with formate, formic acid, acetate, acetic acid
**   and hydrated formaldehyd; Aquatic Surface Photochem, 85 - 96
F007 Chin, M.; Wine, P.H. (1994): A temperature-dependent
**   competitive kinetics study of the aqueous-phase reactions of
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**   OH radicals with formate, formic acid, acetate, acetic acid
**   and hydrated formaldehyd; Aquatic Surface Photochem, 85 - 96
F008 AIDA
F020 1549677
EOR
F002 7822
F010 3.1.1
F004 6
F005 RS
F006 rate constants for reaction of OH-radicals (297 K) in water
**   with HCOO- (340 +/- 39) x 10e7 mol e-1 sec e-1 and for HCOOH
**   (10.1 +/- 1.3) x 10e7 mol e-1 sec -1.
F007 rate constants for reaction of OH-radicals (297 K) in water
**   with HCOO- (340 +/- 39) x 10e7 mol e-1 sec e-1 and for HCOOH
**   (10.1 +/- 1.3) x 10e7 mol e-1 sec -1.
F008 AIDA
F020 1549678
EOR
F002 7822
F010 3.1.1
F004 7
F005 RE
F006 Exner, M.; et al. (1994): Rate constants for the reactions
**   of the NO3 radical with HCOOH/HCOO- and CH3COOH/CH3COO- in
**   aqueous solution between 278 and 328 K, J. Atmos. Chem., 18,
**   359 - 378
F007 Exner, M.; et al. (1994): Rate constants for the reactions
**   of the NO3 radical with HCOOH/HCOO- and CH3COOH/CH3COO- in
**   aqueous solution between 278 and 328 K, J. Atmos. Chem., 18,
**   359 - 378
F008 AIDA
F020 1549680
EOR
F002 7822
F010 3.1.1
F004 7
F005 RS
F006 k (HCOOH) = (3.3 +/- 1.0) x 10e5 l mol e-1 sec e-1, k
**   (HCOO-) = (5.0 +/- 0.4) x 10e7 l mol e-1 sec e-1 (298 K)
F007 k (HCOOH) = (3.3 +/- 1.0) x 10e5 l mol e-1 sec e-1, k
**   (HCOO-) = (5.0 +/- 0.4) x 10e7 l mol e-1 sec e-1 (298 K)
F008 AIDA
F020 1549681
EOR
F002 7822
F010 3.1.2
F004 3
F005 RE
F006 BASF AG, GKA Analytik, unpublished results, Study No.
**   02L00109, March 27, 2002
F007 BASF AG, GKA Analytik, unpublished results, Study No.
**   02L00109, March 27, 2002
F008 AIDA
F020 1549683
EOR
F002 7822
F010 3.1.2
```

F004 3
F005 RL
F006 guideline study
F007 guideline study
F008 AIDA
F020 1549684
EOR
F002 7822
F010 3.1.2
F004 3
F005 RS
F006 pH 4: no hydrolysis could be observed
** pH 7: no hydrolysis could be observed
** pH 9: no hydrolysis could be observed
F007 pH 4: no hydrolysis could be observed
** pH 7: no hydrolysis could be observed
** pH 9: no hydrolysis could be observed
F008 AIDA
F020 1549685
EOR
F002 7822
F010 3.1.2
F004 3
F005 TS
F006 formic acid, purity 85.3 g/100 g of formic acid and 14.3
** g/100 g of water
F007 formic acid, purity 85.3 g/100 g of formic acid and 14.3
** g/100 g of water
F008 AIDA
F020 1549687
EOR
F002 7822
F010 3.2.1
F004 1
F005 RE
F006 Gesellschaft Deutscher Chemiker, BUA-report No. 81
** 'Ameisensaeure', VCH Weinheim, (1991)
F007 Gesellschaft Deutscher Chemiker, BUA-report No. 81
** 'Ameisensaeure', VCH Weinheim, (1991)
F008 AIDA
F020 1549688
EOR
F002 7822
F010 3.2.1
F004 1
F005 RM
F006 many foodstuffs and beverages like milk, cheese, vine,
** fruits, honey, coffee contain formic acid; according to FDA,
** PB 266282 the range of concentration is between 1-7700
** mg/kg.
**
** formic acid is to be found in the atmosphere and could be
** ana
F007 many foodstuffs and beverages like milk, cheese, vine,
** fruits, honey, coffee contain formic acid; according to FDA,
** PB 266282 the range of concentration is between 1-7700
** mg/kg.

```
**
**   formic acid is to be found in the atmosphere and could be
**   analysed in rain-water:
**   rain-water from Ithaca (USA,1977) - 110 ug/l;
**   rain-water from New Hampshire (USA,1977) - 9.2 ug/l;
**   rain-water from the Taunus (region in Germany; 1983/84) -
**   120 ug/l. (Hahn, 1986)
**   rain-water from Hannover (1987) - 260 ug/l. (Winkeler et
**   al.,
**   1988)
**   rain-water from Juelich (1986) - 250 ug/l. (Mueller,1986)
F008 AIDA
F020 1549689
EOR
F002 7822
F010 3.2.1
F004 2
F005 RE
F006 Hrutfiord,B.F. et al., Tappi Environ. Conf. Prepr.181,
**   (1975)
F007 Hrutfiord,B.F. et al., Tappi Environ. Conf. Prepr.181,
**   (1975)
F008 AIDA
F020 1549691
EOR
F002 7822
F010 3.2.1
F004 2
F005 RM
F006 detection of 18 mg/l (gas liquid chromatography mass
**   spectrometry).
F007 detection of 18 mg/l (gas liquid chromatography mass
**   spectrometry).
F008 AIDA
F020 1549692
EOR
F002 7822
F010 3.2.1
F004 3
F005 RE
F006 Hrutfiord,B.F. et al., Tappi Environ. Conf. Prepr.181,
**   (1975)
F007 Hrutfiord,B.F. et al., Tappi Environ. Conf. Prepr.181,
**   (1975)
F008 AIDA
F020 1549694
EOR
F002 7822
F010 3.2.1
F004 3
F005 RM
F006 detection of 31 mg/l (gas liquid chromatography mass
**   spectrometry).
F007 detection of 31 mg/l (gas liquid chromatography mass
**   spectrometry).
F008 AIDA
F020 1549695
```

EOR
F002 7822
F010 3.2.1
F004 4
F005 RE
F006 Goncharova,I.A. et al., Gidrokhim Mater 47, 110, (1968)
F007 Goncharova,I.A. et al., Gidrokhim Mater 47, 110, (1968)
F008 AIDA
F020 1549697
EOR
F002 7822
F010 3.2.1
F004 4
F005 RM
F006 detection of 3-18 ug/l (liquid chromatography).
F007 detection of 3-18 ug/l (liquid chromatography).
F008 AIDA
F020 1549698
EOR
F002 7822
F010 3.2.1
F004 5
F005 RE
F006 Murtaugh,J.J. et al., JWPCF 37, 410, (1965)
F007 Murtaugh,J.J. et al., JWPCF 37, 410, (1965)
F008 AIDA
F020 1549700
EOR
F002 7822
F010 3.2.1
F004 5
F005 RM
F006 detection of 10-24 ug/l (gas liquid chromatography).
F007 detection of 10-24 ug/l (gas liquid chromatography).
F008 AIDA
F020 1549701
EOR
F002 7822
F010 3.2.1
F004 6
F005 RE
F006 Hrutfiord,B.F. et al., Tappi 58, 98, (1975)
F007 Hrutfiord,B.F. et al., Tappi 58, 98, (1975)
F008 AIDA
F020 1549703
EOR
F002 7822
F010 3.2.1
F004 6
F005 RM
F006 detection of 18/31 mg/l (influent to /effluent from stabili-
** sation basin).
F007 detection of 18/31 mg/l (influent to /effluent from stabili-
** sation basin).
F008 AIDA
F020 1549704
EOR

F002 7822
F010 3.2.1
F004 7
F005 RE
F006 Gesellschaft Deutscher Chemiker, BUA-report No. 81
** 'Ameisensaeure', VCH Weinheim, (1991)
F007 Gesellschaft Deutscher Chemiker, BUA-report No. 81
** 'Ameisensaeure', VCH Weinheim, (1991)
F008 AIDA
F020 1549706
EOR
F002 7822
F010 3.2.1
F004 7
F005 RM
F006 formic acid is a natural material. It is made in the
** metabolism of micro-organisms, plant and animals as an
** intermediate and final product. Enterobacteriaceae like E.
** coli, which are found in the human gut, secrete formic acid
** during the pr
F007 formic acid is a natural material. It is made in the
** metabolism of micro-organisms, plant and animals as an
** intermediate and final product. Enterobacteriaceae like E.
** coli, which are found in the human gut, secrete formic acid
** during the process of fermentation like other acid forming
** fermentation organisms. Moreover, formic acid is build in
** the glands of ants, nettles and other animals and plants.
F008 AIDA
F020 1549707
EOR
F002 7822
F010 3.2.1
F004 8
F005 RE
F006 Hartmann,W.R. et al., Atmos. Environ.23, 1531-1533, (1989)
F007 Hartmann,W.R. et al., Atmos. Environ.23, 1531-1533, (1989)
F008 AIDA
F020 1549709
EOR
F002 7822
F010 3.2.1
F004 8
F005 RM
F006 Formic acid found in (ppbv): 1. Germany: Continental anti-
** cyclone 1.04 +/- 1.08, Marine influence 0.17 +/- 0.06;
** 2. Amazon/Basin, ABLE-2A, dry season: 1.6 +/- 0.6 (boundary
** layer); 3. Amazon/Basin, ABLE-2B, wet season: 0.37 +/- 0.24
** (bound
F007 Formic acid found in (ppbv): 1. Germany: Continental anti-
** cyclone 1.04 +/- 1.08, Marine influence 0.17 +/- 0.06;
** 2. Amazon/Basin, ABLE-2A, dry season: 1.6 +/- 0.6 (boundary
** layer); 3. Amazon/Basin, ABLE-2B, wet season: 0.37 +/- 0.24
** (boundary layer), 0.15 +/- 0.09 (free troposphere);
** 4. Central Africa/DECAFE, dry season: 3.7 +/- 1.0 (boundary
** layer), 0.9 +/- 0.3 (free troposphere).
F008 AIDA
F020 1549710

EOR
F002 7822
F010 3.2.1
F004 9
F005 RE
F006 Dawson G.A., Farmer J.C. (1988) Soluble atmospheric trace gases in the
* southwestern United States. 2. Organic species
** formaldehyde, formic acid, and acetic acid. Journal of
** Geophysical Research [Atmospheres] 93: 5200-6
** CA10908060574U
F007 Dawson G.A., Farmer J.C. (1988) Soluble atmospheric trace gases in the
* southwestern United States. 2. Organic species
** formaldehyde, formic acid, and acetic acid. Journal of
** Geophysical Research [Atmospheres] 93: 5200-6
** CA10908060574U
F008 IUC4
F020 1549712
EOR
F002 7822
F010 3.2.1
F004 9
F005 RL
F006 Secondary quotation
F007 Secondary quotation
F008 IUC4
F020 1549713
EOR
F002 7822
F010 3.2.1
F004 9
F005 RS
F006 Formic acid concentration:
**
** typically urban concentration: 3 ppb
** typically concentration in remote areas: 0.9 ppb
**
** The data suggest that in forested and probably desert
** regions, there is a substantial natural production of
** organic acids dur
F007 Formic acid concentration:
**
** typically urban concentration: 3 ppb
** typically concentration in remote areas: 0.9 ppb
**
** The data suggest that in forested and probably desert
** regions, there is a substantial natural production of
** organic acids during summer, presumably vegetation.
F008 IUC4
F020 1549714
EOR
F002 7822
F010 3.2.1
F004 10
F005 RE
F006 Zobrist J, Wersin P, Jaques C, Sigg L, Stumm W (1993) Dry
** deposition measurements using water as a receptor: a
** chemical approach. Water, Air, and Soil Pollution 71 .

**   111-30
**   CA12006061249F
F007 Zobrist J, Wersin P, Jaques C, Sigg L, Stumm W (1993) Dry
**   deposition measurements using water as a receptor: a
**   chemical approach. Water, Air, and Soil Pollution 71 .
**   111-30
**   CA12006061249F
F008 IUC4
F020 1549715
EOR
F002 7822
F010 3.2.1
F004 10
F005 RL
F006 Secondary quotation
F007 Secondary quotation
F008 IUC4
F020 1549716
EOR
F002 7822
F010 3.2.1
F004 10
F005 RS
F006 The following dry deposition rate was observed.:
**   formate 4.0 mu.mol/m2-day
F007 The following dry deposition rate was observed.:
**   formate 4.0 mu.mol/m2-day
F008 IUC4
F020 1549717
EOR
F002 7822
F010 3.3.1
F004 1
F005 RE
F006 Gaffney,J.S. et al., Environ. Sci. Technol.21, 519-524,
**   (1987)
F007 Gaffney,J.S. et al., Environ. Sci. Technol.21, 519-524,
**   (1987)
F008 AIDA
F020 1549718
EOR
F002 7822
F010 3.3.1
F004 1
F005 RE
F006 Lyman,W.J. et al., Handbook of Chemical Property Estimation
**   Methods New York: McGraw-Hill, 15-1 to 15-34, (1982)
F007 Lyman,W.J. et al., Handbook of Chemical Property Estimation
**   Methods New York: McGraw-Hill, 15-1 to 15-34, (1982)
F008 AIDA
F020 1549719
EOR
F002 7822
F010 3.3.1
F004 1
F005 RM
F006 Henry´s law constant: 1.67*10^-7 atm*m^3/mol (calculated

```
**   value based on the data mentioned in the original quotation:
**   "6*10^3 mol l^-1 atm^-1").
F007 Henry´s law constant: 1.67*10^-7 atm*m^3/mol (calculated
**   value based on the data mentioned in the original quotation:
**   "6*10^3 mol l^-1 atm^-1").
F008 AIDA
F020 1549720
EOR
F002 7822
F010 3.3.1
F004 1
F005 RM
F006 The Henry's Law Constant indicates that volatilization from
**   water is not be significant.
F007 The Henry's Law Constant indicates that volatilization from
**   water is not be significant.
F008 AIDA
F020 1549721
EOR
F002 7822
F010 3.3.1
F004 3
F005 ME
F006 HPLC screening method
F007 HPLC screening method
F008 AIDA
F020 1549723
EOR
F002 7822
F010 3.3.1
F004 3
F005 RE
F006 BASF AG, GKA Analytik, unpublished results, Study No.
**   02L00109, March 27, 2002
F007 BASF AG, GKA Analytik, unpublished results, Study No.
**   02L00109, March 27, 2002
F008 AIDA
F020 1549724
EOR
F002 7822
F010 3.3.1
F004 3
F005 RL
F006 guideline study
F007 guideline study
F008 AIDA
F020 1549725
EOR
F002 7822
F010 3.3.1
F004 3
F005 RM
F006 As formic acid is an ionisable substance, two tests are
**   performed with both ionised and non-ionised forms in
**   appropriate buffer solutions.
**
**   This result was given from the run test a), where the mobile
```

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**   phase is acidic. This means, that the t
F007 As formic acid is an ionisable substance, two tests are
**   performed with both ionised and non-ionised forms in
**   appropriate buffer solutions.
**
**   This result was given from the run test a), where the mobile
**   phase is acidic. This means, that the test item is in the
**   non-ionisable form. The run from test b), where the test
**   item is ionised, leads to no results.
F008 AIDA
F020 1549726
EOR
F002 7822
F010 3.3.1
F004 3
F005 RS
F006 log Koc = < 1.25 (at 23°C)
**
**   theoretical value: 0 (calculation of log Koc was done with
**   EPIWIN-software, Syracuse Research Corp., 1992-94, Merrill
**   Lane, Syracuse, N.Y.
F007 log Koc = < 1.25 (at 23°C)
**
**   theoretical value: 0 (calculation of log Koc was done with
**   EPIWIN-software, Syracuse Research Corp., 1992-94, Merrill
**   Lane, Syracuse, N.Y.
F008 AIDA
F020 1549727
EOR
F002 7822
F010 3.3.1
F004 3
F005 TS
F006 formic acid, purity 85.3 g/100 g of formic acid and 14.3
**   g/100 g of water
F007 formic acid, purity 85.3 g/100 g of formic acid and 14.3
**   g/100 g of water
F008 AIDA
F020 1549729
EOR
F002 7822
F010 3.3.1
F004 4
F005 RE
F006 Gaffney, J.S. et al., Environmental Science & Technology,
**   21: 519-524, 1987
F007 Gaffney, J.S. et al., Environmental Science & Technology,
**   21: 519-524, 1987
F008 AIDA
F020 1549730
EOR
F002 7822
F010 3.3.1
F004 4
F005 RM
F006 Henry's Law constant: 0.016 Pa x m3/mole at 25°C.
**
```

```
**   The effective Henry's Law constant is given for an acid
**   equilibrium considered at pH 4 with a liquid water content
**   of 1 gram/m3 of air.
F007 Henry's Law constant: 0.016 Pa x m3/mole at 25°C.
**
**   The effective Henry's Law constant is given for an acid
**   equilibrium considered at pH 4 with a liquid water content
**   of 1 gram/m3 of air.
F008 AIDA
F020 1549731
EOR
F002 7822
F010 3.3.2
F004 3
F005 ME
F006 Level I V 2.11 Model
F007 Level I V 2.11 Model
F008 AIDA
F020 1549733
EOR
F002 7822
F010 3.3.2
F004 3
F005 RE
F006 BASF AG, Department of Product Safety, unpublished
**   calculation, 10.06.2002
F007 BASF AG, Department of Product Safety, unpublished
**   calculation, 10.06.2002
F008 AIDA
F020 1549734
EOR
F002 7822
F010 3.3.2
F004 3
F005 RL
F006 scientifically acceptable method
F007 scientifically acceptable method
F008 AIDA
F020 1549735
EOR
F002 7822
F010 3.3.2
F004 3
F005 RM
F006 the following physico-chemical properties of the substance
**   were used to calculate the distribution:
**   - molecular mass: 46 g/mol
**   - data temperature: 20 °C
**   - log Kow: -2.1
**   - water-solubility: 1.22E6 g/m3
**   - Henry´s law constant: 0.09 Pa*m3/mol
F007 the following physico-chemical properties of the substance
**   were used to calculate the distribution:
**   - molecular mass: 46 g/mol
**   - data temperature: 20 °C
**   - log Kow: -2.1
**   - water-solubility: 1.22E6 g/m3
```

```
**   - Henry´s law constant: 0.09 Pa*m3/mol
**   - vapour pressure: 2420 Pa
**   - melting point: -50.8 °C
F008 AIDA
F020 1549736
EOR
F002 7822
F010 3.3.2
F004 3
F005 RS
F006 over time, the substance will preferentially distribute into
**   the water:
**   - water:   96.9 %
**   - air:      3.1 %
**   - soil:     0.0 %
**   - sediment: 0.0 %
F007 over time, the substance will preferentially distribute into
**   the water:
**   - water:   96.9 %
**   - air:      3.1 %
**   - soil:     0.0 %
**   - sediment: 0.0 %
F008 AIDA
F020 1549737
EOR
F002 7822
F010 3.5
F004 3
F005 RE
F006 Takemoto,S. et al., Suishitsu-Odaku-Kenkyu 4, 80-90, (1981)
F007 Takemoto,S. et al., Suishitsu-Odaku-Kenkyu 4, 80-90, (1981)
F008 AIDA
F009 30-11-1992
F020 1549739
EOR
F002 7822
F010 3.5
F004 4
F005 RE
F006 Wagner,R., Vom Wasser 47, 241-265, (1976)
F007 Wagner,R., Vom Wasser 47, 241-265, (1976)
F008 AIDA
F009 30-11-1992
F020 1549741
EOR
F002 7822
F010 3.5
F004 4
F005 RM
F006 dilutions : variable concentration of test substance from
**   24-1200 mg/l.
F007 dilutions : variable concentration of test substance from
**   24-1200 mg/l.
F008 AIDA
F009 30-11-1992
F020 1549742
EOR
```

F002 7822
F010 3.5
F004 5
F005 RE
F006 Takemoto,S. et al., Suishitsu-Odaku-Kenkyu 4, 80-90, (1981)
F007 Takemoto,S. et al., Suishitsu-Odaku-Kenkyu 4, 80-90, (1981)
F008 AIDA
F009 30-11-1992
F020 1549744
EOR
F002 7822
F010 3.5
F004 7
F005 RE
F006 Price,K.S. et al., JWPCF 46(1), 63-77, (1974)
F007 Price,K.S. et al., JWPCF 46(1), 63-77, (1974)
F008 AIDA
F009 30-11-1992
F020 1549751
EOR
F002 7822
F010 3.5
F004 7
F005 RM
F006 concentration at the beginning: 3-10 mg/l related to test
** substance
F007 concentration at the beginning: 3-10 mg/l related to test
** substance
F008 AIDA
F009 30-11-1992
F020 1549752
EOR
F002 7822
F010 3.5
F004 7
F005 RM
F006 test results:
** elimination after 10/15/20 days = 47/39/60 %
F007 test results:
** elimination after 10/15/20 days = 47/39/60 %
F008 AIDA
F009 30-11-1992
F020 1549753
EOR
F002 7822
F010 3.5
F004 7
F005 TC
F006 neutralized
F007 neutralized
F008 AIDA
F020 1549755
EOR
F002 7822
F010 3.5
F004 8
F005 RE

F006 Price,K.S. et al., JWPCF 46(1), 63-77, (1974)
F007 Price,K.S. et al., JWPCF 46(1), 63-77, (1974)
F008 AIDA
F009 30-11-1992
F020 1549756
EOR
F002 7822
F010 3.5
F004 8
F005 RM
F006 concentration at test start: 3-10 mg/l related to test
** substance
F007 concentration at test start: 3-10 mg/l related to test
** substance
F008 AIDA
F009 30-11-1992
F020 1549757
EOR
F002 7822
F010 3.5
F004 8
F005 RM
F006 test results:
** elimination after 10/15/20 days = 91/92/95 %
F007 test results:
** elimination after 10/15/20 days = 91/92/95 %
F008 AIDA
F009 30-11-1992
F020 1549758
EOR
F002 7822
F010 3.5
F004 8
F005 TC
F006 neutralized
F007 neutralized
F008 AIDA
F020 1549760
EOR
F002 7822
F010 3.5
F004 9
F005 RE
F006 Malaney,G.W., Gerhold,R.M., Journal Water Pollution Control
** Federation 41/2/2, R18-R33, (1969)
F007 Malaney,G.W., Gerhold,R.M., Journal Water Pollution Control
** Federation 41/2/2, R18-R33, (1969)
F008 AIDA
F009 30-11-1992
F020 1549761
EOR
F002 7822
F010 3.5
F004 9
F005 RM
F006 test results:
** elimination after 6/12 hours: 28.3/45.4 %

F007 test results:
** elimination after 6/12 hours: 28.3/45.4 %
F008 AIDA
F009 30-11-1992
F020 1549762
EOR
F002 7822
F010 3.5
F004 10
F005 RE
F006 BASF AG, Department of Ecology, unpublished study, 0048/88,
** 07.04.1988
F007 BASF AG, Department of Ecology, unpublished study, 0048/88,
** 07.04.1988
F008 AIDA
F020 1549764
EOR
F002 7822
F010 3.5
F004 10
F005 RL
F006 comparable to guideline study with acceptable restrictions
F007 comparable to guideline study with acceptable restrictions
F008 AIDA
F020 1549765
EOR
F002 7822
F010 3.5
F004 10
F005 RM
F006 test device:
** - 2 l Erlenmeyer flasks, liquid volume: 900 ml
**
** number of replicates:
** - test substance (TS): 2
** - reference substance (RS): 1
** - blank (BC): 1
** - inhibition control (IH): 1
** - assay to examine physico chemical (abiotic) eliminatio
F007 test device:
** - 2 l Erlenmeyer flasks, liquid volume: 900 ml
**
** number of replicates:
** - test substance (TS): 2
** - reference substance (RS): 1
** - blank (BC): 1
** - inhibition control (IH): 1
** - assay to examine physico chemical (abiotic) elimination
** (PC): 1
**
** inoculum:
** - source: effluent from laboratory wastewater treatment
** plants fed with municipal sewage
**
** reference control:
** - reference substance: Na-benzoate
** - concentration: 20 mg/L related to DOC

```
**   - kinetic of reference substance: 1 day(s) 88 % DOC-elimin.
**                                     7 day(s) 96 % DOC-elimin.
**                                     10 day(s) 92 % DOC-elimin.
**                                     13 day(s) 94 % DOC-elimin.
**
**   inhibition control:
**   - substances: Na-benzoate + formic acid
**   - concentration: Na-benzoate: 20 mg/L related to DOC
**                    test subst.: 20 mg/L related to DOC
**   - kinetic of inhibition control: 1 day(s) 46 % DOC-elimin.
**                                    7 day(s) 95 % DOC-elimin.
**                                    10 day(s) 96 % DOC-elimin.
**                                    13 day(s) 97 % DOC-elimin.
**
**   assay to examine physico-chemical (abiotic) elimination:
**   - concentration: 72 mg/L related to test substance (20 mg/L
**   related to DOC)
**   - w/o inoculum, w mercury chloride to avoid biodegradation
**   - kinetic of physico-chemical elimination:
**                                    1 day(s): 0 % DOC-elimin.
**                                    7 day(s): 4 % DOC-elimin.
**                                    10 day(s): 2 % DOC-elimin.
**                                    13 day(s): 13 % DOC-elimin.
F008 AIDA
F020 1549766
EOR
F002 7822
F010 3.5
F004 11
F005 RE
F006 BASF AG, Department of Ecology, unpublished study,
**   52/0048/88, 28.09.1988
F007 BASF AG, Department of Ecology, unpublished study,
**   52/0048/88, 28.09.1988
F008 AIDA
F020 1549768
EOR
F002 7822
F010 3.5
F004 11
F005 RL
F006 comparable to guideline study with acceptable restrictions
F007 comparable to guideline study with acceptable restrictions
F008 AIDA
F020 1549769
EOR
F002 7822
F010 3.5
F004 11
F005 RM
F006 test device:
**   - 2 l Erlenmeyer flasks, liquid volume: 900 ml
**
**   number of replicates:
**   - test substance (TS): 2
**   - reference substance (RS): 1
**   - blank (BC): 1
```

```
**
**   inoculum:
**   - source: effluent from laboratory wastewater treatment
**   plants fed with m
F007 test device:
**   - 2 l Erlenmeyer flasks, liquid volume: 900 ml
**
**   number of replicates:
**   - test substance (TS): 2
**   - reference substance (RS): 1
**   - blank (BC): 1
**
**   inoculum:
**   - source: effluent from laboratory wastewater treatment
**   plants fed with municipal sewage
**
**   reference control:
**   - reference substance: Na-benzoate
**   - concentration: 20 mg/L related to DOC
**   - kinetic of reference substance: 1 day(s) 17 % DOC-elimin.
**                                     2 day(s) 98 % DOC-elimin.
**                                     3 day(s) 98 % DOC-elimin.
F008 AIDA
F020 1549770
EOR
F002 7822
F010 3.5
F004 12
F005 RE
F006 BASF AG, Department of Ecology, unpublished study,
**   52/4849/88, 26.09.1988
F007 BASF AG, Department of Ecology, unpublished study,
**   52/4849/88, 26.09.1988
F008 AIDA
F020 1549772
EOR
F002 7822
F010 3.5
F004 12
F005 RL
F006 comparable to guideline study with acceptable restrictions
F007 comparable to guideline study with acceptable restrictions
F008 AIDA
F020 1549773
EOR
F002 7822
F010 3.5
F004 12
F005 RM
F006 test device:
**   - 2 l Erlenmeyer flasks, liquid volume: 900 ml
**
**   number of replicates:
**   - test substance (TS): 2
**   - reference substance (RS): 1
**   - blank (BC): 1
**
```

```
**   inoculum:
**   - source: effluent from laboratory wastewater treatment
**   plants fed with m
F007 test device:
**   - 2 l Erlenmeyer flasks, liquid volume: 900 ml
**
**   number of replicates:
**   - test substance (TS): 2
**   - reference substance (RS): 1
**   - blank (BC): 1
**
**   inoculum:
**   - source: effluent from laboratory wastewater treatment
**   plants fed with municipal sewage
**
**   reference control:
**   - reference substance: Na-benzoate
**   - concentration: 22 mg/L related to DOC (34 mg/L related to
**   test substance)
**   - kinetic of reference substance: 1 day(s) 17 % DOC-elimin.
**                                     2 day(s) 98 % DOC-elimin.
**                                     3 day(s) 98 % DOC-elimin.
F008 AIDA
F020 1549774
EOR
F002 7822
F010 3.5
F004 13
F005 RE
F006 Ishikawa T, Ose Y, Sato T, Inoue Z (1978): Waste water
**   treatment of night soil. VIII. Removal of volatile fatty
**   acids using bacteria isolated from an aerobic treatment
**   plant for undiluted night soil. Eisei Kagaku 24(5):226-30.
**   Abstract: CA:
F007 Ishikawa T, Ose Y, Sato T, Inoue Z (1978): Waste water
**   treatment of night soil. VIII. Removal of volatile fatty
**   acids using bacteria isolated from an aerobic treatment
**   plant for undiluted night soil. Eisei Kagaku 24(5):226-30.
**   Abstract: CA:09026209529G
F008 IUC4
F020 1549776
EOR
F002 7822
F010 3.5
F004 13
F005 RL
F006 Secondary quotation
F007 Secondary quotation
F008 IUC4
F020 1549777
EOR
F002 7822
F010 3.5
F004 13
F005 RM
F006 Escherichia coli var. communior, Bacillus megaterium, and
**   propionic acid utilizing  bacteria were isolated from the
```

**   aerobic treatment plant for undiluted night soil to study
**   the mechanism of the removal of volatile fatty acids. From
**   the re
F007 Escherichia coli var. communior, Bacillus megaterium, and
**   propionic acid utilizing bacteria were isolated from the
**   aerobic treatment plant for undiluted night soil to study
**   the mechanism of the removal of volatile fatty acids. From
**   the results of the determination of oxygen absorption, these
**   3 bacteria had different abilities to remove substrates,
**   i.e., dissimilation ratio of E. coli was 90.4% for HCO2H
**   [64-18-6]; B. megaterium did not
**   dissimilate HCO2H.
F008 IUC4
F020 1549778
EOR
F002 7822
F010 3.5
F004 14
F005 RE
F006 Kondo R, Nishijima T, Hata Y (1995): Kinetic study on the
**   mineralization of low molecular fatty acids in an anoxic
**   marine sediment. Fisheries Science 61 (3): 482-6. Abstract:
**   CA12306065190Q
F007 Kondo R, Nishijima T, Hata Y (1995): Kinetic study on the
**   mineralization of low molecular fatty acids in an anoxic
**   marine sediment. Fisheries Science 61 (3): 482-6. Abstract:
**   CA12306065190Q
F008 IUC4
F020 1549779
EOR
F002 7822
F010 3.5
F004 14
F005 RL
F006 Secondary quotation
F007 Secondary quotation
F008 IUC4
F020 1549780
EOR
F002 7822
F010 3.5
F004 14
F005 RM
F006 The mineralization kinetics (Vmax) of low-mol.-wt. fatty
**   acids and glucose were investigated in the anoxic sediment
**   of Uranouchi Inlet, Japan. The Vmax values of mineralization
**   of formate mineralization were highest in all substrates
**   teste
F007 The mineralization kinetics (Vmax) of low-mol.-wt. fatty
**   acids and glucose were investigated in the anoxic sediment
**   of Uranouchi Inlet, Japan. The Vmax values of mineralization
**   of formate mineralization were highest in all substrates
**   tested, 90.8-637 nmol/g-h, 3 orders of magnitude higher than
**   the other compounds.Turnover time varied according to
**   substrate and temperature, ranging for formate from 1.5-4.2
**   h.
**   The highest Vmax values and shortest turnover time of fatty

```
**   acids and mineralization were recorded in summer sediment
**   samples.
F008 IUC4
F020 1549781
EOR
F002 7822
F010 3.5
F004 15
F005 RE
F006 Price,K.S. et al., JWPCF 46(1), 63-77, (1974)
F007 Price,K.S. et al., JWPCF 46(1), 63-77, (1974)
F020 1549882
EOR
F002 7822
F010 3.5
F004 15
F005 RM
F006 concentration at test start: 3-10 mg/l related to test substance
**   test results:
**   elimination after 10/15/20 days = 54/66/68 %
F007 concentration at test start: 3-10 mg/l related to test substance
**   test results:
**   elimination after 10/15/20 days = 54/66/68 %
F020 1549883
EOR
F002 7822
F010 3.5
F004 15
F005 TC
F006 neutralized
F007 neutralized
F020 1549884
EOR
F002 7822
F010 3.7
F004 1
F005 RE
F006 Gesellschaft Deutscher Chemiker, BUA-report No. 81
**   'Ameisensaeure', VCH Weinheim, (1991)
F007 Gesellschaft Deutscher Chemiker, BUA-report No. 81
**   'Ameisensaeure', VCH Weinheim, (1991)
F008 AIDA
F020 1549782
EOR
F002 7822
F010 3.7
F004 1
F005 RM
F006 the measured log Pow = -0.54 is an indication of missing
**   bioaccumulation potential
F007 the measured log Pow = -0.54 is an indication of missing
**   bioaccumulation potential
F008 AIDA
F020 1549783
EOR
F002 7822
F010 3.7
```

F004 2
F005 RE
F006 Lyman,W.J. et al., Handbook of Chemical Property Estimation
** Methods, McGraw-Hill, New York, table 5-1, page 5-5, (1982)
F007 Lyman,W.J. et al., Handbook of Chemical Property Estimation
** Methods, McGraw-Hill, New York, table 5-1, page 5-5, (1982)
F008 AIDA
F020 1549785
EOR
F002 7822
F010 3.7
F004 2
F005 RM
F006 calculation of BCF based on a log Pow=-0.54 and the equation
** "log BCF=0.76 log Kow -0.23".
F007 calculation of BCF based on a log Pow=-0.54 and the equation
** "log BCF=0.76 log Kow -0.23".
F008 AIDA
F020 1549786
EOR
F002 7822
F010 4.1
F004 1
F005 RE
F006 Dowden, B.F. und Bennett, H.J.: J. Water Pollut. Contr.
** Fed.37, 1308-1316 (1965)
F007 Dowden, B.F. und Bennett, H.J.: J. Water Pollut. Contr.
** Fed.37, 1308-1316 (1965)
F008 HEDSET
F009 06-09-1995
F020 1549788
EOR
F002 7822
F010 4.1
F004 1
F005 RE
F006 Water Quality Characteristics of Hazardous Materials,
** Vol.1-4 (1979)
F007 Water Quality Characteristics of Hazardous Materials,
** Vol.1-4 (1979)
F008 HEDSET
F009 06-09-1995
F020 1549789
EOR
F002 7822
F010 4.1
F004 1
F005 RM
F006 secundary quotation
F007 secundary quotation
F008 HEDSET
F009 06-09-1995
F020 1549790
EOR
F002 7822
F010 4.1
F004 2

F005 RE
F006 Dowden, B.F. und Bennett, H.J.: J. Water Pollut. Contr.
** Fed.37, 1308-1316 (1965)
F007 Dowden, B.F. und Bennett, H.J.: J. Water Pollut. Contr.
** Fed.37, 1308-1316 (1965)
F008 HEDSET
F009 06-09-1995
F020 1549792
EOR
F002 7822
F010 4.1
F004 2
F005 RE
F006 Verschueren,K., Handbook of Environmental Data on Organic
** Chemicals, Second Edition, Van Nostrand Reinhold,
** New York, (1983)
F007 Verschueren,K., Handbook of Environmental Data on Organic
** Chemicals, Second Edition, Van Nostrand Reinhold,
** New York, (1983)
F008 HEDSET
F009 06-09-1995
F020 1549793
EOR
F002 7822
F010 4.1
F004 2
F005 RM
F006 bluegill sunfish
F007 bluegill sunfish
F008 HEDSET
F009 06-09-1995
F020 1549794
EOR
F002 7822
F010 4.1
F004 2
F005 TS
F006 sodium formiat
F007 sodium formiat
F008 HEDSET
F009 06-09-1995
F020 1549796
EOR
F002 7822
F010 4.1
F004 4
F005 RE
F006 Huels AG, unpublished study (No. 10), 11.03.92
F007 Huels AG, unpublished study (No. 10), 11.03.92
F008 HEDSET
F009 06-09-1995
F020 1549797
EOR
F002 7822
F010 4.1
F004 5
F005 RE

F006 BASF AG, Department of Toxicoloy, unpublished study, 88/218,
** 30 March 1989
F007 BASF AG, Department of Toxicoloy, unpublished study, 88/218,
** 30 March 1989
F008 HEDSET
F020 1549799
EOR
F002 7822
F010 4.1
F004 5
F005 RE
F006 Finney D.J., Probit Analysis, Cambr. Univ. Press, 3.
** edition, 1971
F007 Finney D.J., Probit Analysis, Cambr. Univ. Press, 3.
** edition, 1971
F008 HEDSET
F020 1549800
EOR
F002 7822
F010 4.1
F004 5
F005 RL
F006 closely followed German National Standard
F007 closely followed German National Standard
F008 HEDSET
F020 1549801
EOR
F002 7822
F010 4.1
F004 5
F005 RM
F006 closely followed the German National Standard DIN 38 412,
** Part 15 (1982):
** - animal species: Leuciscus idus L., golden variety (golden
** orfe)
** - test water: reconstituted freshwater was prepared from
** fully demineralized tap water according to
F007 closely followed the German National Standard DIN 38 412,
** Part 15 (1982):
** - animal species: Leuciscus idus L., golden variety (golden
** orfe)
** - test water: reconstituted freshwater was prepared from
** fully demineralized tap water according to DIN 38 412, Part
** 11 (1982) that was resalted by the addition of 294.0 mg/L
** $CaCl_2.2H_2O$, 123.3 mg/L $MgSO_4.7H_2O$, 63 mg/L $NaHCO_3$ and 5.5
** mg/L KCl
** - test water had a total hardness of 2.5 mmol/L, an acid
** capacity of 0.8 mmol/L, ratio Ca/mg ions = 4:1, ratio Na/K
** ions = 10:1 and a pH of about 8
** - volume of water: 10 L
** - aeration: slight
** - photoperiod: 16 h light and 8 h darkness
** - No. of animals per test concentration: 10
** - loading (G fish / L test water): 2.8
** - test vessels: non-sealed all-glass aquarium (30 * 22 * 24
** cm)
** - temperature: 20 °C

```
**   - withdrawal of food: 1 day before and during exposure
**   - duration of adaptation to test water and test temperature:
**   3 days
**   - body length: 6.7 cm (range: 6.0 - 7.2 cm)
**   - body weight: 2.8 g (range: 2.0 - 3.6 g)
**   - positive control of animals conducted with chloracetamide:
**   LC50 (48 h): approx. 32 mg/L (this lethal concentration
**   corresponds to the nominal sensitivity)
**   - test concentration: 10.0, 21.5, 46.4, 100.0 mg/L
**   - pH neutralized test solution: to study the effect
**   of the low pH on the toxicity the concentration 100 mg/L
**   was tested in parallel after pH-adjustment (with NaOH-
**   solution)
**   - preparation to test substance: the product was added to
**   the test water without any pretreatment. Subsequently the
**   fish were placed into the aquaria
**
**   - pH values after 1 h and 96 h:
**   concentration (mg/L)     pH (1 h)   pH (96 h)
**        10.0                  7.5         7.5
**        21.5                  7.0         7.5
**        46.4                  4.3         7.2
**       100.0                  3.3
**       control                7.7         7.7
**        100.0 (*)             7.2         7.5
**        (*) test solution after pH-adjustment
**
**   - oxygen values after 1 h and 96 h:
**   concentration (mg/L)     oxygen (1 h)   oxygen (96 h)
**       10.0                     8.3             8.6
**       21.5                     8.4             8.8
**       46.4                     7.9             8.1
**      100.0                     8.3
**       control                  8.2             8.9
**      100.0 (*)                 8.0             8.3
**       (*) test solution after pH-adjustment
**
**   - the controls were the test water without the test
**   substance
**
**   - median lethal concentration (LC50) were calculated using
**   Probit Analysis
**
**   - test concentrations related to nominal concentrations
F008 HEDSET
F020 1549802
EOR
F002 7822
F010 4.1
F004 5
F005 RS
F006 observed symptoms: apathy (after 4 h)
**
**   no observable effect concentration:             21.5 mg/L
**   maximum concentration causing no mortality:     46.4 mg/L
**   minimum concentration causing 100 % mortality: 100.0 mg/L
**
```

```
**   total No. of living fish a
F007 observed symptoms: apathy (after 4 h)
**
**   no observable effect concentration:             21.5 mg/L
**   maximum concentration causing no mortality:     46.4 mg/L
**   minimum concentration causing 100 % mortality: 100.0 mg/L
**
**   total No. of living fish at the beginning and after 96 h:
**   concentration (mg/L)  No. of living fish
**                            (0 h)     (96 h)
**       10.0                  10         10
**       21.5                  10         10
**       46.4                  10         10
**      100.0                  10          0
**   control                   10         10
**      100.0 (*)              10         10
**   (*) after pH-adjustment
**
**   no toxic effect was observed when testing a neutralized
**   sample
F008 HEDSET
F020 1549803
EOR
F002 7822
F010 4.1
F004 6
F005 RE
F006 Nishiuchi Y (1975) Toxicity of formulated pesticides to some fresh water
*    organisms XXXIII  Suisan Zoshoku  Vol. 23, No. 3, pp. 132-4. Abstract:
*    CA08517117592R
F007 Nishiuchi Y (1975) Toxicity of formulated pesticides to some fresh water
*    organisms XXXIII  Suisan Zoshoku  Vol. 23, No. 3, pp. 132-4. Abstract:
*    CA08517117592R
F008 IUC4
F020 1549805
EOR
F002 7822
F010 4.1
F004 6
F005 RL
F006 Secondary quotation
F007 Secondary quotation
F008 IUC4
F020 1549806
EOR
F002 7822
F010 4.1
F004 6
F005 RM
F006 The compounds were used in neutralizing water pH for
**   pesticide toxicity study.
**   Temperature: 25 deg. C
**   The concentrations were related to ppm.
F007 The compounds were used in neutralizing water pH for
**   pesticide toxicity study.
**   Temperature: 25 deg. C
**   The concentrations were related to ppm.
```

F008 IUC4
F020 1549807
EOR
F002 7822
F010 4.2
F004 3
F005 RE
F006 Bringmann,G., Kuehn,R., Gesundheits-Ingenieur, 80(4),
** 115-120, (1959)
F007 Bringmann,G., Kuehn,R., Gesundheits-Ingenieur, 80(4),
** 115-120, (1959)
F008 AIDA
F009 30-11-1992
F020 1549808
EOR
F002 7822
F010 4.2
F004 3
F005 RM
F006 immobilisation
F007 immobilisation
F008 AIDA
F009 30-11-1992
F020 1549809
EOR
F002 7822
F010 4.2
F004 4
F005 RE
F006 Price,K.S. et al., JWPCF 46(1), 63-77, (1974)
F007 Price,K.S. et al., JWPCF 46(1), 63-77, (1974)
F008 AIDA
F009 30-11-1992
F020 1549811
EOR
F002 7822
F010 4.2
F004 5
F005 RE
F006 Randall,T.L., Knopp,P.V., JWPCF 52(8), 2117-2130, (1980)
F007 Randall,T.L., Knopp,P.V., JWPCF 52(8), 2117-2130, (1980)
F008 AIDA
F020 1549813
EOR
F002 7822
F010 4.2
F004 5
F005 RM
F006 confidence limits: 138-165 mg/l
F007 confidence limits: 138-165 mg/l
F008 AIDA
F020 1549814
EOR
F002 7822
F010 4.2
F004 5
F005 TC

F006 22 deg C; pH 7.0-8.2
F007 22 deg C; pH 7.0-8.2
F008 AIDA
F020 1549816
EOR
F002 7822
F010 4.2
F004 6
F005 ME
F006 procedures to determine EC-values after 48 h:
** - EC50: moving average
** - EC0: highest concentration tested at which <= 10 % of the
** animals were immobile
** - EC100: lowest tested concentration at which 100 % of the
** animals were immobile;
**
** static
F007 procedures to determine EC-values after 48 h:
** - EC50: moving average
** - EC0: highest concentration tested at which <= 10 % of the
** animals were immobile
** - EC100: lowest tested concentration at which 100 % of the
** animals were immobile;
**
** static acute toxicity test
F008 AIDA
F020 1549817
EOR
F002 7822
F010 4.2
F004 6
F005 RE
F006 BASF AG, Department of Ecology, unpublished study,
** 1/0290/2/88-0290/88, 22 April 1988
F007 BASF AG, Department of Ecology, unpublished study,
** 1/0290/2/88-0290/88, 22 April 1988
F008 AIDA
F020 1549818
EOR
F002 7822
F010 4.2
F004 6
F005 RE
F006 Sachs L., Angewandte Statistik, Springer Verlag, Berlin,
** Heidelberg, New York, 4. edition, 1974
F007 Sachs L., Angewandte Statistik, Springer Verlag, Berlin,
** Heidelberg, New York, 4. edition, 1974
F008 AIDA
F020 1549819
EOR
F002 7822
F010 4.2
F004 6
F005 RE
F006 Thompson W.R., Bacteriological Reviews 11, 2, 115-145, 1947
F007 Thompson W.R., Bacteriological Reviews 11, 2, 115-145, 1947
F008 AIDA

F020 1549820
EOR
F002 7822
F010 4.2
F004 6
F005 RL
F006 guideline study
F007 guideline study
F008 AIDA
F020 1549821
EOR
F002 7822
F010 4.2
F004 6
F005 RM
F006 test conditions:
** - dilution water: source: tap water; pretreatment steps: (1)
** 6 µm- and charcoal-filtration; (2) H2SO4 was added to reduce
** alkalinity up to pH 4.3; (3) distilled water was added to
** reduce water-hardness; (4) water was aerate
F007 test conditions:
** - dilution water: source: tap water; pretreatment steps: (1)
** 6 µm- and charcoal-filtration; (2) H2SO4 was added to reduce
** alkalinity up to pH 4.3; (3) distilled water was added to
** reduce water-hardness; (4) water was aerated (oil-free air)
** unil saturated with oxygen; (5) water was stored for at
** least 24 h for stabilization. Specifications measured at
** test start: water-hardness: 2.74 mmol/L, alkalinity up to pH
** 4.3: 0.79 mmol/L, pH: 7.8, conductivity: 640 µSiemens/cm
** - water solubility of test substance: >500 mg/L at 21 °C
** (293 K)
** - illumination: diffuse light
** - temperature: 20-22 °C (292-294 K)
** - test volume: 10 ml
** - test vessels: test tubes (glass) with flat bottom (nominal
** volume 20 ml)
** - replicates: 4 per concentration
** - volume/animal: 2 ml
** - number of animals/vessel: 5
** - total number of animals/conc.: 20
** - age of animals: 2-24 h
** - observation times: visually after 0, 3, 6, 24 and 48 h
** - observation parameters: swimming ability, pH, oxygen
** - test concentrations: 0.781, 1.56, 3.12, 6.25, 12.5, 25.0,
** 50.0, 100.0 mg/L (nominal)
F008 AIDA
F020 1549822
EOR
F002 7822
F010 4.2
F004 6
F005 RS
F006 - number of mobile test animals after exposure (48 h) to
** various test concentrations:
** concentration (mg/L) mobile Daphnids
** 0.781 20
** 1.56 20

```
**            3.12                 19
**            6.25
F007 - number of mobile test animals after exposure (48 h) to
**   various test concentrations:
**     concentration (mg/L)  mobile Daphnids
**            0.781                20
**            1.56                 20
**            3.12                 19
**            6.25                 20
**           12.5                  19
**           25.0                  18
**           50.0                   0
**          100.0                   0
**         control                 19
**
**   - effect values after 48 h:
**     EC50    = 32.19 mg/L
**             95 % confidence limits: 25.94 - 38.44 mg/L
**
**   - effect values after 24 h:
**     EC0     = 25.0 mg/L
**     EC50    = 34.21 mg/L
**             95 % confidence limits: 30.57 - 37.85 mg/L
**     EC100   = 50.0 mg/L
**
**   - remark in the report:
**   toxicity at 50 - 100 mg/L may be due to the low pH (lowest
**   value = pH 3.74)
**
**   - mentioned effect values related to nominal concentrations
**
**   - range of pH at start: 3.74 (100 mg/L) - 8.07 (control)
**   - range of pH after 48 h: 3.59 (100 mg/L) - 7.76 (0.781
**   mg/L)
**
**   - range of O2 (mg/L) at start: 8.59 (50 mg/L) - 8.72
**   (control)
**   - range of O2 (mg/L) after 48 h: 7.73 (50 mg/L) - 8.78 (100
**   mg/L)
F008 AIDA
F020 1549823
EOR
F002 7822
F010 4.3
F004 3
F005 RE
F006 Bringmann,G., Kuehn,R., Gesundheits-Ingenieur, 80(4),
**   115-120, (1959)
F007 Bringmann,G., Kuehn,R., Gesundheits-Ingenieur, 80(4),
**   115-120, (1959)
F008 AIDA
F009 30-11-1992
F020 1549825
EOR
F002 7822
F010 4.3
F004 4
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F005 RE
F006 BASF AG, Department of Ecology, unpublished study,
** 2/0290/88, 09.09.1988
F007 BASF AG, Department of Ecology, unpublished study,
** 2/0290/88, 09.09.1988
F008 AIDA
F020 1549827
EOR
F002 7822
F010 4.3
F004 4
F005 RE
F006 BASF AG, Department of Product Safety, unpublished
** recalculation, 06.03.2002
F007 BASF AG, Department of Product Safety, unpublished
** recalculation, 06.03.2002
F008 AIDA
F020 1549828
EOR
F002 7822
F010 4.3
F004 4
F005 RL
F006 test procedure following national standard
F007 test procedure following national standard
F008 AIDA
F020 1549829
EOR
F002 7822
F010 4.3
F004 4
F005 RM
F006 effect values (endpoints: growth rate and biomass) were
** recalculated according to OECD 201 guideline using linear
** regression analysis considering fluorescence values
** mentioned in the report (BASF AG, Department of Ecology,
** unpublished data,
F007 effect values (endpoints: growth rate and biomass) were
** recalculated according to OECD 201 guideline using linear
** regression analysis considering fluorescence values
** mentioned in the report (BASF AG, Department of Ecology,
** unpublished data, 2/0290/88, 09.09.1988), yielding 72 h
** growth rate values of ErC10 = 21.1 mg/L, ErC50 = 32.6 mg/l,
** ErC90 = 43.3 mg/l, and biomass values of EbC10 = 13.1 mg/L,
** EbC50 = 28.0 mg/L and EbC90 = 44.6 mg/L
**
** original effect values given in the report:
** EC20 (72 h) = 14.9 mg/L
** EC50 (72 h) = 26.9 mg/L
** EC90 (72 h) = 45.6 mg/L
** EC20 (96 h) = 12.6 mg/L
** EC50 (96 h) = 25.0 mg/L
** EC90 (96 h) = 45.1 mg/L
** (these calculated values relate to the inhibition of the
** fluorescence in vessels containing different concentrations
** of the test substance compared to a control without the
** chemical)

```
**
**   test was performed according to the German Industrial
**   Standard DIN 38412, Part 9:
**
**   pre-culture:
**   - species: Scenedesmus subspicatus, SAG 86.81
**   - medium: OECD-medium (OECD 201)
**   - temperature: 20 °C
**   - test flasks: 250 ml-Erlenmeyer flasks plugged with gas
**   permeable silicon-sponge caps
**   - test volume: 100 ml
**   - flasks were incubated in an incubation chamber for 72 h
**   - flasks were shaken once a day to hold cells in suspension
**   - illumination: permanent artificial light
**   - light intensity: approx. 120 µE/(m2*s)
**
**   test-culture:
**   - No. of algae in test flasks at test start: 10000
**   exponentially-growing cells
**   - stock solution of test substance: concentration: 100 mg/L
**   of the volatile test substance, conductivity: 18 µS/cm, pH
**   3.5; stock solution was diluted in test medium to reach the
**   final test concentrations
**   - test concentrations: 0.78, 1.56, 3.13, 6.25, 12.5, 25, 50
**   mg/L
**   - test vessels: 20 ml tubes plugged with gas permeable
**   silicon-sponge caps (test was performed in non-sealed
**   vessels)
**   - replicates: per concentration and control: 6, blank per
**   concentration (w/o cells): 1
**   - test volume: 10 ml
**   - tubes were incubated in an incubation chamber for 96 h at
**   23 °C
**   - tubes were shaken once a day to hold cells in suspension
**   - illumination: permanent artificial light
**   - light intensity: approx. 120 µE/(m2*s)
**   - samples were taken at regular intervals (0, 24, 48, 72, 96
**   h)
**   - measurements: fluorescence (in vivo chlorophyll-a
**   fluorescence at 685 nm as a size for the biomass (pulsed
**   excitation with light flashes having a wavelength of 435
**   nm)), pH
F008 AIDA
F020 1549830
EOR
F002 7822
F010 4.3
F004 4
F005 RS
F006 - effect values related to nominal concentration of the
**   volatile test substance
**
**   -effect values (endpoint: biomass):
**   EbC10 (72 h)  = 13.1 mg/L
**   EbC50 (72 h)  = 28.0 mg/L
**   EbC90 (72 h) = 44.6 mg/L
**
```

```
**   - range of pH at start: 4.5 (50 mg/L, w/o cel
F007 - effect values related to nominal concentration of the
**   volatile test substance
**
**   -effect values (endpoint: biomass):
**   EbC10 (72 h)  = 13.1 mg/L
**   EbC50 (72 h)  = 28.0 mg/L
**   EbC90 (72 h) = 44.6 mg/L
**
**   - range of pH at start: 4.5 (50 mg/L, w/o cells) - 7.8
**   (control, w/o cells)
**   - range of pH after 96 h: 4.9 (50 mg/L, w cells) - 10.0
**   (3.13 mg/L, w cells)
F008 AIDA
F020 1549831
EOR
F002 7822
F010 4.3
F004 5
F005 RE
F006 BASF AG, Department of Ecology, unpublished study,
**   08.12.1988
F007 BASF AG, Department of Ecology, unpublished study,
**   08.12.1988
F008 AIDA
F020 1549833
EOR
F002 7822
F010 4.3
F004 5
F005 RL
F006 relevant methodological deficiencies (unacceptable high
**   variation coefficient values of inoculated replicates)
F007 relevant methodological deficiencies (unacceptable high
**   variation coefficient values of inoculated replicates)
F008 AIDA
F020 1549834
EOR
F002 7822
F010 4.3
F004 5
F005 RM
F006 calculated effect values relate to the inhibition of the
**   fluorescence in vessels containing different concentrations
**   of the test substance compared to a control without the
**   chemical
**
**   test was performed according to the German Industrial
**   Sta
F007 calculated effect values relate to the inhibition of the
**   fluorescence in vessels containing different concentrations
**   of the test substance compared to a control without the
**   chemical
**
**   test was performed according to the German Industrial
**   Standard DIN 38412, Part 9:
**
```

```
**   pre-culture:
**   - species: Scenedesmus subspicatus, SAG 86.81
**   - medium: OECD-medium (OECD 201)
**   - temperature: 20 °C
**   - test flasks: 250 ml-Erlenmeyer flasks plugged with gas
**   permeable silicon-sponge caps
**   - test volume: 100 ml
**   - flasks were incubated in an incubation chamber for 72 h
**   - flasks were shaken once a day to hold cells in suspension
**   - illumination: permanent artificial light
**   - light intensity: approx. 120 µE/(m2*s)
**
**   test-culture:
**   - No. of algae in test flasks at test start: 10000
**   exponentially-growing cells
**   - stock solution of test substance: concentration: 200 mg/L
**   test substance, conductivity: 210 µS/cm, pH 3.17; stock
**   solution was diluted in test medium to reach the final test
**   concentrations
**   - test concentrations: 0.78, 1.56, 3.13, 6.25, 12.5, 25, 50,
**   100 mg/L (nominal)
**   - test vessels: 20 ml tubes plugged with gas permeable
**   silicon-sponge caps (test was performed in non-sealed
**   vessels)
**   - replicates: per concentration and control: 5, blank per
**   concentration (w/o cells): 2
**   - test volume: 10 ml
**   - tubes were incubated in an incubation chamber for 72 h at
**   23 °C
**   - tubes were shaken once a day to hold cells in suspension
**   - illumination: permanent artificial light
**   - light intensity: approx. 120 µE/(m2*s)
**   - samples were taken at regular intervals (0, 24, 48, 72 h)
**   - measurements: fluorescence (in vivo chlorophyll-a
**   fluorescence at 685 nm as a size for the biomass (pulsed
**   excitation with ligth flashes having a wavelength of 435
**   nm)), pH
F008 AIDA
F020 1549835
EOR
F002 7822
F010 4.3
F004 5
F005 RS
F006 - effect values related to nominal concentration of the test
**   substance
**
**   - range of pH at start: 3.7 (100 mg/L, w/o cells) - 8.0
**   (control, 0.78 mg/L, w/o cells)
**
**   - range of pH after 72 h: 4.0 (100 mg/L, inoculated) - 9.8
**   (6.25 mg/L, inoculat
F007 - effect values related to nominal concentration of the test
**   substance
**
**   - range of pH at start: 3.7 (100 mg/L, w/o cells) - 8.0
**   (control, 0.78 mg/L, w/o cells)
```

```
**
**   - range of pH after 72 h: 4.0 (100 mg/L, inoculated) - 9.8
**   (6.25 mg/L, inoculated)
F008 AIDA
F020 1549836
EOR
F002 7822
F010 4.4
F004 4
F005 RE
F006 Bringmann,G., Kuehn,R., Gesundheits-Ingenieur, 80(4),
**   115-120, (1959)
F007 Bringmann,G., Kuehn,R., Gesundheits-Ingenieur, 80(4),
**   115-120, (1959)
F008 AIDA
F009 30-11-1992
F020 1549838
EOR
F002 7822
F010 4.4
F004 4
F005 RM
F006 below 1000 mg/L the production of acids by Escherichia coli
**   was not inhibited
F007 below 1000 mg/L the production of acids by Escherichia coli
**   was not inhibited
F008 AIDA
F009 30-11-1992
F020 1549839
EOR
F002 7822
F010 4.4
F004 5
F005 RE
F006 BASF AG, Department of Ecology, unpublished study,
**   9/0290/88, 31 March 1988
F007 BASF AG, Department of Ecology, unpublished study,
**   9/0290/88, 31 March 1988
F008 AIDA
F020 1549841
EOR
F002 7822
F010 4.4
F004 5
F005 RL
F006 test procedure following national standard
F007 test procedure following national standard
F008 AIDA
F020 1549842
EOR
F002 7822
F010 4.4
F004 5
F005 RM
F006 pre-culture:
**   - species: Pseudomonas putida, DSM 50026
**   - incubated at 24 °C (297 K +- 1 K), 150 rpm for 7+-1 h
```

```
**   - medium: AK-medium according to DIN 38412, Part 8 (draft)
**   - test vessel: 300 ml-Erlenmeyer flasks, 1 baffle
**   - liquid volume: 1
F007 pre-culture:
**   - species: Pseudomonas putida, DSM 50026
**   - incubated at 24 °C (297 K +- 1 K), 150 rpm for 7+-1 h
**   - medium: AK-medium according to DIN 38412, Part 8 (draft)
**   - test vessel: 300 ml-Erlenmeyer flasks, 1 baffle
**   - liquid volume: 100 ml
**
**   test-culture:
**   - test vessel: Penicillium glass vessel
**   - liquid volume: 10 ml
**   - inoculum: 1 ml pre-culture (adjusted to 10 TE/F)
**   - test medium: AK-medium according to DIN 38412, Part 8
**   (draft)
**   - test concentrations (nominal): 7.81, 15.63, 31.25, 62.5,
**   125, 250, 500, 1000 mg/L
**   - replicates: inoculated: 4 per concentration and control;
**   non-inoculated: 1 per concentration
**   - incubated at 20°C (292 K), 150 rpm for 17 h
**   - measurements: photometric determination at 436 nm and pH
**   at test start and after 17 h
F008 AIDA
F020 1549843
EOR
F002 7822
F010 4.4
F004 5
F005 RS
F006 - range of pH:
**   at test start: 2.9 (1000 mg/L, w/o cells) - 7.1 (control,
**   w/o cells)
**   after 17 h: 2.9 (1000 mg/L, w cells) - 5.0 (15.63 mg/L, w
**   cells)
**
**   - inhibition (%) after 17 h:
**     test concentration    inhibition
**           (mg/L)
F007 - range of pH:
**   at test start: 2.9 (1000 mg/L, w/o cells) - 7.1 (control,
**   w/o cells)
**   after 17 h: 2.9 (1000 mg/L, w cells) - 5.0 (15.63 mg/L, w
**   cells)
**
**   - inhibition (%) after 17 h:
**     test concentration    inhibition
**           (mg/L)             (%)
**           control             --
**             7.81           - 2.05 (1)
**            15.63           - 0.45 (1)
**            31.25             1.86
**            62.5             99.42
**           125               99.23
**           250               99.42
**           500               99.55
**          1000               99.42
```

```
**          (1) no inhibition but growth promotion
**
**   the inhibitory effect may be mainly due to acidic pH of the
**   test solutions
F008 AIDA
F020 1549844
EOR
F002 7822
F010 4.4
F004 6
F005 RE
F006 BASF AG, Department of Ecology, unpublished study,
**   01.0048/88, 13.04.1988
F007 BASF AG, Department of Ecology, unpublished study,
**   01.0048/88, 13.04.1988
F008 AIDA
F020 1549846
EOR
F002 7822
F010 4.4
F004 6
F005 RL
F006 comparable to guideline study with acceptable restrictions
F007 comparable to guideline study with acceptable restrictions
F008 AIDA
F020 1549847
EOR
F002 7822
F010 4.4
F004 6
F005 RM
F006 test concentration: 988 mg/L
F007 test concentration: 988 mg/L
F008 AIDA
F020 1549848
EOR
F002 7822
F010 4.4
F004 6
F005 RS
F006 - in comparison to a blank no inhibition but a promotion of
**   the respiration activity of the activated sludge was
**   observed at 988 mg/L test substance
**
**   - respiration acitivty:
**     blank (mean value):          30 mg/L*h
**     test concentration 988
F007 - in comparison to a blank no inhibition but a promotion of
**   the respiration activity of the activated sludge was
**   observed at 988 mg/L test substance
**
**   - respiration acitivty:
**     blank (mean value):          30 mg/L*h
**     test concentration 988 mg/L: 44 mg/L*h
**
**   - the inhibition of the degradation activity of activated
**   sludge is not anticipated when introduced in appropriate low
```

**   concentrations
F008 AIDA
F020 1549849
EOR
F002 7822
F010 4.4
F004 7
F005 RE
F006 Tenuta M, Conn KL, Lazarovits G (2002): Volatile fatty acids
**   in liquid swine manure can kill microsclerotia of
**   Verticillium dahliae. Phytopathology 92 (5) 548-552.
**   Abstract: CA 13701002982T
F007 Tenuta M, Conn KL, Lazarovits G (2002): Volatile fatty acids
**   in liquid swine manure can kill microsclerotia of
**   Verticillium dahliae. Phytopathology 92 (5) 548-552.
**   Abstract: CA 13701002982T
F008 IUC4
F020 1549851
EOR
F002 7822
F010 4.4
F004 7
F005 RL
F006 Secondary quotation
F007 Secondary quotation
F008 IUC4
F020 1549852
EOR
F002 7822
F010 4.4
F004 7
F005 RM
F006 Liquid swine manure added to acidic soils killed
**   microsclerotia of the wilt fungus Verticillium dahliae
**   The survival of microsclerotia was determined after
**   exposure to various dilutions of manure or its volatile
**   fatty acid components. The
F007 Liquid swine manure added to acidic soils killed
**   microsclerotia of the wilt fungus Verticillium dahliae
**   The survival of microsclerotia was determined after
**   exposure to various dilutions of manure or its volatile
**   fatty acid components. The individual volatile fatty acids
**   were more toxic to microsclerotia as the solutions. The
**   protonated forms were toxic. Allthough Formic acid was not
**   detected the effective concentration reducing germination of
**   microsclerotia
**   by 95% (EC95) for formic acid was determined for approx. 4
**   mM.
F008 IUC4
F020 1549853
EOR
F002 7822
F010 4.4
F004 7
F005 RS
F006 EC95 = 184 mg/L (corresponding to 4 mmol/L)
F007 EC95 = 184 mg/L (corresponding to 4 mmol/L)

F008 IUC4
F020 1549854
EOR
F002 7822
F010 4.6.3
F004 1
F005 RE
F006 Banage W B, Visser SA (1965) The effect of some fatty acids
** and pH on a soil nematode Nematalogica 11: 255-62.
** Abstract: CA06310ß075720U
F007 Banage W B, Visser SA (1965) The effect of some fatty acids
** and pH on a soil nematode Nematalogica 11: 255-62.
** Abstract: CA06310ß075720U
F008 IUC4
F020 1549855
EOR
F002 7822
F010 4.6.3
F004 1
F005 RL
F006 Secondary quotation
F007 Secondary quotation
F008 IUC4
F020 1549856
EOR
F002 7822
F010 4.6.3
F004 1
F005 RS
F006 Specimens of Dorylaimus were placed in solns. of formic acid
** and 4 homologe fatty acids in water at concns.ranging
** 10-4-1M. A concn. of 10-4M (corresponding to 46 mg/L) was
** without effect over a 2-hr. period.
** Nematodes exposed to concns. 10
F007 Specimens of Dorylaimus were placed in solns. of formic acid
** and 4 homologe fatty acids in water at concns.ranging
** 10-4-1M. A concn. of 10-4M (corresponding to 46 mg/L) was
** without effect over a 2-hr. period.
** Nematodes exposed to concns. 10-3-1M had survival
** (immobilization) times that varied exponentially with the
** molarity. No difference could be seen between the acids
** when equimolar concns. were used.
**
** Na salts of these acids showed a lower order of toxicity.
** Immobilization time increased as pH was increased. Formic
** acid was less effective then then oter fatty acids at pH
** values ranging from approx. 2 to 3.4. No protoplasmic or
** cuticular changes were noted.
F008 IUC4
F020 1549857
EOR
F002 7822
F010 4.6.4
F004 1
F005 RE
F006 Gesellschaft Deutscher Chemiker, BUA-report No. 81
** 'Ameisensaeure', VCH Weinheim, (1991)

F007 Gesellschaft Deutscher Chemiker, BUA-report No. 81
** 'Ameisensaeure', VCH Weinheim, (1991)
F008 AIDA
F020 1549858
EOR
F002 7822
F010 4.6.4
F004 2
F005 RE
F006 Schafer, E.W. et al.: Arch. Environ. Contam. Toxicol. 12,
** 355-382 (1983)
F007 Schafer, E.W. et al.: Arch. Environ. Contam. Toxicol. 12,
** 355-382 (1983)
F008 AIDA
F020 1549860
EOR
F002 7822
F010 4.6.4
F004 2
F005 RM
F006 the acute oral toxicity and a "repellency-toxicity index"
** were determined.
F007 the acute oral toxicity and a "repellency-toxicity index"
** were determined.
F008 AIDA
F020 1549861
EOR
F002 7822
F010 4.9
F004 1
F005 RE
F006 Kramer,V.C. et al., J. Inv. Pathol.42, 285-287, (1983)
F007 Kramer,V.C. et al., J. Inv. Pathol.42, 285-287, (1983)
F008 AIDA
F020 1549863
EOR
F002 7822
F010 5.1.1
F004 1
F005 RE
F006 FDA, PB 266282, Evaluation of the Health Aspects of Formic
** Acid and (...) as Food Ingredients, Washington DC, (1976)
F007 FDA, PB 266282, Evaluation of the Health Aspects of Formic
** Acid and (...) as Food Ingredients, Washington DC, (1976)
F008 HEDSET
F009 06-09-1995
F020 1355875
EOR
F002 7822
F010 5.1.1
F004 1
F005 RE
F006 Patty Ind. Hyg. Toxicol. 3rd Ed., 4903 (1981)
F007 Patty Ind. Hyg. Toxicol. 3rd Ed., 4903 (1981)
F008 HEDSET
F009 06-09-1995
F020 1355876

EOR
F002 7822
F010 5.1.1
F004 1
F005 RM
F006 Das Ergebnis liegt lediglich tabellarisch in Form eines
** Sekundaerzitates vor.
F007 Das Ergebnis liegt lediglich tabellarisch in Form eines
** Sekundaerzitates vor.
F008 HEDSET
F009 06-09-1995
F020 1355877
EOR
F002 7822
F010 5.1.1
F004 2
F005 RE
F006 Sax, S. 695 (1979)
F007 Sax, S. 695 (1979)
F008 HEDSET
F009 06-09-1995
F020 1355878
EOR
F002 7822
F010 5.1.1
F004 2
F005 RE
F006 Water Quality Characteristics of Hazardous Materials,
** Vol.1-4 (1979)
F007 Water Quality Characteristics of Hazardous Materials,
** Vol.1-4 (1979)
F008 HEDSET
F009 06-09-1995
F020 1355879
EOR
F002 7822
F010 5.1.1
F004 2
F005 RM
F006 Das Ergebnis liegt lediglich als kurzes Sekundaerzitat vor.
F007 Das Ergebnis liegt lediglich als kurzes Sekundaerzitat vor.
F008 HEDSET
F009 06-09-1995
F020 1355880
EOR
F002 7822
F010 5.1.1
F004 3
F005 RE
F006 FDA, PB 266282, Evaluation of the Health Aspects of Formic
** Acid and (...) as Food Ingredients, Washington DC, (1976)
F007 FDA, PB 266282, Evaluation of the Health Aspects of Formic
** Acid and (...) as Food Ingredients, Washington DC, (1976)
F008 HEDSET
F009 06-09-1995
F020 1355881
EOR

F002 7822
F010 5.1.1
F004 3
F005 RE
F006 Malorny, G.: Z. Ernaehrungswiss. 9, 332-339 (1969)
F007 Malorny, G.: Z. Ernaehrungswiss. 9, 332-339 (1969)
F008 HEDSET
F009 06-09-1995
F020 1355882
EOR
F002 7822
F010 5.1.1
F004 3
F005 RE
F006 Patty Ind. Hyg. Toxicol. 3rd Ed., 4903 (1981)
F007 Patty Ind. Hyg. Toxicol. 3rd Ed., 4903 (1981)
F008 HEDSET
F009 06-09-1995
F020 1355883
EOR
F002 7822
F010 5.1.1
F004 3
F005 RM
F006 Es wurden 55 Tiere eingesetzt; keine weiteren Angaben. Das
** Ergebnis liegt lediglich in tabellarischer Form vor.
F007 Es wurden 55 Tiere eingesetzt; keine weiteren Angaben. Das
** Ergebnis liegt lediglich in tabellarischer Form vor.
F008 HEDSET
F009 06-09-1995
F020 1355884
EOR
F002 7822
F010 5.1.1
F004 4
F005 RE
F006 FDA, PB 266282, Evaluation of the Health Aspects of Formic
** Acid and (...) as Food Ingredients, Washington DC, (1976)
F007 FDA, PB 266282, Evaluation of the Health Aspects of Formic
** Acid and (...) as Food Ingredients, Washington DC, (1976)
F008 HEDSET
F009 05-09-1995
F020 1355885
EOR
F002 7822
F010 5.1.1
F004 4
F005 RE
F006 Oettingen W.F. von: Arch. Ind. Health 20, 517 (1959)
F007 Oettingen W.F. von: Arch. Ind. Health 20, 517 (1959)
F008 HEDSET
F009 05-09-1995
F020 1355886
EOR
F002 7822
F010 5.1.1
F004 4

F005 RE
F006 Water Quality Characteristics of Hazardous Materials,
** Vol.1-4 (1979)
F007 Water Quality Characteristics of Hazardous Materials,
** Vol.1-4 (1979)
F008 HEDSET
F009 05-09-1995
F020 1355887
EOR
F002 7822
F010 5.1.1
F004 4
F005 RE
F006 WHO Food Additives Series, Nr. 5, Genf (1974)
F007 WHO Food Additives Series, Nr. 5, Genf (1974)
F008 HEDSET
F009 05-09-1995
F020 1355888
EOR
F002 7822
F010 5.1.1
F004 4
F005 RM
F006 Todesfaelle aufgetreten. In der Quelle wird eine angebliche
** Methaemoglobinbildung beschrieben. Das Original (Fleig
** 1907)steht nicht zur Verfuegung, von Oettingen (1959)
** erwaehnt diesen Effekt nicht. Der Befund erscheint
** unwahrscheinlich.
F007 Todesfaelle aufgetreten. In der Quelle wird eine angebliche
** Methaemoglobinbildung beschrieben. Das Original (Fleig
** 1907)steht nicht zur Verfuegung, von Oettingen (1959)
** erwaehnt diesen Effekt nicht. Der Befund erscheint
** unwahrscheinlich.
F008 HEDSET
F009 05-09-1995
F020 1355889
EOR
F002 7822
F010 5.1.1
F004 4
F005 TS
F006 Gepruefte Substanz: Natriumformiat.
F007 Gepruefte Substanz: Natriumformiat.
F008 HEDSET
F009 05-09-1995
F020 1355890
EOR
F002 7822
F010 5.1.1
F004 5
F005 RE
F006 Malorny, G.: Z. Ernaehrungswiss. 9, 332-339 (1969)
F007 Malorny, G.: Z. Ernaehrungswiss. 9, 332-339 (1969)
F008 HEDSET
F009 05-09-1995
F020 1355891
EOR

F002 7822
F010 5.1.1
F004 5
F005 RM
F006 Es wurden 45 Tiere eingesetzt; keine weiteren Angaben. Das
** Ergebnis liegt lediglich in tabellarischer Form vor.
F007 Es wurden 45 Tiere eingesetzt; keine weiteren Angaben. Das
** Ergebnis liegt lediglich in tabellarischer Form vor.
F008 HEDSET
F009 05-09-1995
F020 1355892
EOR
F002 7822
F010 5.1.1
F004 5
F005 TS
F006 Natriumformiat
F007 Natriumformiat
F008 HEDSET
F009 05-09-1995
F020 1355893
EOR
F002 7822
F010 5.1.1
F004 6
F005 RE
F006 Malorny, G.: Z. Ernaehrungswiss. 9, 332-339 (1969)
F007 Malorny, G.: Z. Ernaehrungswiss. 9, 332-339 (1969)
F008 HEDSET
F009 05-09-1995
F020 1355894
EOR
F002 7822
F010 5.1.1
F004 6
F005 RM
F006 Es wurden 45 Tiere eingesetzt; keine weiteren Angaben. Das
** Ergebnis liegt lediglich in tabellarischer Form vor.
F007 Es wurden 45 Tiere eingesetzt; keine weiteren Angaben. Das
** Ergebnis liegt lediglich in tabellarischer Form vor.
F008 HEDSET
F009 05-09-1995
F020 1355895
EOR
F002 7822
F010 5.1.1
F004 6
F005 TS
F006 Calciumformiat
F007 Calciumformiat
F008 HEDSET
F009 05-09-1995
F020 1355896
EOR
F002 7822
F010 5.1.1
F004 8

F005 RE
F006 RTECS, Update 9001: Gig. Tr. Prof. Zabol. 23 (12), 49 (1979)
F007 RTECS, Update 9001: Gig. Tr. Prof. Zabol. 23 (12), 49 (1979)
F008 HEDSET
F009 06-09-1995
F020 1355897
EOR
F002 7822
F010 5.1.1
F004 8
F005 RM
F006 Das Ergebnis liegt lediglich als Sekundaerzitat vor.
F007 Das Ergebnis liegt lediglich als Sekundaerzitat vor.
F008 HEDSET
F009 06-09-1995
F020 1355898
EOR
F002 7822
F010 5.1.1
F004 9
F005 RE
F006 Huels AG, unpublished results (Nr. 0359), Feb. 05, 1985
F007 Huels AG, unpublished results (Nr. 0359), Feb. 05, 1985
F008 HEDSET
F009 05-09-1995
F020 1355899
EOR
F002 7822
F010 5.1.1
F004 9
F005 RM
F006 Five rats per sex and dose level received the unchanged test substance
* (formic acid with a purity of 99%) via gavage. The doses administered
* were 501, 631, 794 and 1,000 mg/kg bw. And the volume administered
* unchanged from 0.41 to 0.82 cm3/
F007 Five rats per sex and dose level received the unchanged test substance
* (formic acid with a purity of 99%) via gavage. The doses administered
* were 501, 631, 794 and 1,000 mg/kg bw. And the volume administered
* unchanged from 0.41 to 0.82 cm3/kg bw. The animals have been observed for
* clinical symptoms or mortality on a daily base. At the end of the 14 day
* observation period the animals were sacrificed and subjected to a
* macroscopic inspection. Body weight was determined on day 1, 7 and 14 of
* the study. The LD50 was calculated according to the method of Litchfield
* and Wilcoxon and a 95% confidence interval was determined (J. Pharmacol.
* Exp. Ther. 96, 1949, 99).
F008 HEDSET
F009 05-09-1995
F020 1355900
EOR
F002 7822
F010 5.1.1
F004 9
F005 RS
F006 Mortalities and clinical symptoms were observed at every dose level:
**
** Dose 501 631 794 1000
** (mg/kg bw)

```
**
**   Number/                    5m/5f     5m/5f    5m/5f      5m/5f
**   Sex
**
**   Animals died                0/1
F007 Mortalities and clinical symptoms were observed at every dose level:
**
**   Dose                        501       631      794       1000
**   (mg/kg bw)
**
**   Number/                    5m/5f     5m/5f    5m/5f      5m/5f
**   Sex
**
**   Animals died                0/1       2/2      1/5        4/4
**
**   Animals with                5/5       5/5      5/5        5/5
**   clinical symptoms
**
**   Mortality within hours/    1 h      24 h      8 d       48 h
**   days after dosing
**
**   Bodyweight development was impaired in a dose dependent way. Clinical
*    symptoms were noted at all dose levels and included piloerection,
*    tumbling, sedation, ataxia, difficulty in breathing. Blood was noted
*    around the nose and in the urine. With th exception of one animal
*    surviving at the highest dose level still showing symptoms at study
*    termination, all other animals were free of symptoms at day 8. Gross
*    pathology revealed hyperemia in teh stomach and intestine mucosa,
*    spleenic congestion and areas of different color in the liver and kidneys
*    in animals that died. Animals that were sacrificed at study termination
*    showed hyperemia of the small intestine mucosa, patchy colored liver as
*    well as pale kidneys and pancreas.
**
**   The LD50 for both sexes was determined to be 730 mg/kg bw with a 95%
*    confidnece interval of 618-863 mg/kg bw.
F008 HEDSET
F009 05-09-1995
F020 1355901
EOR
F002 7822
F010 5.1.1
F004 9
F005 TS
F006 Formic acid 99 %
F007 Formic acid 99 %
F008 HEDSET
F009 05-09-1995
F020 1355902
EOR
F002 7822
F010 5.1.1
F004 11
F005 RE
F006 RTECS, Update 9001: Gig. Tr. Prof. Zabol. 23 (12), 49 (1979)
F007 RTECS, Update 9001: Gig. Tr. Prof. Zabol. 23 (12), 49 (1979)
F008 HEDSET
F009 06-09-1995
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F020 1355903
EOR
F002 7822
F010 5.1.1
F004 11
F005 RM
F006 Das Ergebnis liegt lediglich als Sekundaerzitat vor.
F007 Das Ergebnis liegt lediglich als Sekundaerzitat vor.
F008 HEDSET
F009 06-09-1995
F020 1355904
EOR
F002 7822
F010 5.1.1
F004 12
F005 RE
F006 Bayer AG, unveroeffentlichte Untersuchung, 21.04.78
F007 Bayer AG, unveroeffentlichte Untersuchung, 21.04.78
F008 HEDSET
F009 23-10-1995
F020 1355905
EOR
F002 7822
F010 5.1.1
F004 12
F005 TS
F006 Calciumformiat
F007 Calciumformiat
F008 HEDSET
F009 23-10-1995
F020 1355906
EOR
F002 7822
F010 5.1.1
F004 13
F005 RE
F006 Patty's Industrial Hygiene and Toxicology, 4th edition,
** 3528, 1994
F007 Patty's Industrial Hygiene and Toxicology, 4th edition,
** 3528, 1994
F008 HEDSET
F020 1355907
EOR
F002 7822
F010 5.1.1
F004 13
F005 TS
F006 formic acid
F007 formic acid
F008 HEDSET
F020 1355908
EOR
F002 7822
F010 5.1.1
F004 14
F005 RE
F006 Patty's Industrial Hygiene and Toxicology, 4th edition,

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**   3526, 1994
F007 Patty's Industrial Hygiene and Toxicology, 4th edition,
**   3526, 1994
F008 HEDSET
F020 1355909
EOR
F002 7822
F010 5.1.1
F004 14
F005 RM
F006 Formic acid (150 mg/kg) was without adverse effect, except
**   for some
**   indicatiobn of anorexia.
F007 Formic acid (150 mg/kg) was without adverse effect, except
**   for some
**   indicatiobn of anorexia.
F008 HEDSET
F020 1355911
EOR
F002 7822
F010 5.1.1
F004 14
F005 TS
F006 formic acid
F007 formic acid
F008 HEDSET
F020 1355912
EOR
F002 7822
F010 5.1.2
F004 1
F005 RE
F006 BASF AG, Department of Toxicology, unpublished results, 78/651, Aug. 21,
*    1980
F007 BASF AG, Department of Toxicology, unpublished results, 78/651, Aug. 21,
*    1980
F008 HEDSET
F009 05-09-1995
F020 1355913
EOR
F002 7822
F010 5.1.2
F004 1
F005 RM
F006 Ten animals per sex and dose group were exposed to vapors of formic acid
*    (> 98% Merck) using whole body exposure conditions for 4 hours followed
*    by a 14 day observation period. The concentrations ranged from 2.82 to
*    14.7 mg/l/4h (analytical
F007 Ten animals per sex and dose group were exposed to vapors of formic acid
*    (> 98% Merck) using whole body exposure conditions for 4 hours followed
*    by a 14 day observation period. The concentrations ranged from 2.82 to
*    14.7 mg/l/4h (analytically values).The animals were observed for clinical
*    symptoms and mortality during exposure and thereafter until sacrifice
*    (day 14). Bodyweight was determined at the begin (prior to exposure)of
*    the study and at days 7 and 14, when the animals were sacrificed and
*    subjected to a macroscopic examination. Statistic was don by probit
*    analysis.
```

F008 HEDSET
F009 05-09-1995
F020 1355914
EOR
F002 7822
F010 5.1.2
F004 1
F005 RS
F006 Dose Concentration Mortality
** group (mg/l) (dead animals/
** exposed animals)
** Analytical Nominal Males Females
** value value
** 1 14.70 17.90
F007 Dose Concentration Mortality
** group (mg/l) (dead animals/
** exposed animals)
** Analytical Nominal Males Females
** value value
** 1 14.70 17.90 10/10 10/10
** 2 10.60 13.40 10/10 10/10
** 3 8.08 10.58 8/10 8/10
** 4 6.60 8.50 2/10 1/10
** 5 2.82 4.03 0/10 0/10
**
** Mortalities were noted up to day 7 of the study. Clinical symptoms such
* as salivation, eye lid closure, dyspnea, tumbling gait, hunched posture,
* apathy, wet fur, corneal opacity and corrosive lesions of the skin at the
* snout were noted. Only at the lowest dose these symptoms were reversible
* by day 11 of the study. All other animals had still symptoms at study
* termination. Body weight development was impaired in a dose dependent
* way. While there were no macroscopic findings at sacrifice, animals that
* died during the study had acute dilatation of the ventricles of the
* heart, lung congestion. Degenerative changes of the liver, gray brown
* discoloration and congestion in the hilus area were noted. The following
* LC50 values were calculated:
**
** - 7.4 mg/l/4h for males and females
** - 7.3 mg/l/4h for males
** - 7.5 mg/l/4h for females
**
** There was virtually no difference between males and females.
F020 1480082
EOR
F002 7822
F010 5.1.2
F004 2
F005 RE
F006 RTECS, Update 9001: Gig. Tr. Prof. Zabol. 23 (12), 49 (1979)
F007 RTECS, Update 9001: Gig. Tr. Prof. Zabol. 23 (12), 49 (1979)
F008 HEDSET
F009 06-09-1995
F020 1355915
EOR
F002 7822
F010 5.1.2
F004 2

F005 RM
F006 Das Ergebnis liegt lediglich als Sekundaerzitat vor.
F007 Das Ergebnis liegt lediglich als Sekundaerzitat vor.
F008 HEDSET
F009 06-09-1995
F020 1355916
EOR
F002 7822
F010 5.1.2
F004 3
F005 RE
F006 RTECS, Update 9001: Gig. Tr. Prof. Zabol. 23 (12), 49 (1979)
F007 RTECS, Update 9001: Gig. Tr. Prof. Zabol. 23 (12), 49 (1979)
F008 HEDSET
F009 06-09-1995
F020 1355917
EOR
F002 7822
F010 5.1.2
F004 3
F005 RM
F006 Das Ergebnis liegt lediglich als Sekundaerzitat vor.
F007 Das Ergebnis liegt lediglich als Sekundaerzitat vor.
F008 HEDSET
F009 06-09-1995
F020 1355918
EOR
F002 7822
F010 5.1.2
F004 4
F005 RE
F006 BASF AG, Abt. Toxikologie, unveroeffentlichte Untersuchung
** (78/651), 03.12.1979
F007 BASF AG, Abt. Toxikologie, unveroeffentlichte Untersuchung
** (78/651), 03.12.1979
F008 HEDSET
F009 06-09-1995
F020 1355919
EOR
F002 7822
F010 5.1.2
F004 4
F005 RM
F006 Mortalitaet (2/12) nach 3 Minuten, 5/6 nach 10 min. und
** jeweils 6/6 nach 30 bzw. 50 min. Exposition in einer bei 20
** Grad C angereicherten bzw. gesaettigten Atmosphaere.
F007 Mortalitaet (2/12) nach 3 Minuten, 5/6 nach 10 min. und
** jeweils 6/6 nach 30 bzw. 50 min. Exposition in einer bei 20
** Grad C angereicherten bzw. gesaettigten Atmosphaere.
F008 HEDSET
F009 06-09-1995
F020 1355920
EOR
F002 7822
F010 5.1.2
F004 5
F005 RE

F006 BASF AG, Abt. Toxikologie, unveroeffentlichte Untersuchung
** (79/422) 10.01.1980
F007 BASF AG, Abt. Toxikologie, unveroeffentlichte Untersuchung
** (79/422) 10.01.1980
F008 HEDSET
F009 05-09-1995
F020 1355921
EOR
F002 7822
F010 5.1.2
F004 5
F005 RM
F006 Keine Mortalitaet nach 30 min. Exposition in einer bei 20
** Grad C angereicherten bzw. gesaettigten Atmosphaere.
** Letalitaet bei laengerer Exposition.
F007 Keine Mortalitaet nach 30 min. Exposition in einer bei 20
** Grad C angereicherten bzw. gesaettigten Atmosphaere.
** Letalitaet bei laengerer Exposition.
F008 HEDSET
F009 05-09-1995
F020 1355922
EOR
F002 7822
F010 5.1.2
F004 5
F005 TS
F006 Ameisensaeure 50 %ig in Wasser
F007 Ameisensaeure 50 %ig in Wasser
F008 HEDSET
F009 05-09-1995
F020 1355923
EOR
F002 7822
F010 5.1.2
F004 6
F005 RE
F006 BASF AG, Abt. Toxikologie, unveroeffentlichte Untersuchung
** (79/423) 23.12.1981
F007 BASF AG, Abt. Toxikologie, unveroeffentlichte Untersuchung
** (79/423) 23.12.1981
F008 HEDSET
F009 05-09-1995
F020 1355924
EOR
F002 7822
F010 5.1.2
F004 6
F005 RM
F006 Keine Mortalitaet nach 3 Std. Exposition in einer bei 20
** Grad C angereicherten bzw. gesaettigten Atmosphaere.
** Letalitaet nach laengerer Exposition.
F007 Keine Mortalitaet nach 3 Std. Exposition in einer bei 20
** Grad C angereicherten bzw. gesaettigten Atmosphaere.
** Letalitaet nach laengerer Exposition.
F008 HEDSET
F009 05-09-1995
F020 1355925

EOR
F002 7822
F010 5.1.2
F004 6
F005 TS
F006 Ameisensaeure 25 %ig in Wasser
F007 Ameisensaeure 25 %ig in Wasser
F008 HEDSET
F009 05-09-1995
F020 1355926
EOR
F002 7822
F010 5.1.2
F004 7
F005 RE
F006 BASF AG, Abt. Toxikologie, unveroeffentlichte Untersuchung
** (79/424) 26.10.1981
F007 BASF AG, Abt. Toxikologie, unveroeffentlichte Untersuchung
** (79/424) 26.10.1981
F008 HEDSET
F009 05-09-1995
F020 1355927
EOR
F002 7822
F010 5.1.2
F004 7
F005 RM
F006 Keine Mortalitaet nach 7 Std. Exposition in einer bei 20
** Grad C angereicherten bzw. gesaettigten Atmosphaere.
F007 Keine Mortalitaet nach 7 Std. Exposition in einer bei 20
** Grad C angereicherten bzw. gesaettigten Atmosphaere.
F008 HEDSET
F009 05-09-1995
F020 1355928
EOR
F002 7822
F010 5.1.2
F004 7
F005 TS
F006 Ameisensaeure 10 %ig in Wasser
F007 Ameisensaeure 10 %ig in Wasser
F008 HEDSET
F009 05-09-1995
F020 1355929
EOR
F002 7822
F010 5.1.2
F004 8
F005 RE
F006 TSCATS, OTS 84003A, Doc.I.D. 878212113 8D, Shell Oil Co.,
** (1982)
F007 TSCATS, OTS 84003A, Doc.I.D. 878212113 8D, Shell Oil Co.,
** (1982)
F008 HEDSET
F009 06-09-1995
F020 1355930
EOR

F002 7822
F010 5.1.2
F004 8
F005 RM
F006 Inhalation Hazard Test: Nach 10 min Exposition in einer bei
** 20 Grad C gesaettigten Atmosphaere (44168 ppm) Letalitaet
** bei 6 von 6 eingesetzten Ratten.
F007 Inhalation Hazard Test: Nach 10 min Exposition in einer bei
** 20 Grad C gesaettigten Atmosphaere (44168 ppm) Letalitaet
** bei 6 von 6 eingesetzten Ratten.
F008 HEDSET
F009 06-09-1995
F020 1355931
EOR
F002 7822
F010 5.1.2
F004 9
F005 RE
F006 Hoechst Aktiengesellschaft, department toxicology,
** unpublished data, 12 Nov. 1981
F007 Hoechst Aktiengesellschaft, department toxicology,
** unpublished data, 12 Nov. 1981
F008 HEDSET
F020 1355932
EOR
F002 7822
F010 5.1.2
F004 9
F005 RM
F006 12/12 rats died after 10 and 116 min by inhalation of an
** atmosphere that had been saturated at 20 degrees centigrade
** with the volatile part of the compound. 8/12 rats died after
** 3min by inhalation.
F007 12/12 rats died after 10 and 116 min by inhalation of an
** atmosphere that had been saturated at 20 degrees centigrade
** with the volatile part of the compound. 8/12 rats died after
** 3min by inhalation.
F008 HEDSET
F020 1355933
EOR
F002 7822
F010 5.1.2
F004 9
F005 TS
F006 formic acid, purity >98%
F007 formic acid, purity >98%
F008 HEDSET
F020 1355934
EOR
F002 7822
F010 5.1.4
F004 1
F005 RE
F006 FDA, PB 266282, Evaluation of the Health Aspects of Formic
** Acid and (...) as Food Ingredients, Washington DC, (1976)
F007 FDA, PB 266282, Evaluation of the Health Aspects of Formic
** Acid and (...) as Food Ingredients, Washington DC, (1976)

F008 HEDSET
F009 06-09-1995
F020 1355935
EOR
F002 7822
F010 5.1.4
F004 1
F005 RE
F006 Patty Ind. Hyg. Toxicol. 3rd Ed., 4903 (1981)
F007 Patty Ind. Hyg. Toxicol. 3rd Ed., 4903 (1981)
F008 HEDSET
F009 06-09-1995
F020 1355936
EOR
F002 7822
F010 5.1.4
F004 1
F005 RE
F006 RTECS, Update 9001: Igiena 11, 507 (1962)
F007 RTECS, Update 9001: Igiena 11, 507 (1962)
F008 HEDSET
F009 06-09-1995
F020 1355937
EOR
F002 7822
F010 5.1.4
F004 1
F005 RE
F006 Sax, S. 695 (1979)
F007 Sax, S. 695 (1979)
F008 HEDSET
F009 06-09-1995
F020 1355938
EOR
F002 7822
F010 5.1.4
F004 1
F005 RM
F006 Das Ergebnis liegt lediglich als Sekundaerzitat vor.
F007 Das Ergebnis liegt lediglich als Sekundaerzitat vor.
F008 HEDSET
F009 06-09-1995
F020 1355939
EOR
F002 7822
F010 5.1.4
F004 2
F005 RE
F006 FDA, PB 266282, Evaluation of the Health Aspects of Formic
** Acid and (...) as Food Ingredients, Washington DC, (1976)
F007 FDA, PB 266282, Evaluation of the Health Aspects of Formic
** Acid and (...) as Food Ingredients, Washington DC, (1976)
F008 HEDSET
F009 06-09-1995
F020 1355940
EOR
F002 7822

F010 5.1.4
F004 2
F005 RE
F006 Malorny, G.: Z. Ernaehrungswiss. 9, 332-339 (1969)
F007 Malorny, G.: Z. Ernaehrungswiss. 9, 332-339 (1969)
F008 HEDSET
F009 06-09-1995
F020 1355941
EOR
F002 7822
F010 5.1.4
F004 2
F005 RE
F006 Patty Ind. Hyg. Toxicol. 3rd Ed., 4903 (1981)
F007 Patty Ind. Hyg. Toxicol. 3rd Ed., 4903 (1981)
F008 HEDSET
F009 06-09-1995
F020 1355942
EOR
F002 7822
F010 5.1.4
F004 2
F005 RE
F006 Sax, S. 695 (1979)
F007 Sax, S. 695 (1979)
F008 HEDSET
F009 06-09-1995
F020 1355943
EOR
F002 7822
F010 5.1.4
F004 2
F005 RM
F006 Es wurden 50 Tiere eingesetzt; keine weiteren Angaben. Das
** Ergebnis liegt lediglich in tabellarischer Form vor.
F007 Es wurden 50 Tiere eingesetzt; keine weiteren Angaben. Das
** Ergebnis liegt lediglich in tabellarischer Form vor.
F008 HEDSET
F009 06-09-1995
F020 1355944
EOR
F002 7822
F010 5.1.4
F004 3
F005 RE
F006 FDA, PB 266282, Evaluation of the Health Aspects of Formic
** Acid and (...) as Food Ingredients, Washington DC, (1976)
F007 FDA, PB 266282, Evaluation of the Health Aspects of Formic
** Acid and (...) as Food Ingredients, Washington DC, (1976)
F008 HEDSET
F009 06-09-1995
F020 1355945
EOR
F002 7822
F010 5.1.4
F004 3
F005 RM

F006 Todesfaelle aufgetreten. Das Ergebnis liegt lediglich als
** Sekundaerzitat in tabellarischer Form vor.
F007 Todesfaelle aufgetreten. Das Ergebnis liegt lediglich als
** Sekundaerzitat in tabellarischer Form vor.
F008 HEDSET
F009 06-09-1995
F020 1355946
EOR
F002 7822
F010 5.1.4
F004 4
F005 RE
F006 Patty's Industrial Hygiene and Toxicology, 4th edition,
** 3525, 1994
F007 Patty's Industrial Hygiene and Toxicology, 4th edition,
** 3525, 1994
F008 HEDSET
F020 1355947
EOR
F002 7822
F010 5.1.4
F004 4
F005 RM
F006 Rabbits tolerated a 300 mg/kg s.c. administration without
** adverse effect.
F007 Rabbits tolerated a 300 mg/kg s.c. administration without
** adverse effect.
F008 HEDSET
F020 1355948
EOR
F002 7822
F010 5.1.4
F004 4
F005 TS
F006 formic acid
F007 formic acid
F008 HEDSET
F020 1355949
EOR
F002 7822
F010 5.1.4
F004 5
F005 RE
F006 Patty's Industrial Hygiene and Toxicology, 4th edition,
** 3525, 1994
F007 Patty's Industrial Hygiene and Toxicology, 4th edition,
** 3525, 1994
F008 HEDSET
F020 1355950
EOR
F002 7822
F010 5.1.4
F004 5
F005 RM
F006 Doses of 0.46-1.25 mg/kg caused central nervous system
** depression, vasoconstriction, and diuresis in rabbits;
** larger doses (about 4 g/kg) produced convulsions and death.

F007 Doses of 0.46-1.25 mg/kg caused central nervous system
** depression, vasoconstriction, and diuresis in rabbits;
** larger doses (about 4 g/kg) produced convulsions and death.
F008 HEDSET
F020 1355951
EOR
F002 7822
F010 5.1.4
F004 5
F005 TS
F006 formic acid
F007 formic acid
F008 HEDSET
F020 1355952
EOR
F002 7822
F010 5.10
F004 1
F005 RE
F006 Schober, P.,H., et al.; Wiener Klin. Wschr. 101, 318-322,
** (1989)
F007 Schober, P.,H., et al.; Wiener Klin. Wschr. 101, 318-322,
** (1989)
F008 AIDA
F020 1356095
EOR
F002 7822
F010 5.10
F004 1
F005 RM
F006 Case report of corrosive burning of the oesophagus in a child after
* ingestion of formic acid.
F007 Case report of corrosive burning of the oesophagus in a child after
* ingestion of formic acid.
F008 AIDA
F020 1356096
EOR
F002 7822
F010 5.10
F004 2
F005 RE
F006 Lundberg, P. (Hrgs.), Scientific basis for Swedish
** occupational standards 32, 137-141, (1988)
F007 Lundberg, P. (Hrgs.), Scientific basis for Swedish
** occupational standards 32, 137-141, (1988)
F008 AIDA
F020 1356097
EOR
F002 7822
F010 5.10
F004 2
F005 RM
F006 In studies of workers exposed to concentrations near the Finnish
* occupational exposure limit (5 ppm), formic acid was found in urine the
* mornig after exposure. Data on urine excretion indicate there may be an
* acumulation in the body. Direct
F007 In studies of workers exposed to concentrations near the Finnish

*   occupational exposure limit (5 ppm), formic acid was found in urine the
*   mornig after exposure. Data on urine excretion indicate there may be an
*   acumulation in the body. Direct contact with formic acid can severely
*   burn skin and eyes, and when it is drunk with suicidal intent or by
*   mistake it causes severe acids burns in mouth and throat. Nausea,
*   vomiting, hemorrhage, acidosis, hemolysis, and damage to the heart and
*   central nervous system can follow, dpending on the intake. There are very
*   little data concerning toxic effects in relation to exposure levels. One
*   experimental study reports that formic acid is a more powerful irritant
*   than formaldehyde. There is very little literature on occupational
*   exposure or its effects.
F008 AIDA
F020 1356098
EOR
F002 7822
F010 5.10
F004 3
F005 RE
F006 Liesivuori, J.; Ann. Occup. Hyg. 30, 329-333, (1986)
F007 Liesivuori, J.; Ann. Occup. Hyg. 30, 329-333, (1986)
F008 AIDA
F020 1356099
EOR
F002 7822
F010 5.10
F004 3
F005 RM
F006 A novel modification for urinary formic acid analysis was developed in
*   order to gain experience in the biological monitoring of farmers to the
*   acid vapours in silage making. It appeared that the farmers excreted
*   varying amounts of acid befo
F007 A novel modification for urinary formic acid analysis was developed in
*   order to gain experience in the biological monitoring of farmers to the
*   acid vapours in silage making. It appeared that the farmers excreted
*   varying amounts of acid before the actual silage-making period, but all
*   showed increased excretion rates up to 15 h after the exposure. The data
*   indicated that formic acid may have a long biological half-life possibly
*   causing an accumulation of the acid in the body.
F008 AIDA
F020 1356100
EOR
F002 7822
F010 5.10
F004 4
F005 RE
F006 Liesivuori, J., Savolainen, H.; Am. Ind. Hyg. Assoc. J. 48,
**   32-34, (1987)
F007 Liesivuori, J., Savolainen, H.; Am. Ind. Hyg. Assoc. J. 48,
**   32-34, (1987)
F008 AIDA
F020 1356101
EOR
F002 7822
F010 5.10
F004 4
F005 RM
F006 A sampling strategy was developed to detect personnal exposure to

*   methanol and formic acid vapors. Formic acid is the metabolic end product
*   of methanol, and part of inhaled formic acid is excreted directly in
*   urine, so that urinary formic a
F007 A sampling strategy was developed to detect personnal exposure to
*   methanol and formic acid vapors. Formic acid is the metabolic end product
*   of methanol, and part of inhaled formic acid is excreted directly in
*   urine, so that urinary formic acid would reveal exposure to both agents.
*   A linear relationship to inhaled vapors, however, could be schown onyl if
*   urinary sampling were delayed until 16 h after exposure. Exposure to
*   methanol vapor at the current Finnish hygienic level (200 ppm) produced
*   80 mg formic acid/g creatinine; exposure to formic acid at the hygiene
*   limit (5 ppm) caused 90 mg/g creatinine.
F008 AIDA
F020 1356102
EOR
F002 7822
F010 5.10
F004 5
F005 RE
F006 Fahy, J., O., Elkins, H., B.; unpubl. data zit. in: ACGIH,
**   Doc. threshold limit values, 5. ed., Cincinnati, (1986)
F007 Fahy, J., O., Elkins, H., B.; unpubl. data zit. in: ACGIH,
**   Doc. threshold limit values, 5. ed., Cincinnati, (1986)
F008 AIDA
F020 1356103
EOR
F002 7822
F010 5.10
F004 5
F005 RM
F006 Workers exposed to formic and acetic acids in a textile plant complained
*   of nausea. Air tests in the area revealed concentrations of each acid
*   averaging 15 ppm.
F007 Workers exposed to formic and acetic acids in a textile plant complained
*   of nausea. Air tests in the area revealed concentrations of each acid
*   averaging 15 ppm.
F008 AIDA
F020 1356104
EOR
F002 7822
F010 5.10
F004 6
F005 RE
F006 Jeffery, D.,B., Wiseman, H., M.; Postgrad. Med. J. 56,
**   761-763, (1980)
F007 Jeffery, D.,B., Wiseman, H., M.; Postgrad. Med. J. 56,
**   761-763, (1980)
F008 AIDA
F020 1356105
EOR
F002 7822
F010 5.10
F004 6
F005 RM
F006 Forty-five cases of formic acid poisoning from 1963 to 1978 are reviewed.
*   Nine children accidentially ingested less than 10 g of formic acid. They
*   suffered oropharnygeal burns, which were only superficial and fully

*   recovered. Two adults acc
F007 Forty-five cases of formic acid poisoning from 1963 to 1978 are reviewed.
*   Nine children accidentially ingested less than 10 g of formic acid. They
*   suffered oropharnygeal burns, which were only superficial and fully
*   recovered. Two adults accidentially ingested formic acid, whilst 34
*   deliberately consumed it. Consumption, by 23 subjects, of between 5 and
*   30 g of formic acid produced no deaths. The majority (16) developed minor
*   superficial oropharyngeal burns only. Five had more severe symptoms
*   including abdominal pain, vomiting, dyspnoea and dysphagia, whilst 2
*   sustained haematemesis, pneumonitis and they subsequently developed
*   oesophageal strictures. Ingestion of 30-45 g of formic acid produced more
*   serious effects. Of the 6 patients recorded, one did, one had reversible
*   disseminated intravascular coagulation and 3 had reversible acute renal
*   failure. All suffered haematemeses and had biochemical evidence of liver
*   impairement. Four needed subsequent treatment for oesophageal strictures.
*   Ingestion of 45 to 200 g of formic acid was recorded from 16 patients, of
*   whom 14 died. Two recovered. Considering the fatalities, the majority (9)
*   died painfully within the first 36 hours from corrosive perforations of
*   the abdominal viscera and from gastrointestinal haemorrhage. The other 5
*   developed acute renal failure and this contribute to their death.
F008 AIDA
F020 1356106
EOR
F002 7822
F010 5.10
F004 7
F005 RE
F006 Rajan, N., et al.; Postgrad. Med. J. 56, 761-763, (1980)
F007 Rajan, N., et al.; Postgrad. Med. J. 56, 761-763, (1980)
F008 AIDA
F020 1356107
EOR
F002 7822
F010 5.10
F004 7
F005 RM
F006 A report of 53 cases of formic acid ingestion with suicidal intent were
*   reported. The patients weree seen in a hospital over a 3 year period.
*   Fifteen patients died and 38 patients survived. Major complications were
*   oesophageal stricture, in
F007 A report of 53 cases of formic acid ingestion with suicidal intent were
*   reported. The patients weree seen in a hospital over a 3 year period.
*   Fifteen patients died and 38 patients survived. Major complications were
*   oesophageal stricture, inhaltion pneumonitis, renal failure, hypotension,
*   and unconsiousness.
F008 AIDA
F020 1356108
EOR
F002 7822
F010 5.10
F004 8
F005 RE
F006 Naik, R., B., et al.; Postgrad. Med. J. 56, 451-456, (1980)
F007 Naik, R., B., et al.; Postgrad. Med. J. 56, 451-456, (1980)
F008 AIDA
F020 1356109
EOR

F002 7822
F010 5.10
F004 8
F005 RM
F006 Three patients were treated after they had deliberately ingested domestic
* agents containing formic acid. The major complication included the local
* effects on the orpharynx, oesophagus and stomach, metabolic acidosis,
* derangment of clothing
F007 Three patients were treated after they had deliberately ingested domestic
* agents containing formic acid. The major complication included the local
* effects on the orpharynx, oesophagus and stomach, metabolic acidosis,
* derangment of clothing mechanisms with haemorrhage and shock, widespread
* intravascular haemolysis, dissiminated intravascular coagulation and
* acute onset of respiratory and renal failure. All 3 patients died between
* 2 and 14 days after admission.
F008 AIDA
F020 1356110
EOR
F002 7822
F010 5.10
F004 9
F005 RE
F006 Malizia, E., et al.; Acta Pharmacol. Toxicol. S41, 342-347,
** (1977)
F007 Malizia, E., et al.; Acta Pharmacol. Toxicol. S41, 342-347,
** (1977)
F008 AIDA
F020 1356111
EOR
F002 7822
F010 5.10
F004 9
F005 RM
F006 2 cases of accidental intoxications by formic acid are referred. In these
* cases the most important characteristic has been a very severe metabolic
* acidosis. Formic acid accumulates in the body mainly when its principal
* detoxification pathwa
F007 2 cases of accidental intoxications by formic acid are referred. In these
* cases the most important characteristic has been a very severe metabolic
* acidosis. Formic acid accumulates in the body mainly when its principal
* detoxification pathway, the hepatic one, is compromized on account of a
* low contetn of folic acid and folates.
F008 AIDA
F020 1356112
EOR
F002 7822
F010 5.10
F004 10
F005 RE
F006 Verstraete, A., et al.; Am. J. Emergency Med. 7, 286-290,
** (1989)
F007 Verstraete, A., et al.; Am. J. Emergency Med. 7, 286-290,
** (1989)
F008 AIDA
F020 1356113
EOR
F002 7822

F010 5.10
F004 10
F005 RM
F006 A case of fatal oral poisoing (appr. 200 ml of 50 % sol.) with formic
* acid resulting in shock, metabolic acidosis, and hemolysis is reported.
* The formic acid concentration on admission (appr. 2 h after ingestion)
* was 348 µg/ml, which, toget
F007 A case of fatal oral poisoing (appr. 200 ml of 50 % sol.) with formic
* acid resulting in shock, metabolic acidosis, and hemolysis is reported.
* The formic acid concentration on admission (appr. 2 h after ingestion)
* was 348 µg/ml, which, together with an increase in lactic acid,
* contributed to the metabolic acidosis.
F008 AIDA
F020 1356114
EOR
F002 7822
F010 5.10
F004 11
F005 RE
F006 Jaques, S.; Nursing Times 78, 1312-1315, (1982)
F007 Jaques, S.; Nursing Times 78, 1312-1315, (1982)
F008 AIDA
F020 1356115
EOR
F002 7822
F010 5.10
F004 11
F005 RM
F006 Case report of acute renal failure following ingestion of formic acid (55
* %) in a 56-year old man.
F007 Case report of acute renal failure following ingestion of formic acid (55
* %) in a 56-year old man.
F008 AIDA
F020 1356116
EOR
F002 7822
F010 5.10
F004 12
F005 RE
F006 Sigurdsson, J., et al.; Burns 9, 358-361, (1982)
F007 Sigurdsson, J., et al.; Burns 9, 358-361, (1982)
F008 AIDA
F020 1356117
EOR
F002 7822
F010 5.10
F004 12
F005 RM
F006 A case of severe burn with undiluted formic acid is reported. In the
* beginning, the dermal injury seemed to be of minor degree, but then the
* patient, a 15-year-old girl, developed signs of systemic formic acid
* intoxication, including metabo
F007 A case of severe burn with undiluted formic acid is reported. In the
* beginning, the dermal injury seemed to be of minor degree, but then the
* patient, a 15-year-old girl, developed signs of systemic formic acid
* intoxication, including metabolic acidosis, intravascular hemolysis and
* hemoglobinuria. These signs were similar to thsoe described as a result

*   of formic acid ingestion. The burn turned out mainly to be
*   full-thickness, resulting in major scarring.
F008 AIDA
F020 1356118
EOR
F002 7822
F010 5.10
F004 13
F005 RE
F006 Sudarsky, R., D.; Arch. Ophthal. 74, 805-806, (1965)
F007 Sudarsky, R., D.; Arch. Ophthal. 74, 805-806, (1965)
F008 AIDA
F020 1356119
EOR
F002 7822
F010 5.10
F004 13
F005 RM
F006 A case of ocular injury due to formic acid splash is reported. A single
*   drop of concentrated formic acid (90 %) produced transient opacifiaction
*   of the anterior half of the cornea in a 30-year-old man.
F007 A case of ocular injury due to formic acid splash is reported. A single
*   drop of concentrated formic acid (90 %) produced transient opacifiaction
*   of the anterior half of the cornea in a 30-year-old man.
F008 AIDA
F020 1356120
EOR
F002 7822
F010 5.10
F004 14
F005 RE
F006 Liesivuori, J., Laitinen, J., Savolainen, H.; Arch Toxicol.
**   66, 522-524, (1992)
F007 Liesivuori, J., Laitinen, J., Savolainen, H.; Arch Toxicol.
**   66, 522-524, (1992)
F008 AIDA
F020 1356121
EOR
F002 7822
F010 5.10
F004 14
F005 RM
F006 Twelve male farmers were exposed to 7.3 +- 2.2 mg formic acid/m3 for 8 h
*   in the silage making. Each had gave urine samples immediately, 15 h and
*   30 h after the end of exposure. The excretion of formate was linearly
*   related to the exposure 1
F007 Twelve male farmers were exposed to 7.3 +- 2.2 mg formic acid/m3 for 8 h
*   in the silage making. Each had gave urine samples immediately, 15 h and
*   30 h after the end of exposure. The excretion of formate was linearly
*   related to the exposure 15 and 30 h after the exposure. Exposure
*   increased renal ammongenesis and urinary calcium at 30 h post-exposure.
*   Both biochemical effects may be explained by the interaction of formic
*   acid with the oxidative metabolism or renal tubular cells, as formic acid
*   is a known inhibitor of the cytochrome oxidase.
F008 AIDA
F020 1356122
EOR

F002 7822
F010 5.10
F004 15
F005 RE
F006 Heinzov, B., Ellrott, T.; Zbl. Hyg. Umweltmed. 192, 455-461,
** (1992)
F007 Heinzov, B., Ellrott, T.; Zbl. Hyg. Umweltmed. 192, 455-461,
** (1992)
F008 AIDA
F020 1356123
EOR
F002 7822
F010 5.10
F004 15
F005 RM
F006 Reference intervals of formic acid excretion in urine of healthy
* occupational unexposed adults were determined. Within the range of
* specific gravity between 1.016 - 1.032 g/mc3 normalization by creatinine
* or gravity is necessary. The mean f
F007 Reference intervals of formic acid excretion in urine of healthy
* occupational unexposed adults were determined. Within the range of
* specific gravity between 1.016 - 1.032 g/mc3 normalization by creatinine
* or gravity is necessary. The mean formic acid concentration in urine of
* female and male adults aged 20 - 80 years was 21 mg/l +- 30 mg/l (95
* percentile 60 mg/l) with slightly higher values in elder persons. Smoking
* and dietary habits had no influence on formic acid excretion but age was
* positively correlated with increased concentrations. An oral methanol
* intake of 10 mg/kg body weight had no significant impact on urine
* excretion of formic acid.
F008 AIDA
F020 1356124
EOR
F002 7822
F010 5.10
F004 17
F005 RE
F006 BASF AG, Werksarztlicher Dienst, unveroeffentlichte
** Mitteilung, (1994)
F007 BASF AG, Werksarztlicher Dienst, unveroeffentlichte
** Mitteilung, (1994)
F008 AIDA
F020 1356127
EOR
F002 7822
F010 5.10
F004 17
F005 RM
F006 From 1989 - 1993 a total of 3 cases of skin and/or eye corrosion after
* accidental local exposure of formic acid were send to the hospital for
* further treatment.
F007 From 1989 - 1993 a total of 3 cases of skin and/or eye corrosion after
* accidental local exposure of formic acid were send to the hospital for
* further treatment.
F008 AIDA
F020 1356128
EOR
F002 7822

F010 5.10
F004 19
F005 RE
F006 Franzblau, A., et al; Appl. Occup. Environ. hyg. 7, 467-471,
** (1992)
F007 Franzblau, A., et al; Appl. Occup. Environ. hyg. 7, 467-471,
** (1992)
F008 AIDA
F020 1356131
EOR
F002 7822
F010 5.10
F004 19
F005 RM
F006 Four human subjects were exposed to appr. 200 ppm of methanol in a test
* chamber for 6 hours. Mean urinary formic acid was increased from baseline
* at the end of the exposure session (Though not significantly), but had
* returned to baseline in
F007 Four human subjects were exposed to appr. 200 ppm of methanol in a test
* chamber for 6 hours. Mean urinary formic acid was increased from baseline
* at the end of the exposure session (Though not significantly), but had
* returned to baseline in samples collected 16 hours following cessation of
* exposure.
F008 AIDA
F020 1356132
EOR
F002 7822
F010 5.10
F004 20
F005 RE
F006 Franzblau, A., et al; Appl. Occup. Environ. Hyg. 8, 883-888,
** (1993)
F007 Franzblau, A., et al; Appl. Occup. Environ. Hyg. 8, 883-888,
** (1993)
F008 AIDA
F020 1356133
EOR
F002 7822
F010 5.10
F004 20
F005 RM
F006 Five human subjects were exposed to an atmosphere containing 200 ppm of
* methanol in a test chamber for 7 hours per day for 5 consecutive days.
* The concentration of formic acid in morning urine specimens did not
* change significantly over the
F007 Five human subjects were exposed to an atmosphere containing 200 ppm of
* methanol in a test chamber for 7 hours per day for 5 consecutive days.
* The concentration of formic acid in morning urine specimens did not
* change significantly over the 7 days of the experiment.
F008 AIDA
F020 1356134
EOR
F002 7822
F010 5.10
F004 21
F005 RE
F006 Schmid, K., et al; Zbl. Hyg. Umweltmed. 196, 139-152, (1994)

F007 Schmid, K., et al; Zbl. Hyg. Umweltmed. 196, 139-152, (1994)
F008 AIDA
F020 1356135
EOR
F002 7822
F010 5.10
F004 21
F005 RM
F006 Investigation in persons not occupationally exposed to formaldehyde
* (n=70) was done to determine possible influencing factors on the
* physiological excretion of formic acid. It was seen that the formic acid
* excretion in the urine with non-ex
F007 Investigation in persons not occupationally exposed to formaldehyde
* (n=70) was done to determine possible influencing factors on the
* physiological excretion of formic acid. It was seen that the formic acid
* excretion in the urine with non-exposed persons is subject to
* considerable inter and intraindividual fluctuations (at a maximum by a
* factor of 30). In addition to differences in the endogenous formation of
* formates an imprtant influencing factor is probaly the uptake of food
* containg formic acid or its precursors. A value of 23 mg formic acid/g
* creatinine is given as the upper norm level (95th percentile) of adults.
F008 AIDA
F020 1356136
EOR
F002 7822
F010 5.10
F004 22
F005 RE
F006 d`Alessandro, A., et al; Environ. Health Pers. 102, 178-181,
** (1994)
F007 d`Alessandro, A., et al; Environ. Health Pers. 102, 178-181,
** (1994)
F008 AIDA
F020 1356137
EOR
F002 7822
F010 5.10
F004 22
F005 RM
F006 Ingestion of over 60 g of formic acid by an adult is
** potentially fatal. A case of a 36-year-old woman with a
** history of depression who ingested 110 g of formic acid is
** reported. She survived a complicated intensive care
** hospitalization foll
F007 Ingestion of over 60 g of formic acid by an adult is
** potentially fatal. A case of a 36-year-old woman with a
** history of depression who ingested 110 g of formic acid is
** reported. She survived a complicated intensive care
** hospitalization following usage of intravenous folinic acid, urinary
* alkalinization, intravenous furosemide and
** supportive care. It is suggested to minimize formate
** toxicity by enhancing hepatic formate degradation via the
** folinic acid (one-carbon pool) and by enhanced renal
** elimination of formate.
F008 AIDA
F020 1356138
EOR

F002 7822
F010 5.10
F004 23
F005 RE
F006 Chan, T., C., et al; Ann. Emerg. Me. 26, 383-386, (1995)
F007 Chan, T., C., et al; Ann. Emerg. Me. 26, 383-386, (1995)
F008 AIDA
F020 1356139
EOR
F002 7822
F010 5.10
F004 23
F005 RM
F006 Systemic toxicity developed in a 3-year-old girl burned by
** formic acid over 35% of her total body surface area. The
** patient presented with profound metabolic acidosis and a
** serum formate level of 400 µg/ml, the highest reported in
** the liter
F007 Systemic toxicity developed in a 3-year-old girl burned by
** formic acid over 35% of her total body surface area. The
** patient presented with profound metabolic acidosis and a
** serum formate level of 400 µg/ml, the highest reported in
** the literature for poisoning by any route. The patient was
** successfully treated with hemodialysis, intravenous bicarbonate, and
* supportive measures.
F008 AIDA
F020 1356140
EOR
F002 7822
F010 5.10
F004 24
F005 RE
F006 Osterloh, J., D., et al; J. Occup. Environ. Med. 38,
** 571-576, (1996)
F007 Osterloh, J., D., et al; J. Occup. Environ. Med. 38,
** 571-576, (1996)
F008 AIDA
F020 1356141
EOR
F002 7822
F010 5.10
F004 24
F005 RM
F006 After inhalation of 200 ppm methanol for 4 h in 22 subjects
** serum methanol concentration were increased by more than fourfold, as
* were urinary methanol excretion rates, although formate concentration
* were not increased over background conce
F007 After inhalation of 200 ppm methanol for 4 h in 22 subjects
** serum methanol concentration were increased by more than fourfold, as
* were urinary methanol excretion rates, although formate concentration
* were not increased over background concentration.
F008 AIDA
F020 1356142
EOR
F002 7822
F010 5.10
F004 25

F005 RE
F006 Yelon, J., A., et al; J. Burn Care Rehab. 17, 241-242,
** (1996)
F007 Yelon, J., A., et al; J. Burn Care Rehab. 17, 241-242,
** (1996)
F008 AIDA
F020 1356143
EOR
F002 7822
F010 5.10
F004 25
F005 RM
F006 A case in which a patient sustained an inhalation injury as
** a result of aerosolized formic acid is reported. The patient
** sustained a partial-thickness burn to the face from a
** chemical spray; however, as a result of aerosolization, he
** also i
F007 A case in which a patient sustained an inhalation injury as
** a result of aerosolized formic acid is reported. The patient
** sustained a partial-thickness burn to the face from a
** chemical spray; however, as a result of aerosolization, he
** also inhaled formic acid. This resulted in a reversible
** pulmonary chemical injury. Inhaltion of formic acid results
** in a reactive airway dysfunction syndrome a common response
** to inhalation of an occupational irritant.
F008 AIDA
F020 1356144
EOR
F002 7822
F010 5.10
F004 26
F005 RE
F006 Repetto M., R., Repetto M., Clin. Toxicol. 37, 1-8 (1999)
F007 Repetto M., R., Repetto M., Clin. Toxicol. 37, 1-8 (1999)
F008 AIDA
F020 1356145
EOR
F002 7822
F010 5.10
F004 26
F005 RL
F006 only secundary literature
F007 only secundary literature
F008 AIDA
F020 1356146
EOR
F002 7822
F010 5.10
F004 26
F005 RM
F006 Compilation of concentrations of drugs affecting digestive
** system and metabolism. For formic acid the following
** concentrations in serum/plasma were noted:
** habitual/therapeutic 0-12 µg/ml and toxic 120 µg/ml.
F007 Compilation of concentrations of drugs affecting digestive
** system and metabolism. For formic acid the following
** concentrations in serum/plasma were noted:

**   habitual/therapeutic 0-12 µg/ml and toxic 120 µg/ml.
F008 AIDA
F020 1356147
EOR
F002 7822
F010 5.10
F004 28
F005 RE
F006 Berode M., et al., Int. Arch. Occup. Environ. Helath, 73, 410-414, (2000)
F007 Berode M., et al., Int. Arch. Occup. Environ. Helath, 73, 410-414, (2000)
F020 1480395
EOR
F002 7822
F010 5.10
F004 28
F005 RM
F006 Volunteers exposed to 100 ppm methyl formate vapor at rest for 8 hours
*   excreted 3.62 +- 1.13 mg methanol/l at the end of exposure. This was
*   significantly different from pre-exposure excretion or from that of
*   controls. The urinary formic aci
F007 Volunteers exposed to 100 ppm methyl formate vapor at rest for 8 hours
*   excreted 3.62 +- 1.13 mg methanol/l at the end of exposure. This was
*   significantly different from pre-exposure excretion or from that of
*   controls. The urinary formic acid excretion was 32.2 +- 11.3 mg/g
*   creatinine after the exposure, which was significantly different from
*   pre-exposure excretion or that of controls. In foundry-men, the urinary
*   formic acid excretion after the 8 hour workshift exposure to a time
*   weighted average concentration of 2 to 156 ppm methyl formate showed a
*   dose-dependent increase. The highest urinary formic acid concentration
*   was 129 mg/g creatinine. The pre-shift urinary formic acid of the
*   foundry-men did not differ from that of controls.
F020 1480396
EOR
F002 7822
F010 5.10
F004 29
F005 RE
F006 Nihlen A., Droz P.-O., Int. Arch. Occup. Environ. Health, 73, 479-487,
*   (2000)
F007 Nihlen A., Droz P.-O., Int. Arch. Occup. Environ. Health, 73, 479-487,
*   (2000)
F020 1480400
EOR
F002 7822
F010 5.10
F004 29
F005 RM
F006 A toxicokinetic model was developed to describe the inhalation exposure
*   in humans to methyl formate. The model consisted of four compartments:
*   methylformate, methanol, formic acid, and a urinary compartment decribing
*   the saturable reabsorpt
F007 A toxicokinetic model was developed to describe the inhalation exposure
*   in humans to methyl formate. The model consisted of four compartments:
*   methylformate, methanol, formic acid, and a urinary compartment decribing
*   the saturable reabsorption of formic acid. Levels of methanol and formic
*   acid in urine, from an experimental study (100 ppm methyl formate, 8
*   hours at rest), validated the present model.

F020 1480401
EOR
F002 7822
F010 5.10
F004 31
F005 RE
F006 BASF AG, Abt. Arbeitsmedizin und Gesundheitsschutz, unveroeffentlichte
* Mitteilung, (2002)
F007 BASF AG, Abt. Arbeitsmedizin und Gesundheitsschutz, unveroeffentlichte
* Mitteilung, (2002)
F020 1480655
EOR
F002 7822
F010 5.10
F004 31
F005 RM
F006 Report of one case of skin corrosion in a worker after accidential local
* exposure of formic acid, who was send to the hospital for further
* treatment.
F007 Report of one case of skin corrosion in a worker after accidential local
* exposure of formic acid, who was send to the hospital for further
* treatment.
F020 1480658
EOR
F002 7822
F010 5.10
F004 32
F005 RE
F006 Westphal F., et al., Int. J. Legal Med. 114, 181-185, (2001)
F007 Westphal F., et al., Int. J. Legal Med. 114, 181-185, (2001)
F020 1538569
EOR
F002 7822
F010 5.10
F004 32
F005 RM
F006 A fatality caused by ingestion of a decalcifying agent containing formic
* acid is reported. Quantitative analysis of formic acid in the form of its
* methyl ester was performed in different body fluids and organ samples
* using head-space gas ch
F007 A fatality caused by ingestion of a decalcifying agent containing formic
* acid is reported. Quantitative analysis of formic acid in the form of its
* methyl ester was performed in different body fluids and organ samples
* using head-space gas chromatography with flame ionization detection. The
* blood taken at the time of admission to hospital had a concentration of
* 370.3 microg/ml, which declined to 13.9 microg/ml after 6.5 h of
* haemodialysis. Post-mortem concentrations were 855.4 microg/ml (heart
* blood), 2,712 microg/ml (gastric contents), 1128 microg/ml (haemorrhagic
* fluid from abdominal cavity), 3,051 microg/ml (bile), 2,664 microg/ml
* (contents of small intestine), 442.7 microg/g (liver) and 542.3 microg/g
* (kidney). The most important morphological findings for differentiating
* between oral and respiratory ingestion were ulceration of the oropharynx
* and the oesophagus as well as extensive necrotic lesions in the stomach
* and the duodenum without perforation. Death was caused by massive
* acidosis, haemolysis, bleeding complications, hepatic and renal failure.
* Toxicological and morphological findings revealed that a considerable
* amount of formic acid had been ingested orally with a suicidal intention.

F020 1538570
EOR
F002 7822
F010 5.11
F004 1
F005 RM
F006 Der nachfolgende Text beschreibt allgemein den Metabolismus
** der Ameisensaeure. Die zugrundeliegenden Zitate sind mit
** Titel der Arbeiten getrennt aufgefuehrt.
** Ameisensaeure wird ueber alle Zufuhrwege gut resorbiert.
** Alsphysiologisches Stoffw
F007 Der nachfolgende Text beschreibt allgemein den Metabolismus
** der Ameisensaeure. Die zugrundeliegenden Zitate sind mit
** Titel der Arbeiten getrennt aufgefuehrt.
** Ameisensaeure wird ueber alle Zufuhrwege gut resorbiert.
** Alsphysiologisches Stoffwechselzwischenprodukt wird sie
** teils zu CO2 verstoffwechselt und abgeatmet, teils
** unveraendert imUrin in Konzentrationen von 11.7-60 mg/l
** ausgeschieden. Die biologische Halbwertszeit betraegt
** zwischen 15 Minuten und 1Stunde:
**
** Ameisensaeure wird aus dem Gastrointestinaltrakt, ueber die
** Lungen und die intakte Haut resorbiert. Die resorbierte
** Substanz wird zu Kohlendioxid (CO2) und Wasser abgebaut,
** teilweise auch unveraendert im Urin ausgeschieden. Der
** Grossteil der aufgenommenen Ameisensaeure wird in der Leber
** verstoffwechselt, aber teilweise auch in der
** Intestinalschleimhaut, den Lungen, den Nieren und der Milz.
** Die Ameisensaeure-Oxidation geschieht folat-abhaengig und
** nach einem katalase-peroxidativen Mechanismus. Die
** Halbwertszeiten von Natriumformiat im Blut betragen bei
** Ratten, Affen und beim Menschen 12-23, 31-51 und 55
** Minuten.Die Verstoffwechselung von Ameisensaeure zu CO2 ist
** beim Primaten wesentlich langsamer als bei der Ratte. Die
** Speziesempfindlichkeit gegenueber einer Methanolintoxikation
** (metabolische Acidose durch Ameisensaeure) ist
** moeglicherweise abhaengig von der
** Tetrahydrofolatkonzentration.
F008 HEDSET
F009 08-09-1995
F020 1355953
EOR
F002 7822
F010 5.11
F004 2
F005 RE
F006 FDA, PB 266282, Evaluation of the Health Aspects of Formic
** Acid and (...) as Food Ingredients, Washington DC, (1976)
F007 FDA, PB 266282, Evaluation of the Health Aspects of Formic
** Acid and (...) as Food Ingredients, Washington DC, (1976)
F008 HEDSET
F009 06-09-1995
F020 1355954
EOR
F002 7822
F010 5.11
F004 2

F005 RM
F006 Title: Evaluation of the Health Aspects of Formic Acid,
** Sodium Formate, and Ethyl Formate as Food Ingredients
F007 Title: Evaluation of the Health Aspects of Formic Acid,
** Sodium Formate, and Ethyl Formate as Food Ingredients
F008 HEDSET
F009 06-09-1995
F020 1355955
EOR
F002 7822
F010 5.11
F004 3
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F008 HEDSET
F009 06-09-1995
F020 1355956
EOR
F002 7822
F010 5.11
F004 3
F005 RM
F006 Title: Kinetics and toxic effects of repeated intravenous
** dosage of formic acid in rabbits
F007 Title: Kinetics and toxic effects of repeated intravenous
** dosage of formic acid in rabbits
F008 HEDSET
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F008 HEDSET
F009 06-09-1995
F020 1355958
EOR
F002 7822
F010 5.11
F004 4
F005 RM
F006 Title: Studies on Methanol toxicity and formate metabolism
** in isolated hepatocytes
F007 Title: Studies on Methanol toxicity and formate metabolism
** in isolated hepatocytes
F008 HEDSET
F009 06-09-1995
F020 1355959
EOR
F002 7822
F010 5.11

F004 5
F005 RE
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F008 HEDSET
F009 06-09-1995
F020 1355960
EOR
F002 7822
F010 5.11
F004 5
F005 RM
F006 Title: Urinary Formic Acid as an indicator of occupational
** exposure to Formic Acid and Methanol
F007 Title: Urinary Formic Acid as an indicator of occupational
** exposure to Formic Acid and Methanol
F008 HEDSET
F009 06-09-1995
F020 1355961
EOR
F002 7822
F010 5.11
F004 6
F005 RE
F006 Liesivuori, J. und Savolainen, H.: Acta Pharmacol. Toxicol.
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F009 06-09-1995
F020 1355962
EOR
F002 7822
F010 5.11
F004 6
F005 RM
F006 Title: Urinary Excetion of Formic Acid in rabbits
F007 Title: Urinary Excetion of Formic Acid in rabbits
F008 HEDSET
F009 06-09-1995
F020 1355963
EOR
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F010 5.11
F004 7
F005 RE
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EOR
F002 7822

F010 5.11
F004 7
F005 RM
F006 Title: Accumulation of Formic Acid in rabbits after daily
** dosages
F007 Title: Accumulation of Formic Acid in rabbits after daily
** dosages
F008 HEDSET
F009 06-09-1995
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EOR
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F010 5.11
F004 8
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F009 06-09-1995
F020 1355966
EOR
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F010 5.11
F004 8
F005 RM
F006 Title: Pharmacokinetic and deuterium isotope effect studies
** on the metabolism of formaldehyde and formate to carbon
** dioxide in rats in vivo
F007 Title: Pharmacokinetic and deuterium isotope effect studies
** on the metabolism of formaldehyde and formate to carbon
** dioxide in rats in vivo
F008 HEDSET
F009 06-09-1995
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F008 HEDSET
F009 06-09-1995
F020 1355968
EOR
F002 7822
F010 5.11
F004 9
F005 RM
F006 Title: An evaluation of the utility of four in vitro short
** term tests for predicting the cytotoxicity of individual
** compounds derived from tobacco smoke
F007 Title: An evaluation of the utility of four in vitro short

** term tests for predicting the cytotoxicity of individual
** compounds derived from tobacco smoke
F008 HEDSET
F009 06-09-1995
F020 1355969
EOR
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F010 5.11
F004 10
F005 RE
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F009 06-09-1995
F020 1355970
EOR
F002 7822
F010 5.11
F004 10
F005 RM
F006 Title: Cytotoxicity of carbohydrates heavily irradiated in
** solution
F007 Title: Cytotoxicity of carbohydrates heavily irradiated in
** solution
F008 HEDSET
F009 06-09-1995
F020 1355971
EOR
F002 7822
F010 5.11
F004 11
F005 RE
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F009 06-09-1995
F020 1355972
EOR
F002 7822
F010 5.11
F004 11
F005 RM
F006 Title: Formic Acid poisoning: Case report and in vitro
** studyof the hemolytic activity
F007 Title: Formic Acid poisoning: Case report and in vitro
** studyof the hemolytic activity
F008 HEDSET
F009 06-09-1995
F020 1355973
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F004 12
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F009 06-09-1995
F020 1355974
EOR
F002 7822
F010 5.11
F004 12
F005 RM
F006 Title: Formate in urine as a biological indicator of
** Formaldehyde exposure: A review
F007 Title: Formate in urine as a biological indicator of
** Formaldehyde exposure: A review
F008 HEDSET
F009 06-09-1995
F020 1355975
EOR
F002 7822
F010 5.11
F004 13
F005 RE
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** Hyg. Vol. 4-5, 473 (1988)
F008 HEDSET
F009 06-09-1995
F020 1355976
EOR
F002 7822
F010 5.11
F004 13
F005 RM
F006 Title: Formic-Acid excretion in urine as a
** biological-monitoring parameter in areas with different
** air-pollution
F007 Title: Formic-Acid excretion in urine as a
** biological-monitoring parameter in areas with different
** air-pollution
F008 HEDSET
F009 06-09-1995
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F004 14
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F009 06-09-1995
F020 1355978
EOR
F002 7822
F010 5.11

F004 14
F005 RM
F006 Titel: Die akute und chronische Toxizitaet der
** Ameisensaeureund ihrer Formiate
F007 Titel: Die akute und chronische Toxizitaet der
** Ameisensaeureund ihrer Formiate
F008 HEDSET
F009 06-09-1995
F020 1355979
EOR
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F010 5.11
F004 15
F005 RE
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F008 HEDSET
F009 06-09-1995
F020 1355980
EOR
F002 7822
F010 5.11
F004 15
F005 RM
F006 Title: Effect of Renal Formic Acid Excretion on Urinary
** Calcium and Ammonia Concentrations
F007 Title: Effect of Renal Formic Acid Excretion on Urinary
** Calcium and Ammonia Concentrations
F008 HEDSET
F009 06-09-1995
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EOR
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F010 5.11
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F009 06-09-1995
F020 1355982
EOR
F002 7822
F010 5.11
F004 16
F005 RM
F006 Title: Cytotoxicity Testing of 114 Compounds by the
** Determination of the Protein Content in HEP G2 Cell Cultures
F007 Title: Cytotoxicity Testing of 114 Compounds by the
** Determination of the Protein Content in HEP G2 Cell Cultures
F008 HEDSET
F009 06-09-1995
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EOR
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F004 17
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EOR
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F010 5.11
F004 17
F005 RM
F006 Title: An in vitro Method for predicting sensitizing
** properties of inhaled Chemicals
F007 Title: An in vitro Method for predicting sensitizing
** properties of inhaled Chemicals
F008 HEDSET
F009 06-09-1995
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EOR
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F004 18
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F009 06-09-1995
F020 1355986
EOR
F002 7822
F010 5.11
F004 18
F005 RM
F006 Hautpenetration; Keine direkt verwertbaren Daten
F007 Hautpenetration; Keine direkt verwertbaren Daten
F008 HEDSET
F009 06-09-1995
F020 1355987
EOR
F002 7822
F010 5.11
F004 19
F005 RE
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F020 1355988
EOR
F002 7822
F010 5.11

F004 19
F005 RM
F006 Die Gabe von Ameisensaure in nicht spezifizierter Dosierung
** an Kaninchen, Hunde und Affen (vermutlich im Futter) fuehrte
** zu den gleichen histopathologischen Veraenderungen der
** Retina und des nervus opticus wie Methanol. Dabei trat eine
** Acid
F007 Die Gabe von Ameisensaure in nicht spezifizierter Dosierung
** an Kaninchen, Hunde und Affen (vermutlich im Futter) fuehrte
** zu den gleichen histopathologischen Veraenderungen der
** Retina und des nervus opticus wie Methanol. Dabei trat eine
** Acidose auf. Die Autoren spekulieren, dass der Metabolismus
** des Methanol zur Ameisensaeure ueber eine generelle Acidose
** fuer die toxischen Effekte verantwortlich sein koennte. Die
** Arbeit liegt nur als Abstract vor, die Ergebnisse sind nicht
** bewertbar.
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F009 06-09-1995
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EOR
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F010 5.11
F004 20
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EOR
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F004 20
F005 RM
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** Kooperation bei Chinese hamster V79 Lungenfibroblasten.
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** Kooperation bei Chinese hamster V79 Lungenfibroblasten.
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EOR
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F004 21
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EOR
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F004 21

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F010 5.11
F004 21
F005 RE
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F010 5.11
F004 21
F005 RE
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F009 06-09-1995
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F010 5.11
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F020 1356002
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F004 21
F005 RM
F006 Zusammenfassende Darstellungen
F007 Zusammenfassende Darstellungen
F008 AIDA
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F020 1356003
EOR
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F004 22
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F008 HEDSET
F009 06-09-1995
F020 1356004
EOR
F002 7822
F010 5.11
F004 22
F005 RM
F006 Ameisensaeure reizt die Augen und die Schleimhaeute von Nase
** und Rachen. Direkter Kontakt kann zu schweren Veraetzungen
** an der Haut und Augen und nach peroraler Aufnahme im Mund
** und Rachen fuehren. Uebelkeit, Erbrechen, Haemorrhagie,
** Azidos
F007 Ameisensaeure reizt die Augen und die Schleimhaeute von Nase
** und Rachen. Direkter Kontakt kann zu schweren Veraetzungen
** an der Haut und Augen und nach peroraler Aufnahme im Mund
** und Rachen fuehren. Uebelkeit, Erbrechen, Haemorrhagie,
** Azidose, Haemolyse und Schaedigung von Herz und
** Zentralnervensystem koennen auftreten.
F008 HEDSET
F009 06-09-1995
F020 1356005
EOR
F002 7822
F010 5.11
F004 23
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F009 06-09-1995
F020 1356006
EOR
F002 7822
F010 5.11
F004 23
F005 RM
F006 U.a. ein Fall von Oesophagusveraetzung bei einem Kind
F007 U.a. ein Fall von Oesophagusveraetzung bei einem Kind
F008 HEDSET
F009 06-09-1995
F020 1356007
EOR
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F008 HEDSET
F009 06-09-1995
F020 1356008
EOR
F002 7822
F010 5.11
F004 24
F005 RM
F006 arbeitsmed. Untersuchung
**   10 Beschaeftigte in der Ameisensaeureabfuellung und
**   Harnstoff-Formaldehyd-Harz-Produktion. Inhalation von
**   Methanol (40-160 ppm) und Ameisensaeure (2-5.5 ppm) am
**   Arbeitsplatz. Ameisensaeure-Urinkonzentration 16 h nac
F007 arbeitsmed. Untersuchung
**   10 Beschaeftigte in der Ameisensaeureabfuellung und
**   Harnstoff-Formaldehyd-Harz-Produktion. Inhalation von
**   Methanol (40-160 ppm) und Ameisensaeure (2-5.5 ppm) am
**   Arbeitsplatz. Ameisensaeure-Urinkonzentration 16 h nach
**   Exposition 21.2-118 mg/g Kreatinin.
F008 HEDSET
F009 06-09-1995
F020 1356009
EOR
F002 7822
F010 5.11
F004 25
F005 RE
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F008 AIDA
F009 15-12-1992
F020 1356010
EOR
F002 7822
F010 5.11
F004 25
F005 RM
F006 arbeitsmed. Untersuchung
**   13 Landwirte nach Umgang mit Silage-Loesung (ca. 80 %
**   Ameisensaeure)
**   Erhoehte Ameisensaeure-Urinkonzentration 15 h nach
**   Exposition
F007 arbeitsmed. Untersuchung
**   13 Landwirte nach Umgang mit Silage-Loesung (ca. 80 %
**   Ameisensaeure)
**   Erhoehte Ameisensaeure-Urinkonzentration 15 h nach
**   Exposition
F008 AIDA
F009 15-12-1992
F020 1356011
EOR
F002 7822
F010 5.11
F004 26

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** zit. in: Doc. of the treshoold limit values ... 5.Ed.,
** Cincinanati, Ohio, (1986)
F008 HEDSET
F009 06-09-1995
F020 1356012
EOR
F002 7822
F010 5.11
F004 26
F005 RM
F006 arbeitsmed. Untersuchung
** Beschaeftigte in einer Textilfabrik.
** Ameisensaeurekonzentration in der Luft ca. 15 ppm.
** Subjektive Beschwerden ueber Uebelkeit.
F007 arbeitsmed. Untersuchung
** Beschaeftigte in einer Textilfabrik.
** Ameisensaeurekonzentration in der Luft ca. 15 ppm.
** Subjektive Beschwerden ueber Uebelkeit.
F008 HEDSET
F009 06-09-1995
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EOR
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F010 5.11
F004 27
F005 RE
F006 Jefferys, D.B. und Wiseman, H.M.: Postgraduate Medical J.
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F007 Jefferys, D.B. und Wiseman, H.M.: Postgraduate Medical J.
** 56, 761-763 (1980)
F008 HEDSET
F009 06-09-1995
F020 1356014
EOR
F002 7822
F010 5.11
F004 27
F005 RM
F006 Fallbericht
** 45 Faelle von Ameisensaeure-Ingestion. Abdominalschmerzen,
** Erbrechen, Haematemesis, Schluckbeschwerden, Atemnot,
** Veraetzungen im Gastrointestinaltrakt mit nachfolgenden
** Strikturen, Gerinnungsstoerungen, Pneumonie, akutes
** Nierenv
F007 Fallbericht
** 45 Faelle von Ameisensaeure-Ingestion. Abdominalschmerzen,
** Erbrechen, Haematemesis, Schluckbeschwerden, Atemnot,
** Veraetzungen im Gastrointestinaltrakt mit nachfolgenden
** Strikturen, Gerinnungsstoerungen, Pneumonie, akutes
** Nierenversagen, Leberfunktionsstoerungen. Nach Ingestion
** von45-200 g Ameisensaeure verstarben von 16 Patienten 9 nach
** Perforationen im Gastrointestinaltrakt und 5 an akutem

**   Nierenversagen.
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F009 06-09-1995
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EOR
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F010 5.11
F004 28
F005 RE
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F009 06-09-1995
F020 1356016
EOR
F002 7822
F010 5.11
F004 28
F005 RM
F006 Fallbericht
**   53 Faelle von Ameisensaeure-Ingestion. Veraetzungen des
**   Gastrointestinaltraktes mit Oesophagusstrikturen,
**   Pneumonie, Nierenversagen, Hypotension, Bewusstlosigkeit.
F007 Fallbericht
**   53 Faelle von Ameisensaeure-Ingestion. Veraetzungen des
**   Gastrointestinaltraktes mit Oesophagusstrikturen,
**   Pneumonie, Nierenversagen, Hypotension, Bewusstlosigkeit.
F008 HEDSET
F009 06-09-1995
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F010 5.11
F004 29
F005 RE
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**   (1980)
F008 HEDSET
F009 06-09-1995
F020 1356018
EOR
F002 7822
F010 5.11
F004 29
F005 RM
F006 Fallbericht
**   3 Todesfaelle nach Ameisensaeure-Ingestion. Veraetzungen im
**   Gastrointestinaltrakt, metabolische Azidose,
**   Gerinnungsstoerungen, Haemorrhagie, Schock, Haemolyse,
**   Ateminsuffizienz, Nierenversagen. Methaemalbuminspiegel 143
**   mg % (no
F007 Fallbericht
**   3 Todesfaelle nach Ameisensaeure-Ingestion. Veraetzungen im
**   Gastrointestinaltrakt, metabolische Azidose,
**   Gerinnungsstoerungen, Haemorrhagie, Schock, Haemolyse,

**   Ateminsuffizienz, Nierenversagen. Methaemalbuminspiegel 143
**   mg % (normal 6 mg %) im Blut.
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EOR
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**   342-347 (1977)
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F008 HEDSET
F009 06-09-1995
F020 1356020
EOR
F002 7822
F010 5.11
F004 30
F005 RM
F006 Fallbericht
**   2 Faelle von Ameisensaeure-Ingestion. Reizung, Oedem,
**   Blasenbildung und Nekrose der Mund- und Rachenschleimhaut.
**   Ameisensaeure konnte im Blut und Urin nicht nachgewiesen
**   werden, keine Methaemoglobinaemie.
F007 Fallbericht
**   2 Faelle von Ameisensaeure-Ingestion. Reizung, Oedem,
**   Blasenbildung und Nekrose der Mund- und Rachenschleimhaut.
**   Ameisensaeure konnte im Blut und Urin nicht nachgewiesen
**   werden, keine Methaemoglobinaemie.
F008 HEDSET
F009 06-09-1995
F020 1356021
EOR
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F004 31
F005 RE
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F008 HEDSET
F009 06-09-1995
F020 1356022
EOR
F002 7822
F010 5.11
F004 31
F005 RM
F006 Fallbericht
**   1 Todesfall nach Ameisensaeure-Ingestion (ca. 200 ml einer
**   ca. 50%igen Loesung). Blutspiegel von 348 ug/ml
**   Ameisensaeure ca. 2 h nach Ingestion. Haematemesis,
**   Zyanose,Veraetzungen im Gastrointestinaltrakt, Schock,

**   metabolische A
F007 Fallbericht
**   1 Todesfall nach Ameisensaeure-Ingestion (ca. 200 ml einer
**   ca. 50%igen Loesung). Blutspiegel von 348 ug/ml
**   Ameisensaeure ca. 2 h nach Ingestion. Haematemesis,
**   Zyanose,Veraetzungen im Gastrointestinaltrakt, Schock,
**   metabolische Azidose, Haemolyse. in-vitro Untersuchung:
**   Haemolyse durch Aziditaet.
F008 HEDSET
F009 06-09-1995
F020 1356023
EOR
F002 7822
F010 5.11
F004 32
F005 RE
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F008 HEDSET
F009 06-09-1995
F020 1356024
EOR
F002 7822
F010 5.11
F004 32
F005 RM
F006 Fallbericht
**   1 Todesfall nach Ameisensaeure-Ingestion. Hypotension,
**   Atemsuffizienz, Gerinnungsstoeruengen, Nierenversagen.
F007 Fallbericht
**   1 Todesfall nach Ameisensaeure-Ingestion. Hypotension,
**   Atemsuffizienz, Gerinnungsstoeruengen, Nierenversagen.
F008 HEDSET
F009 06-09-1995
F020 1356025
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F004 33
F005 RE
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EOR
F002 7822
F010 5.11
F004 33
F005 RM
F006 Fallbericht
**   1 Fall von lokaler Einwirkung von konz. Ameisensaeure an
**   derHaut. Veraetzungen der Beine mit nachfolgenden narbigen
**   Veraenderungen.Systemische Effekte: Uebelkeit, Erbrechen,
**   metabolische Azidose, Haemolyse, Haemoglobinurie.
F007 Fallbericht
**   1 Fall von lokaler Einwirkung von konz. Ameisensaeure an

**   derHaut. Veraetzungen der Beine mit nachfolgenden narbigen
**   Veraenderungen.Systemische Effekte: Uebelkeit, Erbrechen,
**   metabolische Azidose, Haemolyse, Haemoglobinurie.
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F020 1356028
EOR
F002 7822
F010 5.11
F004 34
F005 RM
F006 Fallbericht
**   1 Fall von lokaler Einwirkung von Ameisensaeure am Auge.
**   Schwellung und Truebung der Kornea, Schmerzen, Traenenfluss,
**   Pupillenverengung.
F007 Fallbericht
**   1 Fall von lokaler Einwirkung von Ameisensaeure am Auge.
**   Schwellung und Truebung der Kornea, Schmerzen, Traenenfluss,
**   Pupillenverengung.
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F010 5.11
F004 36
F005 RM
F006 Titel:
**   "Quantitative structure activity relationships for skin
**   corrosivity of organic acids, bases and phenols"
F007 Titel:
**   "Quantitative structure activity relationships for skin
**   corrosivity of organic acids, bases and phenols"
F008 HEDSET
F009 08-09-1995
F020 1356031
EOR

F002 7822
F010 5.11
F004 36
F005 TS
F006 Ameisensaeure
F007 Ameisensaeure
F008 HEDSET
F009 08-09-1995
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F020 1356034
EOR
F002 7822
F010 5.11
F004 37
F005 RM
F006 Die Autoren untersuchten morphologische Laesionen durch
** Natriumformiat in Zellkultur (primaere cerebrocorticale
** fetale Mauszellen). Die untersuchten Laesionen sollen laut
** Angabe der Autoren Auskunft ueber Neurotoxizitaet,
** Gliotoxizitaet und
F007 Die Autoren untersuchten morphologische Laesionen durch
** Natriumformiat in Zellkultur (primaere cerebrocorticale
** fetale Mauszellen). Die untersuchten Laesionen sollen laut
** Angabe der Autoren Auskunft ueber Neurotoxizitaet,
** Gliotoxizitaet und Zytotoxizitaet geben. Natriumformiat
** zeigte hiernach spezifische neurotoxische Wirkung bei
** Konzentrationen bis zu 60 mM (2760 ug/ml) mit Laesionen
** hauptsaechlich in den grossen polygonalen Neuronen.
** Konzentrationen ueber 120 mM (5520 ug/ml) fuehrten zu
** unspezifischer Zytotoxizitaet. Weiterhin wurden
** Veraenderungen der Membranintegritaet ueber
** Lactatdehydrogenase- und 14C-Adeninnukleotid-Freisetzung
** sowie metabolische Aktivitaet der Mitochondrien untersucht.
F008 HEDSET
F009 08-09-1995
F020 1356035

EOR
F002 7822
F010 5.11
F004 37
F005 TS
F006 Natriumformiat
F007 Natriumformiat
F008 HEDSET
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F020 1356036
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F020 1356037
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F010 5.11
F004 39
F005 RM
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** potential of surfactants and surfactant-based formulations"
F007 Titel:
** "A new in vitro method to determine the corrosivity
** potential of surfactants and surfactant-based formulations"
F008 HEDSET
F009 08-09-1995
F020 1356038
EOR
F002 7822
F010 5.11
F004 39
F005 TS
F006 Ameisensaeure
F007 Ameisensaeure
F008 HEDSET
F009 08-09-1995
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F008 HEDSET
F009 08-09-1995
F020 1356040
EOR

F002 7822
F010 5.11
F004 40
F005 RM
F006 Titel:
** "Penetration of Industrial Chemicals Across the Skin: A
** Predictive Model"
**
** Anhand eines Modellsystems wurde die Testsubstanz eingestuft
** mit toxikologischem Potential bei dermaler Zufuhr.
F007 Titel:
** "Penetration of Industrial Chemicals Across the Skin: A
** Predictive Model"
**
** Anhand eines Modellsystems wurde die Testsubstanz eingestuft
** mit toxikologischem Potential bei dermaler Zufuhr.
F008 HEDSET
F009 08-09-1995
F020 1356041
EOR
F002 7822
F010 5.11
F004 40
F005 TS
F006 Ameisensaeure
F007 Ameisensaeure
F008 HEDSET
F009 08-09-1995
F020 1356042
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F002 7822
F010 5.11
F004 41
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F008 HEDSET
F009 08-09-1995
F020 1356043
EOR
F002 7822
F010 5.11
F004 41
F005 RM
F006 In einem in vitro Testsystem (bovine udder) wurden
** verschiedene stark hautreizende Substanzen untersucht. Nach
** 2 Stunden wurde das Gewebe biochemisch (Zytotoxizitaet,
** Eicosanoidkonzentrationen) und histologisch untersucht. Die
** untersuchten
F007 In einem in vitro Testsystem (bovine udder) wurden
** verschiedene stark hautreizende Substanzen untersucht. Nach
** 2 Stunden wurde das Gewebe biochemisch (Zytotoxizitaet,
** Eicosanoidkonzentrationen) und histologisch untersucht. Die
** untersuchten Substanzen zeigten deutliche Auswirkungen auf
** die Prostaglandin E2 Konzentration und auf die Histologie.

**   Nach Angabe der Autoren sind weitere Untersuchungen noetig,
**   inwiefern auch schwach hautreizende Substanzen in diesem in
**   vitro System erkannt werden.
F008 HEDSET
F009 08-09-1995
F020 1356044
EOR
F002 7822
F010 5.11
F004 41
F005 TS
F006 Ameisensaeure, 25%
F007 Ameisensaeure, 25%
F008 HEDSET
F009 08-09-1995
F020 1356045
EOR
F002 7822
F010 5.11
F004 42
F005 RE
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F008 HEDSET
F009 08-09-1995
F020 1356046
EOR
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F010 5.11
F004 42
F005 RE
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F008 HEDSET
F009 08-09-1995
F020 1356047
EOR
F002 7822
F010 5.11
F004 42
F005 RM
F006 Ein in vitro Modellsystem mit Saccharomyces cerevisiae
**   wurdemit insgesamt 160 Substanzen auf seine Eignung als in
**   vitro Modell fuer die Bestimmung der akuten Toxizitaet
**   bestimmt. Die ermittelten IC50-Werte (50% Wachstumshemmung)
**   korrelierte
F007 Ein in vitro Modellsystem mit Saccharomyces cerevisiae
**   wurdemit insgesamt 160 Substanzen auf seine Eignung als in
**   vitro Modell fuer die Bestimmung der akuten Toxizitaet
**   bestimmt. Die ermittelten IC50-Werte (50% Wachstumshemmung)
**   korrelierten laut Angabe der Autoren gut mit den
**   LD50-Wertenaus der Literatur.
F008 HEDSET
F009 08-09-1995
F020 1356048

EOR
F002 7822
F010 5.11
F004 42
F005 TS
F006 Ameisensaeure
F007 Ameisensaeure
F008 HEDSET
F009 08-09-1995
F020 1356049
EOR
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F010 5.11
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F008 HEDSET
F009 08-09-1995
F020 1356050
EOR
F002 7822
F010 5.11
F004 43
F005 RM
F006 Die Autoren untersuchten die Konzentrationen von
** 10-Formyltetrahydrofolat-Dehydrogenase (FTHFDH) in
** Gewebepraeparationen der Retina, des Sehnervs und des
** Gehirns der Ratte. Hierbei beobachteten die Autoren jeweils
** FTHFDH-Konzentrationen, di
F007 Die Autoren untersuchten die Konzentrationen von
** 10-Formyltetrahydrofolat-Dehydrogenase (FTHFDH) in
** Gewebepraeparationen der Retina, des Sehnervs und des
** Gehirns der Ratte. Hierbei beobachteten die Autoren jeweils
** FTHFDH-Konzentrationen, die eine hohe metabolische
** Kapazitaet der Zielgewebe fuer Ameisensaeure vermuten
** lassen. Nach Angabe der Autoren koennte dies eine
** Erklaerungfuer die fehlende okulare Wirkung der
** Ameisensaeure (Formiat-Toxizitaet) bei der Ratte sein.
F008 HEDSET
F009 08-09-1995
F020 1356051
EOR
F002 7822
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F004 44
F005 RE
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EOR
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F010 5.11

F004 44
F005 RE
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F008 HEDSET
F009 08-09-1995
F020 1356053
EOR
F002 7822
F010 5.11
F004 44
F005 RM
F006 Die Urinproben von 12 maennlichen Landwirten, die 8 Stunden
** gegenueber Ameisensaeure in einer Konzentration von
** 0.0073+/-0.0022 mg/l exponiert waren, wurden untersucht.
** Direkt im Anschluss an die Exposition war die
** Ameisensaeure-Ausscheidun
F007 Die Urinproben von 12 maennlichen Landwirten, die 8 Stunden
** gegenueber Ameisensaeure in einer Konzentration von
** 0.0073+/-0.0022 mg/l exponiert waren, wurden untersucht.
** Direkt im Anschluss an die Exposition war die
** Ameisensaeure-Ausscheidung im Vergleich zur Kontrollgruppe
** nicht erhoeht. Nach 15 und 30 Stunden zeigten sich jedoch
** deutliche und signifikant erhoehte
** Ameisensaeure-Konzentrationen im Urin der exponierten
** Personen (Faktor 2.1 und 3.3). Die Exkretion zeigte lineare
** Abhaengigkeit von der Expositionskonzentration. Der pH-Wert
** im Urin war unveraendert, jedoch war die Ammonium- und
** Calcium-Ausscheidung 30 Stunden nach der Exposition
** signifikant erhoeht.
F008 HEDSET
F009 08-09-1995
F020 1356054
EOR
F002 7822
F010 5.11
F004 44
F005 TS
F006 Ameisensaeure
F007 Ameisensaeure
F008 HEDSET
F009 08-09-1995
F020 1356055
EOR
F002 7822
F010 5.11
F004 45
F005 RE
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F008 HEDSET
F009 08-09-1995
F020 1356056
EOR
F002 7822

F010 5.11
F004 45
F005 RM
F006 Zur Validierung eines neuen Screening-Tests fuer Haut- und
** Schleimhautreizung wurden konventionelle Vorversuche
** durchgefuert, unter anderem mit Ameisensaeure. In einem
** offenen Patch-Test an Ratten und Maeusen zeigte die
** Testsubstanz in 10-1
F007 Zur Validierung eines neuen Screening-Tests fuer Haut- und
** Schleimhautreizung wurden konventionelle Vorversuche
** durchgefuert, unter anderem mit Ameisensaeure. In einem
** offenen Patch-Test an Ratten und Maeusen zeigte die
** Testsubstanz in 10-12%iger Verduennung mittelgradige bis
** starke Hautreizung bei einer applizierten Dosis von 100-120
** mg/kg. In einem intradermalen Hautreiztest an Ratten und
** Maeusen mit 2-3%iger Ameisensaeure wurden entsprechende
** Effekte mit Dosen von 1-1.5 und 10-15 mg/kg erreicht. In
** einem Augenreiztest an Ratten und Maeusen mit 5-6%iger
** Ameisensaeure zeigten sich mittelgradige bis starke Effekte
** mit Dosen von 2.5-3 und 25-30 mg/kg.
F008 HEDSET
F009 08-09-1995
F020 1356057
EOR
F002 7822
F010 5.11
F004 45
F005 TS
F006 Ameisensaeure
F007 Ameisensaeure
F008 HEDSET
F009 08-09-1995
F020 1356058
EOR
F002 7822
F010 5.11
F004 46
F005 RE
F006 BUA-Stoffbericht Nr. 81 (August 1991)
F007 BUA-Stoffbericht Nr. 81 (August 1991)
F008 HEDSET
F009 08-09-1995
F020 1356059
EOR
F002 7822
F010 5.11
F004 46
F005 RE
F006 Ullmann¿s Encyclopedia of Industrial Chemistry Vol. A12,
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F007 Ullmann¿s Encyclopedia of Industrial Chemistry Vol. A12,
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F008 HEDSET
F009 08-09-1995
F020 1356060
EOR
F002 7822

F010 5.11
F004 46
F005 RM
F006 zusammenfassende Literatur
F007 zusammenfassende Literatur
F008 HEDSET
F009 08-09-1995
F020 1356061
EOR
F002 7822
F010 5.11
F004 47
F005 RE
F006 Malorny, G.: Z. Ernaehrungswiss. 9, 332-339 (1969)
F007 Malorny, G.: Z. Ernaehrungswiss. 9, 332-339 (1969)
F008 HEDSET
F009 11-09-1995
F020 1356062
EOR
F002 7822
F010 5.11
F004 47
F005 RM
F006 Die Methode ist nicht akzeptabel. Zudem ist die
** Dokumentation unzureichend. Die Studie ist daher nicht
** bewertbar.
F007 Die Methode ist nicht akzeptabel. Zudem ist die
** Dokumentation unzureichend. Die Studie ist daher nicht
** bewertbar.
F008 HEDSET
F009 11-09-1995
F020 1356063
EOR
F002 7822
F010 5.11
F004 47
F005 RS
F006 In bebruetete Huehnereier wurde Natriumformiat in die
** Luftblase injiziert (5, 10 bzw. 20 mg/Ei) und diese Eier
** biszum 16. Tag weiter bebruetet. Kein vermehrtes Absterben
** der Embryonen. Die Ueberlebensrate lag auf der gleichen
** Hoehe wie die
F007 In bebruetete Huehnereier wurde Natriumformiat in die
** Luftblase injiziert (5, 10 bzw. 20 mg/Ei) und diese Eier
** biszum 16. Tag weiter bebruetet. Kein vermehrtes Absterben
** der Embryonen. Die Ueberlebensrate lag auf der gleichen
** Hoehe wie die der Kontrollen. Die Embryonen-Endgewichte der
** mit Natriumformiat behandelten Eier lassen keine
** Abweichungen erkennen. Natriumformiat, das nach 10-12 Tagen
** Bebruetungsdauer vollstaendig eliminiert wird, und zwar
** vorzugsweise durch Oxydation, erwies sich am bebrueteten
** Huehnerei als teratogen unauffaellig. Gegenueber den
** unbehandelten Kontrollen (n=1051) wurde keine Aenderung der
** Missbildungshaeufigkeit weder in quantitativer noch in
** qualitativer Hinsicht beobachtet.
F008 HEDSET
F009 11-09-1995

F020 1356064
EOR
F002 7822
F010 5.11
F004 47
F005 TS
F006 Natriumformiat
F007 Natriumformiat
F008 HEDSET
F009 11-09-1995
F020 1356065
EOR
F002 7822
F010 5.11
F004 48
F005 RE
F006 Stegink, L.D. et al.: J. Toxicol. Environ. Health 7,
** 281-290(1981)
F007 Stegink, L.D. et al.: J. Toxicol. Environ. Health 7,
** 281-290(1981)
F008 HEDSET
F009 07-12-1995
F020 1356066
EOR
F002 7822
F010 5.11
F004 48
F005 RM
F006 Die Formiatkonzentrationen wurden im Blut von 6 Probanden
** untersucht, denen 200 mg/kg Aspartam oral appliziert wurde.
** Die Formiatkonzentrationen lagen zu Beginn der Studie im
** Durchschnitt bei 1.91 +/- 0.61 mg/100 ml.
F007 Die Formiatkonzentrationen wurden im Blut von 6 Probanden
** untersucht, denen 200 mg/kg Aspartam oral appliziert wurde.
** Die Formiatkonzentrationen lagen zu Beginn der Studie im
** Durchschnitt bei 1.91 +/- 0.61 mg/100 ml.
F008 HEDSET
F009 07-12-1995
F020 1356067
EOR
F002 7822
F010 5.11
F004 48
F005 TS
F006 Aspartam, Ameisensaeure
F007 Aspartam, Ameisensaeure
F008 HEDSET
F009 07-12-1995
F020 1356068
EOR
F002 7822
F010 5.11
F004 49
F005 RE
F006 Baumann, K. und Angerer, J.: Int. Arch. Occup. Environ.
** Health 42, 241-249 (1979)
F007 Baumann, K. und Angerer, J.: Int. Arch. Occup. Environ.

**   Health 42, 241-249 (1979)
F008 HEDSET
F009 07-12-1995
F020 1356069
EOR
F002 7822
F010 5.11
F004 49
F005 RM
F006 Die Formiatkonzentration im Blut und im Urin wurde bei 20
**   Druckerei-Arbeitern untersucht. Es sollte untersucht
**   werden,ob die gemessenen Formiatkonzentrationen
**   Rueckschluesse auf die Methanolexposition in der Luft
**   zulassen; die gemessenen Me
F007 Die Formiatkonzentration im Blut und im Urin wurde bei 20
**   Druckerei-Arbeitern untersucht. Es sollte untersucht
**   werden,ob die gemessenen Formiatkonzentrationen
**   Rueckschluesse auf die Methanolexposition in der Luft
**   zulassen; die gemessenen Methanolkonzentrationen in der
**   Atemluft waren 85, 101 und 134 ppm. Die Formiatkonzentration
**   im Blut der Arbeiter stieg signifikant von 3.2 +/- 2.4 mg/l
**   vor Beginn der Schicht (morgens) auf 7.9 +/- 3.2 mg/l nach
**   der Schicht (abends). Die entsprechenden
**   Formiatkonzentrationen im Urin stiegen von 13.1 +/- 3.9 mg/l
**   auf 20.2 +/- 7 mg/l. Im Vergleich hierzu zeigten die
**   Formiatkonzentrationen im Blut der Kontrollpersonen einen
**   leichten Abfall von morgens 5.6 +/- 4.5 mg/l auf abends 4.9
**   +/- 4.2 mg/l; die entsprechenden Formiatkonzentrationen im
**   Urin waren morgens 11.9 +/- 6.4 mg/l und abends 11.7 +/- 5.6
**   mg/l. Es zeigte sich eine grosse interindividuelle
**   Variabilitaet der Formiatkonzentrationen.
**   Nach Angabe der Autoren ist die Messung der
**   Formiatkonzentration im Blut und im Urin ein wichtiger
**   Parameter zur Ueberwachung der Methanolexposition von
**   Arbeitern.
F008 HEDSET
F009 07-12-1995
F020 1356070
EOR
F002 7822
F010 5.11
F004 49
F005 TS
F006 Methanol, Ameisensaeure
F007 Methanol, Ameisensaeure
F008 HEDSET
F009 07-12-1995
F020 1356071
EOR
F002 7822
F010 5.11
F004 50
F005 RE
F006 Eells, J.T. et al., Toxicol. Appl. Pharmacol., 140, 58-69
**   (1996)
F007 Eells, J.T. et al., Toxicol. Appl. Pharmacol., 140, 58-69
**   (1996)

F008 HEDSET
F020 1356072
EOR
F002 7822
F010 5.11
F004 50
F005 RM
F006 The study compared the effects on retinal function and
** structure of rapidly increasing formate concentrations
** typical of acute methanol intoxication with low
** level plateau formate concentrations more likely to be
** generated by subacute or c
F007 The study compared the effects on retinal function and
** structure of rapidly increasing formate concentrations
** typical of acute methanol intoxication with low
** level plateau formate concentrations more likely to be
** generated by subacute or chronic methanol exposure.
** Anesthetized rats received i.p. injections of methanol at
** doses of 4 g/kg followed by supplemental injections of 2
** g/kg and 1 g/kg, respectively at 12 hour intervals. These
** dosage regimens were designed to maintain blood formate
** concentrations ranging from 8-15 mM or 4-6 mM for 30-40
** h. Rats that accumulated the hight formate concentration of
** 8-15 mM developed metabolic acidosis, retinal dysfunction
** (reductions in a- and b-waves of the ERG), and retinal
** histopathologic changes (vacuolation in the retinal pigment
** epithelium and photoreceptor inner segments). Rats exposed
** to 4-6 mM for 48 h showed evidence of retinal dysfunction in
** the absence of metabolic acidosis and retinal
** histopathology.
F008 HEDSET
F020 1356073
EOR
F002 7822
F010 5.11
F004 50
F005 TS
F006 methanol, HPLC grade
F007 methanol, HPLC grade
F008 HEDSET
F020 1356074
EOR
F002 7822
F010 5.11
F004 51
F005 RE
F006 Patty's Industrial Hygiene and Toxicology, 4th edition,
** 3527- 3532, 1994
F007 Patty's Industrial Hygiene and Toxicology, 4th edition,
** 3527- 3532, 1994
F008 HEDSET
F020 1356075
EOR
F002 7822
F010 5.11
F004 51
F005 TS

F006 formic acid
F007 formic acid
F008 HEDSET
F020 1356076
EOR
F002 7822
F010 5.11
F004 52
F005 RE
F006 Sakurai, H. et al., J. Occup. Health, 38, 133-147, 1996
F007 Sakurai, H. et al., J. Occup. Health, 38, 133-147, 1996
F008 HEDSET
F020 1356077
EOR
F002 7822
F010 5.11
F004 52
F005 RM
F006 Title: 'Brief introduction to occupational exposure limits
** in Japan.' In the article, an occupational exposure limit
** for formic acid of 5 ppm (9.4 mg/m3) was recommended.
F007 Title: 'Brief introduction to occupational exposure limits
** in Japan.' In the article, an occupational exposure limit
** for formic acid of 5 ppm (9.4 mg/m3) was recommended.
F008 HEDSET
F020 1356078
EOR
F002 7822
F010 5.11
F004 52
F005 TS
F006 formic acid
F007 formic acid
F008 HEDSET
F020 1356079
EOR
F002 7822
F010 5.11
F004 53
F005 RE
F006 Gulevich, S. and Rosenberg, N.L., Poisons and Toxins, cited
** in Guide to Clinical Neurology (Mohr, J.P. and Gautier,
** J.C., eds.), Churchill Livingstone, New York, 841-850, 1996
F007 Gulevich, S. and Rosenberg, N.L., Poisons and Toxins, cited
** in Guide to Clinical Neurology (Mohr, J.P. and Gautier,
** J.C., eds.), Churchill Livingstone, New York, 841-850, 1996
F008 HEDSET
F020 1356080
EOR
F002 7822
F010 5.11
F004 53
F005 RM
F006 Formic acid was indicated as the neurotoxic metabolite of
** methanol.
F007 Formic acid was indicated as the neurotoxic metabolite of
** methanol.

F008 HEDSET
F020 1356081
EOR
F002 7822
F010 5.11
F004 54
F005 RE
F006 Damian, P. and Raabe, O.G., Toxicol. Appl. Pharmacol., 139,
** 22-32, 1996
F007 Damian, P. and Raabe, O.G., Toxicol. Appl. Pharmacol., 139,
** 22-32, 1996
F008 HEDSET
F020 1356082
EOR
F002 7822
F010 5.11
F004 54
F005 RM
F006 The dose dependent elimination of formate was investigated
** in the rat using both in vitro and in vivo systems. The in
** situ perfused liver was used to define the kinetics of
** hepatic metabolism and obtain initial in vitro estimates of
** the hep
F007 The dose dependent elimination of formate was investigated
** in the rat using both in vitro and in vivo systems. The in
** situ perfused liver was used to define the kinetics of
** hepatic metabolism and obtain initial in vitro estimates of
** the hepatic metabolism parameters. Formate was eliminated
** from the perfused rat liver following the Michaelis-Menten
** Kinetics. Estimates of the Michaelis-Menten parameters
** obtained from the perfused liver studies were used in a two
** compartment pharmacokinetic model of the dose dependent
** elimination of formate in vivo. A good fit of the model to
** the observed in vivo data was obtained. Initial estimates of
** the Michaelis-Menten parameters, Vmax an Km, obtained from
** the perfused liver model, were within 40% of the final
** fitted values of these parameters in the in vivo model.
F008 HEDSET
F020 1356083
EOR
F002 7822
F010 5.11
F004 54
F005 TS
F006 sodium formate, no further data
F007 sodium formate, no further data
F008 HEDSET
F020 1356084
EOR
F002 7822
F010 5.11
F004 55
F005 RE
F006 Gesondheitsraad, Health Council Committee updating of OELs,
** Draft Febr, 1999
F007 Gesondheitsraad, Health Council Committee updating of OELs,
** Draft Febr, 1999

F008 HEDSET
F020 1356085
EOR
F002 7822
F010 5.11
F004 55
F005 RM
F006 Formic acid, Draft
F007 Formic acid, Draft
F008 HEDSET
F020 1356086
EOR
F002 7822
F010 5.11
F004 56
F005 RE
F006 Dorman D.C. et al.: Teratology society abstracts P26, 183
F007 Dorman D.C. et al.: Teratology society abstracts P26, 183
F008 HEDSET
F020 1356087
EOR
F002 7822
F010 5.11
F004 56
F005 RM
F006 Title: the role of formate in methanol-induced exencephaly
** in CD-1 mice
F007 Title: the role of formate in methanol-induced exencephaly
** in CD-1 mice
F008 HEDSET
F020 1356088
EOR
F002 7822
F010 5.11
F004 57
F005 RE
F006 Nair, B. and A. Andersen, Intern. Journ. of Toxicology, 16:
** 221-234, 1997
F007 Nair, B. and A. Andersen, Intern. Journ. of Toxicology, 16:
** 221-234, 1997
F008 HEDSET
F020 1356089
EOR
F002 7822
F010 5.11
F004 57
F005 RM
F006 Final report on the safety assessment of formic acid
F007 Final report on the safety assessment of formic acid
F008 HEDSET
F020 1356090
EOR
F002 7822
F010 5.11
F004 58
F005 RE
F006 P. Senstein, association des anatomistes, 712-720, 1972

F007 P. Senstein, association des anatomistes, 712-720, 1972
F008 HEDSET
F020 1356091
EOR
F002 7822
F010 5.11
F004 58
F005 RM
F006 Formamid acid 0.1M, 21 hours produce in Pleurodele eggsa
** dissociation of spindle fibers appears around agglutinated
** chromosomes.
F007 Formamid acid 0.1M, 21 hours produce in Pleurodele eggsa
** dissociation of spindle fibers appears around agglutinated
** chromosomes.
F008 HEDSET
F020 1356092
EOR
F002 7822
F010 5.11
F004 59
F005 RE
F006 Intern. Journal of toxicology, 16, 221-234, 1997
F007 Intern. Journal of toxicology, 16, 221-234, 1997
F008 HEDSET
F020 1356093
EOR
F002 7822
F010 5.11
F004 59
F005 TS
F006 formic acid
F007 formic acid
F008 HEDSET
F020 1356094
EOR
F002 7822
F010 5.2.1
F004 1
F005 RE
F006 Documentation of the Threshold Limit Values and Biological
** Exposure Indicies, Fifth Edition 1986
F007 Documentation of the Threshold Limit Values and Biological
** Exposure Indicies, Fifth Edition 1986
F008 HEDSET
F009 11-09-1995
F020 1356151
EOR
F002 7822
F010 5.2.1
F004 1
F005 RE
F006 Patty Ind. Hyg. Toxicol. 3rd Ed., 4903 (1981)
F007 Patty Ind. Hyg. Toxicol. 3rd Ed., 4903 (1981)
F008 HEDSET
F009 11-09-1995
F020 1356152
EOR

F002 7822
F010 5.2.1
F004 1
F005 RE
F006 Patty, F.A. (Ed.), Ind. Hyg. Toxicol., Vol.II, 1772, (1962)
F007 Patty, F.A. (Ed.), Ind. Hyg. Toxicol., Vol.II, 1772, (1962)
F008 HEDSET
F009 11-09-1995
F020 1356153
EOR
F002 7822
F010 5.2.1
F004 1
F005 RE
F006 Plunkett, E.R. (Ed.): Handbook of Ind. Toxicol., (1976)
F007 Plunkett, E.R. (Ed.): Handbook of Ind. Toxicol., (1976)
F008 HEDSET
F009 11-09-1995
F020 1356154
EOR
F002 7822
F010 5.2.1
F004 1
F005 RE
F006 Sax, S. 695 (1979)
F007 Sax, S. 695 (1979)
F008 HEDSET
F009 11-09-1995
F020 1356155
EOR
F002 7822
F010 5.2.1
F004 1
F005 RE
F006 von Oettingen, W.F.: Arch. Ind. Health 20, 517-531 (1959)
F007 von Oettingen, W.F.: Arch. Ind. Health 20, 517-531 (1959)
F008 HEDSET
F009 11-09-1995
F020 1356156
EOR
F002 7822
F010 5.2.1
F004 1
F005 RM
F006 In the literature various citations are found that formic acid is a
* caustic agent. According to OECD guideline 404 (adopted 17.07.1992) in
* the interest of animal welfare, it is important that the unnecessary use
* of animals is avoided, and t
F007 In the literature various citations are found that formic acid is a
* caustic agent. According to OECD guideline 404 (adopted 17.07.1992) in
* the interest of animal welfare, it is important that the unnecessary use
* of animals is avoided, and that any testing which is likely to produce
* severe responses in animals is minimized. Consequently, test materials
* meeting any of the following criteria should not be tested in animals for
* dermal irritation/corrosion.
** Materials that have predictable corrosive potential based n
* structure-activity relationship and/or physicochemical properties such as

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*    strong acidity or alkalinity, e.g., when the material to be applied has a
*    pH of 2 or less of 11.5 or greater (alkaline or acidic reserve should be
*    taken into account).
**
**   In addition it is noteworthy that the European union has labeled formic
*    acid with R 35 (cases severe burns) since a long time (12. ATP). Specific
*    concentration limits for preparations have been set:
**
**
**   Concentration
**   of formic acid      Risk phrase
**
**   >90%            R 35 causes severe burns (assuming also
**                    comparable effects on the eye tissue)
**   >10% < 90%    R 34 causes burns (assuming also comparable
**                    effects on the eye tissue)
**   >2% < 10%     R 36/38 irritant to skin and eyes
**
**   Thus it is possible to evaluate not only formic acid but also
*    formulations with respect to irritation/corrosion to the skin. It should
*    be noted that the in vitro Epiderm Test would not allow a better
*    evaluation as this test system can only distinguish between a caustic
*    effect or an irritant effect.
F008 HEDSET
F009 11-09-1995
F020 1356157
EOR
F002 7822
F010 5.2.1
F004 2
F005 RE
F006 RTECS, Update 9001: Union Carbide Data Sheet 8, 5 (1968)
F007 RTECS, Update 9001: Union Carbide Data Sheet 8, 5 (1968)
F008 HEDSET
F009 06-09-1995
F020 1356158
EOR
F002 7822
F010 5.2.1
F004 2
F005 RM
F006 Das Ergebnis liegt lediglich als Sekundaerzitat vor.
F007 Das Ergebnis liegt lediglich als Sekundaerzitat vor.
F008 HEDSET
F009 06-09-1995
F020 1356159
EOR
F002 7822
F010 5.2.1
F004 2
F005 RM
F006 Wirkung: "mild" nach RTECS
F007 Wirkung: "mild" nach RTECS
F008 HEDSET
F009 06-09-1995
F020 1356160
EOR
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F002 7822
F010 5.2.1
F004 3
F005 RE
F006 Gefahrstoffverordnung, Dtsch.Bundesverl. Bonn, (1986)
F007 Gefahrstoffverordnung, Dtsch.Bundesverl. Bonn, (1986)
F008 HEDSET
F009 11-09-1995
F020 1356161
EOR
F002 7822
F010 5.2.2
F004 1
F005 RE
F006 HSDB, Recherche vom 26.02.91
F007 HSDB, Recherche vom 26.02.91
F008 AIDA
F009 15-12-1992
F020 1356162
EOR
F002 7822
F010 5.2.2
F004 2
F005 RE
F006 Plunkett, E.R. Ed.: Handbook of Ind.Toxicol., 191-192 (1976)
F007 Plunkett, E.R. Ed.: Handbook of Ind.Toxicol., 191-192 (1976)
F008 HEDSET
F009 06-09-1995
F020 1356163
EOR
F002 7822
F010 5.2.2
F004 2
F005 RM
F006 Conjunktivitis, Hornhautverletzungen
F007 Conjunktivitis, Hornhautverletzungen
F008 HEDSET
F009 06-09-1995
F020 1356164
EOR
F002 7822
F010 5.2.2
F004 2
F005 RM
F006 Ergebnisherkunft nicht nachvollziehbar
F007 Ergebnisherkunft nicht nachvollziehbar
F008 HEDSET
F009 06-09-1995
F020 1356165
EOR
F002 7822
F010 5.2.2
F004 4
F005 RE
F006 RTECS, Update 9001: Union Carbide Data Sheet 8, 5 (1968)
F007 RTECS, Update 9001: Union Carbide Data Sheet 8, 5 (1968)
F008 HEDSET

F009 06-09-1995
F020 1356166
EOR
F002 7822
F010 5.2.2
F004 4
F005 RM
F006 No valid studies are available with respect to eye irritation, however
* formic acid fulfills the criteria for a caustic compound (pH < 2). In
* this case OECD 405 guideline states that no testing is recommended. From
* an EU standpoint the study
F007 No valid studies are available with respect to eye irritation, however
* formic acid fulfills the criteria for a caustic compound (pH < 2). In
* this case OECD 405 guideline states that no testing is recommended. From
* an EU standpoint the study is regarded as caustic by skin contact (causes
* severe burns) and similar effects are expected for the eyes. With respect
* to formulations considerations can be drawn due to the fact that the EU
* has set up specific concentration limits (see chapter skin irritation).
* No caustic effect is assumed by concentrations belwo 10%, which should be
* labeled as irritant to the eye (R 36).
F008 HEDSET
F009 06-09-1995
F020 1356167
EOR
F002 7822
F010 5.2.2
F004 4
F005 RS
F006 Methode: 122 mg
** Eye irritation (exposure of 122 mg of the compound) has been reported
* "severe" according to the secondary source (RTECS).
F007 Methode: 122 mg
** Eye irritation (exposure of 122 mg of the compound) has been reported
* "severe" according to the secondary source (RTECS).
F020 1480102
EOR
F002 7822
F010 5.3
F004 1
F005 RE
F006 HSDB, Investigation of Feb. 26, 1991
F007 HSDB, Investigation of Feb. 26, 1991
F008 HEDSET
F009 06-09-1995
F020 1356168
EOR
F002 7822
F010 5.3
F004 1
F005 RM
F006 AS the use of formic acid is wide spread over decades the lack of
* positive reports in humans does not suggest such an effect. Due to the
* caustic nature high concentrations cannot be applied to the skin in
* sensitization tests. In contrast to
F007 AS the use of formic acid is wide spread over decades the lack of
* positive reports in humans does not suggest such an effect. Due to the
* caustic nature high concentrations cannot be applied to the skin in

*   sensitization tests. In contrast to aldehydes, a sensitizing potential to
*   simple organic acids is not to be assumed by expert judgement.
**   Due to limitations in laboratory capacities the report of a scheduled
*   Buehler Test will be available in July 2002. As formic acid is caustic no
*   Guinea pig maximisation test is possible due to ethical considerations. A
*   local lymph node assay is also not possible as caustic compounds interfer
*   with the imunological response to some extend.
F008 HEDSET
F009 06-09-1995
F020 1356169
EOR
F002 7822
F010 5.3
F004 1
F005 RS
F006 According to a secondary source (HSDB) a sensitizing effect of formic
*   acid in humans is a rare event when tose people have been exposed to the
*   known allergen formaldehyde. This cannot be regarded as a valid source.
F007 According to a secondary source (HSDB) a sensitizing effect of formic
*   acid in humans is a rare event when tose people have been exposed to the
*   known allergen formaldehyde. This cannot be regarded as a valid source.
F020 1480111
EOR
F002 7822
F010 5.3
F004 2
F005 RE
F006 BASF AG, Dept. of Experimental Toxicology and Ecology, unpublished
*   results, Project No. 32H0102/022005, May 29, 2002
F007 BASF AG, Dept. of Experimental Toxicology and Ecology, unpublished
*   results, Project No. 32H0102/022005, May 29, 2002
F020 1490042
EOR
F002 7822
F010 5.3
F004 2
F005 RL
F006 guideline study
F007 guideline study
F020 1490630
EOR
F002 7822
F010 5.3
F004 2
F005 RM
F006 None of the 20 test group animals or the 10 control group 1 animals
*   showed any skin findings during the challenge.
F007 None of the 20 test group animals or the 10 control group 1 animals
*   showed any skin findings during the challenge.
F020 1490047
EOR
F002 7822
F010 5.3
F004 2
F005 TC
F006 Control group 1 and 2 had 10 animals, and test group had 20 animals.
*   Because of the clear negative results the control group 2 was not used.

*   For the challenge 2% TS in distilled water was used (occlusive
*   epicutaneous). This was the maxim
F007 Control group 1 and 2 had 10 animals, and test group had 20 animals.
*   Because of the clear negative results the control group 2 was not used.
*   For the challenge 2% TS in distilled water was used (occlusive
*   epicutaneous). This was the maximum non-irritating concentration based
*   on a pre-test.
F020 1490043
EOR
F002 7822
F010 5.3
F004 2
F005 TS
F006 85.3 g formic acid/100 g total formulation.
F007 85.3 g formic acid/100 g total formulation.
F020 1490045
EOR
F002 7822
F010 5.4
F004 1
F005 RE
F006 FDA, PB 266282, Evaluation of the Health Aspects of Formic
**   Acid and (...) as Food Ingredients, Washington DC, (1976)
F007 FDA, PB 266282, Evaluation of the Health Aspects of Formic
**   Acid and (...) as Food Ingredients, Washington DC, (1976)
F008 HEDSET
F009 06-09-1995
F020 1356170
EOR
F002 7822
F010 5.4
F004 1
F005 RM
F006 zitiert nach: Sporn, A. et al.: Igiena (Bucharest) 11,
**   507-515 (1962)
F007 zitiert nach: Sporn, A. et al.: Igiena (Bucharest) 11,
**   507-515 (1962)
F008 HEDSET
F009 06-09-1995
F020 1356171
EOR
F002 7822
F010 5.4
F004 1
F005 RS
F006 Es wurden 8 Tiere pro Gruppe eingesetzt. Verminderung der
**   Koerpergewichtszunahme, Reduktion der Organgewichte (Leber
**   und Niere in beiden Dosisgruppen, Nebenniere und Milz nur
**   inder niedrigen Dosisgruppe), keine Dosisabhaengigkeit.
**
**   Die Erg
F007 Es wurden 8 Tiere pro Gruppe eingesetzt. Verminderung der
**   Koerpergewichtszunahme, Reduktion der Organgewichte (Leber
**   und Niere in beiden Dosisgruppen, Nebenniere und Milz nur
**   inder niedrigen Dosisgruppe), keine Dosisabhaengigkeit.
**
**   Die Ergebnisse liegen lediglich als kurze stichwortartige

**   Zusammenfassung (Sekundaerzitat) vor.
F008 HEDSET
F009 06-09-1995
F020 1356172
EOR
F002 7822
F010 5.4
F004 2
F005 RE
F006 FDA, PB 266282, Evaluation of the Health Aspects of Formic
**   Acid and (...) as Food Ingredients, Washington DC, (1976)
F007 FDA, PB 266282, Evaluation of the Health Aspects of Formic
**   Acid and (...) as Food Ingredients, Washington DC, (1976)
F008 HEDSET
F009 11-09-1995
F020 1356173
EOR
F002 7822
F010 5.4
F004 2
F005 RE
F006 Solmann, T.: J. Pharmacol. Exp. Ther. 16, 463-474 (1921)
F007 Solmann, T.: J. Pharmacol. Exp. Ther. 16, 463-474 (1921)
F008 HEDSET
F009 11-09-1995
F020 1356174
EOR
F002 7822
F010 5.4
F004 2
F005 RS
F006 Gruppe 1: 0.01% im Futter fuer 11 Wochen, 6 Tiere, 8.2
**   mg/kg/d.
**   Gruppe 2: 0.01% im Futter fuer 14 Wochen, 3 Tiere, 10.25
**   mg/kg/d.
**   Gruppe 3: 0.1% im Futter fuer 15 Wochen, 6 Tiere, 90
**   mg/kg/d.
**   Gruppe 4: 0.01% im Futter fuer 12 Wochen und ans
F007 Gruppe 1: 0.01% im Futter fuer 11 Wochen, 6 Tiere, 8.2
**   mg/kg/d.
**   Gruppe 2: 0.01% im Futter fuer 14 Wochen, 3 Tiere, 10.25
**   mg/kg/d.
**   Gruppe 3: 0.1% im Futter fuer 15 Wochen, 6 Tiere, 90
**   mg/kg/d.
**   Gruppe 4: 0.01% im Futter fuer 12 Wochen und anschliessend
**   0.25% fuer 15 Wochen, 4 Tiere, 160 mg/kg/d.
**   Gruppe 5: 0.1% im Futter fuer 17 Wochen und anschliessend
**   0.5% fuer 9 Wochen, 3 Tiere, 360 mg/kg/d.
**
**   Reduktion der Futteraufnahme und des Wachstums in der
**   hoechsten Dosierung (Gruppe 5). Mortalitaet: 1/6 bzw. 2/4
**   inden Gruppen 1 bzw. 4, sonst keine Mortalitaet.
**   Die Ergebnisse liegen lediglich als kurze stichwortartige
**   Zusammenfassung bzw. in der Originalliteratur (Solmann
**   (1921)) in tabellarischer Form vor. Die Studie entspricht
**   nicht heutigen Kriterien.
F008 HEDSET

F009 11-09-1995
F020 1356175
EOR
F002 7822
F010 5.4
F004 3
F005 RE
F006 Malorny, G.: Z. Ernaehrungswiss. 9, 332-339 (1969)
F007 Malorny, G.: Z. Ernaehrungswiss. 9, 332-339 (1969)
F008 HEDSET
F009 06-09-1995
F020 1356176
EOR
F002 7822
F010 5.4
F004 3
F005 RM
F006 Die Ergebnisse werden lediglich stichwortartig
** zusammengefasst bzw. im Falle der Koerpergewichtsentwicklung
** kurz tabellarisch dargestellt.
F007 Die Ergebnisse werden lediglich stichwortartig
** zusammengefasst bzw. im Falle der Koerpergewichtsentwicklung
** kurz tabellarisch dargestellt.
F008 HEDSET
F009 06-09-1995
F020 1356177
EOR
F002 7822
F010 5.4
F004 3
F005 RS
F006 Es wurden 6 Tiere pro Gruppe eingesetzt.
** Es wurden in beiden Dosisgruppen keine klinischen oder
** pathologischen Veraenderungen (Wachstum, Organfunktionen)
** festgestellt, insbesondere traten keine
** Augenhintergrundstoerungen auf. Die Studie umf
F007 Es wurden 6 Tiere pro Gruppe eingesetzt.
** Es wurden in beiden Dosisgruppen keine klinischen oder
** pathologischen Veraenderungen (Wachstum, Organfunktionen)
** festgestellt, insbesondere traten keine
** Augenhintergrundstoerungen auf. Die Studie umfasst mehrere
** Generationen (bis zu 5). Zu Beginn waren 8 maennliche und
** 24weibliche Tiere eingesetzt.
F008 HEDSET
F009 06-09-1995
F020 1356178
EOR
F002 7822
F010 5.4
F004 3
F005 TS
F006 Ca-formiat im Trinkwasser
F007 Ca-formiat im Trinkwasser
F008 HEDSET
F009 06-09-1995
F020 1356179
EOR

F002 7822
F010 5.4
F004 4
F005 RE
F006 Malorny, G.: Z. Ernaehrungswiss. 9, 332-339 (1969)
F007 Malorny, G.: Z. Ernaehrungswiss. 9, 332-339 (1969)
F008 HEDSET
F009 06-09-1995
F020 1356180
EOR
F002 7822
F010 5.4
F004 4
F005 RM
F006 Die Ergebnisse liegen lediglich als kurze stichwortartige
** Zusammenfassung vor.
F007 Die Ergebnisse liegen lediglich als kurze stichwortartige
** Zusammenfassung vor.
F008 HEDSET
F009 06-09-1995
F020 1356181
EOR
F002 7822
F010 5.4
F004 4
F005 RS
F006 keine toxischen Effekte festgestellt
** 6 Tiere/Gruppe;
F007 keine toxischen Effekte festgestellt
** 6 Tiere/Gruppe;
F008 HEDSET
F009 06-09-1995
F020 1356182
EOR
F002 7822
F010 5.4
F004 4
F005 TS
F006 Na-formiat im Trinkwasser
F007 Na-formiat im Trinkwasser
F008 HEDSET
F009 06-09-1995
F020 1356183
EOR
F002 7822
F010 5.4
F004 5
F005 RE
F006 Savolainen, H. and Zitting, A.: Acta Pharmacol. Toxicol.
** 47,239-240 (1980)
F007 Savolainen, H. and Zitting, A.: Acta Pharmacol. Toxicol.
** 47,239-240 (1980)
F008 HEDSET
F009 06-09-1995
F020 1356184
EOR
F002 7822

F010 5.4
F004 5
F005 RE
F006 Zitting, A. and Savolainen, H.: Res. Commun. Chem. Pathol.
** Pharmacol. 27, 157-162 (1980)
F007 Zitting, A. and Savolainen, H.: Res. Commun. Chem. Pathol.
** Pharmacol. 27, 157-162 (1980)
F008 HEDSET
F009 06-09-1995
F020 1356185
EOR
F002 7822
F010 5.4
F004 5
F005 RS
F006 Keine klinischen Symptome. Am 3.Expositionstag war die
** Glutathionkonzentration in Leber und Niere gegenueber der
** Kontrolle erniedrigt und im Gehirn erhoeht. Die zerebrale
** und saure Proteinase-Aktivitaet war am Ende des Experiments
** erhoeht.
F007 Keine klinischen Symptome. Am 3.Expositionstag war die
** Glutathionkonzentration in Leber und Niere gegenueber der
** Kontrolle erniedrigt und im Gehirn erhoeht. Die zerebrale
** und saure Proteinase-Aktivitaet war am Ende des Experiments
** erhoeht. Die hepatische Superoxid-Dismutase-Aktivitaet lag
** unter dem Kontrollevel waehrend die Aktivitaet der
** Ethoxycoumarin-Deethylase erhoeht war. Die Aktivitaeten von
** Cytochrom P450 und Ethoxycoumarin-Deethylase war in der
** Niere erniedrigt. Keine Abhaengingkeit der Veraenderungen
** von der Expositionsdauer.
F008 HEDSET
F009 06-09-1995
F020 1356186
EOR
F002 7822
F010 5.4
F004 6
F005 RE
F006 WHO Food Additives Series, Nr. 5, Genf (1974)
F007 WHO Food Additives Series, Nr. 5, Genf (1974)
F008 HEDSET
F009 06-09-1995
F020 1356187
EOR
F002 7822
F010 5.4
F004 6
F005 RS
F006 keine toxische Wirkung festgestellt; keine weiteren
** Angaben.Lediglich Sekundaerzitat.
F007 keine toxische Wirkung festgestellt; keine weiteren
** Angaben.Lediglich Sekundaerzitat.
F008 HEDSET
F009 06-09-1995
F020 1356188
EOR
F002 7822

F010 5.4
F004 7
F005 RE
F006 Leach, C.L. et al.: The Toxicologist 9 (No.1), 144 (1989),
** abstract no. 575
F007 Leach, C.L. et al.: The Toxicologist 9 (No.1), 144 (1989),
** abstract no. 575
F008 HEDSET
F009 11-09-1995
F020 1356189
EOR
F002 7822
F010 5.4
F004 7
F005 RE
F006 NTP Technical Report No. 19, Formic Acid, NIH-Publication
** 92-3342 (July 1992)
F007 NTP Technical Report No. 19, Formic Acid, NIH-Publication
** 92-3342 (July 1992)
F008 HEDSET
F009 11-09-1995
F020 1356190
EOR
F002 7822
F010 5.4
F004 7
F005 RM
F006 Ten male and ten female Fisher rats inhaled the above mentioned
* concentrations as vapor in an whole-body exposure system. Another 10
* rats/sex/dose group were included for clinical pathological studies
* performed after 3, 23 and 90 days of th
F007 Ten male and ten female Fisher rats inhaled the above mentioned
* concentrations as vapor in an whole-body exposure system. Another 10
* rats/sex/dose group were included for clinical pathological studies
* performed after 3, 23 and 90 days of the study. Clinical examinations wer
* made daily, while bodyweight was recorded on a weekly base. The surviving
* animals were sacrificed after 90 days and thymus, heart, right kidney,
* lung, liver and testis weight was determined. Necropsy was performed on
* every animal and histopathology was performed on a large number of
* organs. In addition to the standard procedure of the study similar to
* OECD Method 413 special attention was given to the respiratory tract and
* reproductive parameters, where sperm morphology and vaginal cytology was
* investigated.
F008 HEDSET
F009 11-09-1995
F020 1356191
EOR
F002 7822
F010 5.4
F004 7
F005 RS
F006 No systemic toxic effect occured after inhalation with the test
* substance. Some parameters (increase in body weight, isolated minor to
* mild changes in hematology and clinical chemistry, effects on
* absolute/relative organ weights) were diffe
F007 No systemic toxic effect occured after inhalation with the test
* substance. Some parameters (increase in body weight, isolated minor to

```
*    mild changes in hematology and clinical chemistry, effects on
*    absolute/relative organ weights) were different from control. However
*    they did not show a dose response effect or were not observed at every
*    investigation time point and were thus not regarded as a substance
*    related effect by the authors. This also holds for organ weight changes
*    in the absence of any histopathological correlate (lung and liver). There
*    were no effect of exposure to formic acid on measures of sperm motility,
*    density or testicular or epididymal weights, and no changes were seen in
*    the length of the estrous cycle.
**
**   As known from other irritant water soluble compounds the target organ
*    after inhalation is the upper respiration tract(nose). The following
*    histopathological changes were noted:
**
**   Exposure
**   concentration (ppm)      0  8  16  32        64      128
**   Males
**   Respiratory epithelium:
**   Squamous metaplasia      0  0   0   0         0        9 (1.0)
**   Olfactory epithelium
**   Degeneration         0  0   0   1 (1.0)   1 (1.0)  9 (1.2)
**   Respiratory epithelium
**   Squamous metaplasia      0  0   0   0         0        6 (1.4)
**   Olfactory epithelium
**   Degeneration         0  0   0   0         0        5 (1.0)
**   Average grade of severity is given in (): 1=minimal / 2=mild / 3=moderate
*    / 4=marked
**
**   The NOAEC in this study was determined to be 64 ppm (0.122 mg/l) based on
*    histopathological changes in the respiratory tract. Lesions observed at
*    62.5 ppm in the 14 day exposure study in this species/laboratory could
*    not be reproduced in this more robust study with longer exposure. The
*    authors suggested that the lack of systemic effects in both 2 week and 13
*    week NTP inhalation studies maybe related to the rapid metabolizing
*    capacity of formate to CO2 which is  not the case in humans who are
*    significantly more sensitive to its toxicity. Nevertheless human
*    experience does not indicate that formic acid represents a significant
*    systemic thread to humans unless given at high concentrations, where the
*    caustic effect is determining the toxic mode of action.
F008 HEDSET
F009 11-09-1995
F020 1356192
EOR
F002 7822
F010 5.4
F004 7
F005 TS
F006 95 % formic acid / 5 % water
F007 95 % formic acid / 5 % water
F008 HEDSET
F009 11-09-1995
F020 1356193
EOR
F002 7822
F010 5.4
F004 8
F005 RE
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F006 Leach, C.L. et al.: The Toxicologist 9 (No.1), 144 (1989),
** abstract no. 575
F007 Leach, C.L. et al.: The Toxicologist 9 (No.1), 144 (1989),
** abstract no. 575
F008 HEDSET
F009 11-09-1995
F020 1356194
EOR
F002 7822
F010 5.4
F004 8
F005 RE
F006 NTP Technical Report No. 19, Formic Acid, NIH-Publication
** 92-3342 (July 1992)
F007 NTP Technical Report No. 19, Formic Acid, NIH-Publication
** 92-3342 (July 1992)
F008 HEDSET
F009 11-09-1995
F020 1356195
EOR
F002 7822
F010 5.4
F004 8
F005 RM
F006 Pro Gruppe wurden 10 maennliche und 10 weibliche Tiere
** eingesetzt. Die Koerpergewichte wurden am Anfang und am Ende
** der Studie, dazwischen in woechentlichen Abstaenden
** ermittelt. Die Organgewichte (Thymus, Herz, rechte Niere,
** Lungen, Leber
F007 Pro Gruppe wurden 10 maennliche und 10 weibliche Tiere
** eingesetzt. Die Koerpergewichte wurden am Anfang und am Ende
** der Studie, dazwischen in woechentlichen Abstaenden
** ermittelt. Die Organgewichte (Thymus, Herz, rechte Niere,
** Lungen, Leber und rechter Hoden) wurden bestimmt. Die Tiere
** wurden am Ende der Studie pathologisch untersucht. Einige
** Organe wurden makroskopisch und histologisch untersucht.
F008 HEDSET
F009 11-09-1995
F020 1356196
EOR
F002 7822
F010 5.4
F004 8
F005 RS
F006 Nach Angabe der Autoren zeigten sich im Studienverlauf
** keineklinischen Toxizitaetszeichen und keine
** expositionsbedingte Mortalitaet. Laut tabellarischer
** Aufstellung ueberlebten in der hoechsten Dosisgruppe jedoch
** nur jeweils 9 von 10 maennl
F007 Nach Angabe der Autoren zeigten sich im Studienverlauf
** keineklinischen Toxizitaetszeichen und keine
** expositionsbedingte Mortalitaet. Laut tabellarischer
** Aufstellung ueberlebten in der hoechsten Dosisgruppe jedoch
** nur jeweils 9 von 10 maennliche und weibliche Tiere; die
** Autoren machen hierzu keine weiteren Angaben.
** Die Koerpergewichtszunahmen waren in der hoechsten
** Dosisgruppe bei den Tieren beiden Geschlechts, bei den

**   weiblichen Tieren auch noch in der 64 ppm Gruppe
**   signifikantvermindert. In der hoechsten Dosisgruppe waren
**   die Koerpergewichte am Studienende bei den Tieren beiden
**   Geschlechts signifikant vermindert; dies fuehrte auch zu
**   teilweise erhoehten relativen Organgewichten. Jedoch wurden
**   leichte, signifikante Erhoehungen der relativen Leber- bzw.
**   Nierengewichte bei maennlichen bzw. weiblichen Tieren der
**   32und 64 ppm Gruppe festgestellt.
**   Makroskopische Veraenderungen wurden nicht beobachtet.
**   Minimale histologische Laesionen (Degenerationen) traten
**   nurbei einigen Tieren der beiden hoechsten Dosisgruppen am
**   olfaktorischen Nasenepithel auf.
**
**   Aufgrund der Ergebnisse der 13-Wochen-Studie betraegt laut
**   NTP der NOAEL 64 ppm (0.122 mg/l); unter Beruecksichtigung
**   der 2-Wochen-Studie (a.a.O.) wurde der NOAEL durch NTP
**   jedoch auf einen Wert von 32 ppm (0.06 mg/l) festgelegt.
F008 HEDSET
F009 11-09-1995
F020 1356197
EOR
F002 7822
F010 5.4
F004 8
F005 TS
F006 Ameisensaeure, ca. 95% mit ca. 5% Wasser
F007 Ameisensaeure, ca. 95% mit ca. 5% Wasser
F008 HEDSET
F009 11-09-1995
F020 1356198
EOR
F002 7822
F010 5.4
F004 9
F005 RE
F006 Leach, C.L. et al.: The Toxicologist 9 (No.1), 144 (1989),
**   abstract no. 575
F007 Leach, C.L. et al.: The Toxicologist 9 (No.1), 144 (1989),
**   abstract no. 575
F008 HEDSET
F009 08-09-1995
F020 1356199
EOR
F002 7822
F010 5.4
F004 9
F005 RE
F006 NTP Technical Report No. 19, Formic Acid, NIH-Publication
**   92-3342 (July 1992)
F007 NTP Technical Report No. 19, Formic Acid, NIH-Publication
**   92-3342 (July 1992)
F008 HEDSET
F009 08-09-1995
F020 1356200
EOR
F002 7822
F010 5.4

F004 9
F005 RM
F006 Die Studie diente als Vorversuch zur 13 Wochen Studie.
** Pro Gruppe wurden 5 maennliche und 5 weibliche Tiere
** eingesetzt. Nach dem dritten Expositionstag wurde der Urin
** der Tiere 16 Stunden lang aufgefangen. Im Urin wurde
** bestimmt: Volumen, p
F007 Die Studie diente als Vorversuch zur 13 Wochen Studie.
** Pro Gruppe wurden 5 maennliche und 5 weibliche Tiere
** eingesetzt. Nach dem dritten Expositionstag wurde der Urin
** der Tiere 16 Stunden lang aufgefangen. Im Urin wurde
** bestimmt: Volumen, pH, Glucose, Protein sowie Aktivitaeten
** von Aspartataminotransferase (AST), Gammaglutamyl
** Transpeptidase (GGT) und alkalische Phosphatase (AP). Einen
** Tag nach dem Ende der Exposition wurden Blutproben
** entnommenund untersucht. Die Tiere und ihre Organe (Leber,
** Thymus, rechte Niere, rechter Hoden, Herz und Lunge) wurden
** makroskopisch, die Atmungsorgane auch histologisch
** untersucht.
F008 HEDSET
F009 08-09-1995
F020 1356201
EOR
F002 7822
F010 5.4
F004 9
F005 RS
F006 In der hoechsten Dosisgruppe starben drei maennliche und
** einweibliches Tier am 10. Tag der Exposition. Die
** Koerpergewichte am Ende der Studie waren bei den
** maennlichenTieren der beiden hoechsten Dosisgruppen, sowie
** bei den weiblichen Tieren
F007 In der hoechsten Dosisgruppe starben drei maennliche und
** einweibliches Tier am 10. Tag der Exposition. Die
** Koerpergewichte am Ende der Studie waren bei den
** maennlichenTieren der beiden hoechsten Dosisgruppen, sowie
** bei den weiblichen Tieren der hoechsten Dosisgruppe
** signifikant vermindert. In den beiden hohen Dosisgruppen
** wurden klinische Symptome beobachtet, die typisch sind fuer
** Stoffe,die die Atemwege reizen: Nasenausfluss, "increased
** preening", Hypoaktivitaet, erschwerte Atmung. In der
** hoechsten Dosisgruppe wurde bei den exponierten Tieren
** waehrend der Studie Hornhauttruebungen festgestellt; bei
** derSektion konnte dieser Effekt jedoch nur bei einem
** maennlichen Tier makroskopisch und mikroskopisch bestaetigt
** werden.
** Substanzbedingte Einfluesse auf den Blut-pH, die
** Blutgerinnung und die Serumelektrolytkonzentrationen waren
** unbedeutend. In den beiden hoechsten Dosierungen zeigte die
** Urinanalyse eine Volumenverminderung des 16-h-Urins bei den
** Tieren beiden Geschlechts und eine dadurch bedingte
** gleichzeitige Erhoehung der spezifischen Dichte.
** Das absolute und relative Thymusgewicht war in der
** hoechstenDosisgruppe bei Tieren beiden Geschlechts
** signifikant vermindert. Andere absolute Organgewichte
** zeigten keine signifikanten Veraenderungen. Das relative
** Nierengewicht warbei Tieren beiden Geschlechts, das relative

```
**   Herzgewicht nur bei den weiblichen Tieren signifikant
**   erhoeht in der hoechsten Dosisgruppe.
**   Histologische Veraenderungen wurden in den oberen Atemwegen
**   bei Tieren beiden Geschlechts ab einer
**   Substanzkonzentrationvon 0.12 mg/l (62.5 ppm) festgestellt
**   und waren dosisabhaengig. Bis zu einer Konzentration von
**   0.48 mg/l (250 ppm) wurden Plattenepithelmetaplasien,
**   Entzuendungen und Nekrosen des respiratorischen Epithels,
**   sowie Nekrosen des olfaktorischen Epithels festgestellt. In
**   der hoechsten Konzentration zeigten sich die staerksten
**   Laesionen auch mitPlattenepithelmetaplasien und
**   Entzuendungen im Kehlkopf. In der niedrigsten Dosierung
**   traten keine substanzbedingten histologischen Veraenderungen
**   auf.
**
**   Zusammenfassend fuehrte die Inhalation der Testsubstanz nur
**   zu geringen systemisch toxischen Effekten; die beobachteten
**   histologischen Veraenderungen waren typisch fuer die
**   Inhalationsexposition von reizenden Stoffen.
F008 HEDSET
F009 08-09-1995
F020 1356202
EOR
F002 7822
F010 5.4
F004 9
F005 TS
F006 Ameisensaeure, ca. 95% mit ca. 5% Wasser
F007 Ameisensaeure, ca. 95% mit ca. 5% Wasser
F008 HEDSET
F009 08-09-1995
F020 1356203
EOR
F002 7822
F010 5.4
F004 10
F005 RE
F006 FDA, PB 266282, Evaluation of the Health Aspects of Formic
**   Acid and (...) as Food Ingredients, Washington DC, (1976)
F007 FDA, PB 266282, Evaluation of the Health Aspects of Formic
**   Acid and (...) as Food Ingredients, Washington DC, (1976)
F008 HEDSET
F009 06-09-1995
F020 1356204
EOR
F002 7822
F010 5.4
F004 10
F005 RM
F006 zitiert nach: Sporn, A. et al.: Igiena (Bucharest) 11,
**   507-515 (1962)
F007 zitiert nach: Sporn, A. et al.: Igiena (Bucharest) 11,
**   507-515 (1962)
F008 HEDSET
F009 06-09-1995
F020 1356205
EOR
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F002 7822
F010 5.4
F004 10
F005 RS
F006 Es wurden 8 Tiere pro Gruppe eingesetzt. Verminderung der
** Koerpergewichtszunahme, Reduktion der Organgewichte (Leber,
** Niere und Nebenniere in beiden Dosisgruppen, Milz nur in
** derniedrigen Dosisgruppe), keine Dosisabhaengigkeit.
**
** Die Ergebn
F007 Es wurden 8 Tiere pro Gruppe eingesetzt. Verminderung der
** Koerpergewichtszunahme, Reduktion der Organgewichte (Leber,
** Niere und Nebenniere in beiden Dosisgruppen, Milz nur in
** derniedrigen Dosisgruppe), keine Dosisabhaengigkeit.
**
** Die Ergebnisse liegen lediglich als kurze stichwortartige
** Zusammenfassung (Sekundaerzitat) vor.
F008 HEDSET
F009 06-09-1995
F020 1356206
EOR
F002 7822
F010 5.4
F004 11
F005 RE
F006 Leach, C.L. et al.: The Toxicologist 9 (No.1), 144 (1989),
** abstract no. 575
F007 Leach, C.L. et al.: The Toxicologist 9 (No.1), 144 (1989),
** abstract no. 575
F008 HEDSET
F009 08-09-1995
F020 1356207
EOR
F002 7822
F010 5.4
F004 11
F005 RE
F006 NTP Technical Report No. 19, Formic Acid, NIH-Publication
** 92-3342 (July 1992)
F007 NTP Technical Report No. 19, Formic Acid, NIH-Publication
** 92-3342 (July 1992)
F008 HEDSET
F009 08-09-1995
F020 1356208
EOR
F002 7822
F010 5.4
F004 11
F005 RM
F006 Die Studie diente als Vorversuch zur 13 Wochen Studie.
** Pro Gruppe wurden 5 maennliche und 5 weibliche Tiere
** eingesetzt. Die Tiere und ihre Organe (Leber, Thymus, rechte
** Niere, rechter Hoden, Herz und Lunge) wurden makroskopisch,
** die Atmungs
F007 Die Studie diente als Vorversuch zur 13 Wochen Studie.
** Pro Gruppe wurden 5 maennliche und 5 weibliche Tiere
** eingesetzt. Die Tiere und ihre Organe (Leber, Thymus, rechte

** Niere, rechter Hoden, Herz und Lunge) wurden makroskopisch,
** die Atmungsorgane auch histologisch untersucht.
F008 HEDSET
F009 08-09-1995
F020 1356209
EOR
F002 7822
F010 5.4
F004 11
F005 RS
F006 Alle Tiere der hoechsten Dosisgruppe starben waehrend der
** ersten Woche der Studie; ein weibliches Tier der 250 ppm
** Gruppe (0.48 mg/l) musste am 4. Tag aufgrund des moribunden
** Zustandes getoetet werden. Am Studienende waren die
** Koerpergewich
F007 Alle Tiere der hoechsten Dosisgruppe starben waehrend der
** ersten Woche der Studie; ein weibliches Tier der 250 ppm
** Gruppe (0.48 mg/l) musste am 4. Tag aufgrund des moribunden
** Zustandes getoetet werden. Am Studienende waren die
** Koerpergewichte der Tiere beiden Geschlechts in der 250 ppm
** Gruppe signifikant vermindert. Expositionsbedingte
** klinischeToxizitaetszeichen wurden nur in den beiden
** hoechsten Dosisgruppen beobachtet und waren wie bei der
** Studie mit Ratten typisch fuer die Inhalationsexposition
** gegenueber reizenden Substanzen. In der hoechsten
** Dosisgruppe wurden bei maennlichen und weiblichen Tieren
** Hornhauttruebungen beobachtet.
** Die eingetretenen Todesfaelle wurden auf Schwellungen der
** Nasenschleimhaut bis zur Nasenokklusion und dadurch
** bedingtestarke Beeintraechtigungen der Atmung
** zurueckgefuehrt. Bei allen anderen Tieren wurden bei der
** Sektion am Ende der Studie keine makroskopischen
** Veraenderungen beobachtet. Die relativen Nierengewichte der
** maennlichen Tiere der 62.5, 125und 250 ppm Gruppen, sowie
** der weiblichen Tiere der 250 ppm Gruppe waren leicht
** erhoeht. In der 250 ppm Gruppe waren dieabsoluten und
** relativen Thymusgewichte bei den Tieren beidenGeschlechts
** vermindert, die relativen Lungengewichte leicht erhoeht.
** Die histologischen Veraenderungen zeigten keine
** wesentlichengeschlechtsspezifischen Unterschiede und wurden
** ausser in der hoechsten Dosisgruppe nur in den Nasenwegen
** festgestellt. Die beobachteten histologischen
** Veraenderungen(Plattenepithelmetaplasie, Entzuendung,
** Nekrosen) waren in ihrem Schweregrad dosisabhaengig und
** betrafen in der hoechsten Dosisgruppe auch Kehlkopf, Rachen
** und Luftroehre. Keine expositionsbedingten Veraenderungen
** wurden bei den maennlichen Tieren in den beiden niedrigen
** Dosierungen festgestellt; zwei weibliche Tiere der 62.5 ppm
** Gruppe zeigten geringgradige Plattenepithelmetaplasien des
** respiratorischen Epithels. In der niedrigsten Dosierung
** wurden keine histologischen Veraenderungen beobachtet.
**
** Zusammenfassend zeigte die inhalative Exposition gegenueber
** der Testsubstanz nur geringe systemische Toxizitaet; die
** beobachteten histologischen Veraenderungen waren typisch
** fuer die Inhalation von reizenden Substanzen. Hierbei
** zeigtesich beim Speziesvergleich die Maus empfindlicher als

**   die Ratte.
F008 HEDSET
F009 08-09-1995
F020 1356210
EOR
F002 7822
F010 5.4
F004 11
F005 TS
F006 Ameisensaeure, ca. 95% mit ca. 5% Wasser
F007 Ameisensaeure, ca. 95% mit ca. 5% Wasser
F008 HEDSET
F009 08-09-1995
F020 1356211
EOR
F002 7822
F010 5.4
F004 12
F005 RE
F006 Frei, J.V. und Stephens, P.: Br. J. Cancer 22, 83-92 (1968)
F007 Frei, J.V. und Stephens, P.: Br. J. Cancer 22, 83-92 (1968)
F008 HEDSET
F009 11-09-1995
F020 1356212
EOR
F002 7822
F010 5.4
F004 12
F005 RM
F006 Die Methode ist nicht akzeptabel und entspricht nicht
**   heutigen Kriterien. Zudem ist die Dokumentation
**   unzureichend. Die Studie ist daher nicht bewertbar.
F007 Die Methode ist nicht akzeptabel und entspricht nicht
**   heutigen Kriterien. Zudem ist die Dokumentation
**   unzureichend. Die Studie ist daher nicht bewertbar.
F008 HEDSET
F009 11-09-1995
F020 1356213
EOR
F002 7822
F010 5.4
F004 12
F005 RS
F006 Pinselung am Ohr mit 8% Ameisensaeure in Mineraloel. Im
**   Vergleich zu Tumorpromotoren (Crotonoel, Tween 60) keine
**   histologischen und histomorphometrischen Veraenderungen.
F007 Pinselung am Ohr mit 8% Ameisensaeure in Mineraloel. Im
**   Vergleich zu Tumorpromotoren (Crotonoel, Tween 60) keine
**   histologischen und histomorphometrischen Veraenderungen.
F008 HEDSET
F009 11-09-1995
F020 1356214
EOR
F002 7822
F010 5.5
F004 1
F005 RE

F006 Sloop F.V. and Baker, F.T.: Abstr. Ann. Meet. Am. Soc.
** Microbiol. 82, Abstr. H 69, (1982)
F007 Sloop F.V. and Baker, F.T.: Abstr. Ann. Meet. Am. Soc.
** Microbiol. 82, Abstr. H 69, (1982)
F008 HEDSET
F009 06-09-1995
F020 1356215
EOR
F002 7822
F010 5.5
F004 1
F005 RM
F006 Methode: "spot-test" und "plate incorporation assay".
** Es wurde Bakteriotoxizitaet festgestellt; die Autoren
** machenkeine Aussage zur mutagenen Wirkung.
F007 Methode: "spot-test" und "plate incorporation assay".
** Es wurde Bakteriotoxizitaet festgestellt; die Autoren
** machenkeine Aussage zur mutagenen Wirkung.
F008 HEDSET
F009 06-09-1995
F020 1356216
EOR
F002 7822
F010 5.5
F004 2
F005 ME
F006 Formic acid has been tested as outlined in the protocol by Zeiger E. et
* al. Environ. Molec. Mutagen. 19 (Suppl.21) 2-141 (1992) and is in line
* with the respective OECD guideline. Up to 7 dose levels ranging from 10
* to 3,333 µg/plate of form
F007 Formic acid has been tested as outlined in the protocol by Zeiger E. et
* al. Environ. Molec. Mutagen. 19 (Suppl.21) 2-141 (1992) and is in line
* with the respective OECD guideline. Up to 7 dose levels ranging from 10
* to 3,333 µg/plate of formic acid were tested in the Ames test in the
* presence or absence of metabolic activation (S9 mix). S-9 mix was
* prepared from liver homogenate of either Aroclor 1254 induced
* Sprague-Dawley rats or Syrian hamsters. The S-9 mix concentration was 10
* or 20% for both species. The test compound was either given into S9 or
* buffer solution before incorporation to the bacteria. Solvent and
* positive controls - 4-nitro-o-phenylenediamine (TA 98), sodium azide (TA
* 100 adn 1535) and 9-aminoacridine (TA 97)- were also tested. All
* compounds/dose levels were tested by triplicate cultures.
F020 1480141
EOR
F002 7822
F010 5.5
F004 2
F005 RE
F006 NTP Technical Report No. 19, Formic Acid, NIH-Publication
** 92-3342 (July 1992)
F007 NTP Technical Report No. 19, Formic Acid, NIH-Publication
** 92-3342 (July 1992)
F008 HEDSET
F009 06-09-1995
F020 1356217
EOR
F002 7822

F010 5.5
F004 2
F005 RE
F006 NTP, Chemical Status Report, (10.1.1990)
F007 NTP, Chemical Status Report, (10.1.1990)
F008 HEDSET
F009 06-09-1995
F020 1356218
EOR
F002 7822
F010 5.5
F004 2
F005 RS
F006 Negative results were obtained for all test conditions described in the
* method part. In 2 cases (TA97 without metabolic activation and TA 97 with
* 30% S9 mix from hamsters) the unclear test result of the first trial was
* reinvestigated at sim
F007 Negative results were obtained for all test conditions described in the
* method part. In 2 cases (TA97 without metabolic activation and TA 97 with
* 30% S9 mix from hamsters) the unclear test result of the first trial was
* reinvestigated at similar test conditions and found to be negative. The
* highest dose was limited due to the bacteriotoxicity observed. The
* positive control indicated that the system is able to detect known
* mutagens.
F020 1480140
EOR
F002 7822
F010 5.5
F004 2
F005 TS
F006 Formic acid approx. 95 % with approx. 5 % water
F007 Formic acid approx. 95 % with approx. 5 % water
F020 1480142
EOR
F002 7822
F010 5.5
F004 3
F005 RE
F006 von der Hude, W. et al.: Mut. Res. 203, 81-94 (1988)
F007 von der Hude, W. et al.: Mut. Res. 203, 81-94 (1988)
F008 HEDSET
F009 06-09-1995
F020 1356220
EOR
F002 7822
F010 5.5
F004 3
F005 RM
F006 In diesem Testsystem wird die SOS-Genexpression, die durch
** DNA-Schaedigung ausgeloest wird, gemessen
F007 In diesem Testsystem wird die SOS-Genexpression, die durch
** DNA-Schaedigung ausgeloest wird, gemessen
F008 HEDSET
F009 06-09-1995
F020 1356221
EOR
F002 7822

F010 5.5
F004 4
F005 RE
F006 Demerec, M. et al.: Am. Nat. 85, 119-136 (1951)
F007 Demerec, M. et al.: Am. Nat. 85, 119-136 (1951)
F008 HEDSET
F009 06-09-1995
F020 1356222
EOR
F002 7822
F010 5.5
F004 4
F005 RM
F006 Schwach positives Ergebnis (ohne S9-Mix).
** Bei nahezu gleicher Substanzkonzentration wurde die Zahl
** derBakterien variiert. Dabei zeigte sich mit abnehmender
** Bakterienzahl eine reduzierte Ueberlebensrate (von 100% bei
** 1.5 x 10E9 Bakterien bis
F007 Schwach positives Ergebnis (ohne S9-Mix).
** Bei nahezu gleicher Substanzkonzentration wurde die Zahl
** derBakterien variiert. Dabei zeigte sich mit abnehmender
** Bakterienzahl eine reduzierte Ueberlebensrate (von 100% bei
** 1.5 x 10E9 Bakterien bis zu 2.8% bei 2,6 x 10E7). Parallel
** dazu reduzierte sich mit hoeherer Ueberlebensrate der
** Bakterien die Anzahl der Mutationen.
F008 HEDSET
F009 06-09-1995
F020 1356223
EOR
F002 7822
F010 5.5
F004 5
F005 RE
F006 Morita, T. et al.: Mut. Res. 240, 195-202 (1990)
F007 Morita, T. et al.: Mut. Res. 240, 195-202 (1990)
F008 HEDSET
F009 06-09-1995
F020 1356224
EOR
F002 7822
F010 5.5
F004 5
F005 RM
F006 Chinese Hamster ovary K1 cells were examined for chromosomal aberration
* in vitro in the presence or absence of metabolic activation (S9 mix from
* rat liver). In order to study the effect of neutralisation of the
* treatment medium the followin
F007 Chinese Hamster ovary K1 cells were examined for chromosomal aberration
* in vitro in the presence or absence of metabolic activation (S9 mix from
* rat liver). In order to study the effect of neutralisation of the
* treatment medium the following sub-experiments were performed:
** Initially formic acid was prepared in distilled water (2M) and then
* appropriately dilluted at the day of use with distilled water. An aliquot
* of 50-75 µl of diluted acid was added to 5 ml of the culture medium.
* Exposure time was 24 hours without and 6 hours with metabolic activation.
* In order to study the effect of pH (neutralisation) the following
* sub-experiments were performed:

** - adjustment of the culture medium to pH 5.8 or 6.0
** - adjustment of the culture medium to pH 5.8 or 6.0 and immediate
* neutralisation with 1M NaOH to pH 6.4 and 7.2
** - using the buffering capacity of 34 mM NaHCO3 in F12 medium (only tested
* without S9-mix)
** - using the buffering capacity of 30 mM HEPES buffer instead of NaHCO3 in
* the F12 medium (only tested without S9-mix).
F008 HEDSET
F009 06-09-1995
F020 1356225
EOR
F002 7822
F010 5.5
F004 5
F005 RS
F006 Table 1: Chromosome aberration in CHO-K1 cells without
* neutralisation/special buffering methods
**
** Dose (mM) pH after treatment Cells scored Aberrant cells
** Without S9 mix
** Initial 6h 24h
** 8 6.4 6.7 7.3 200
F007 Table 1: Chromosome aberration in CHO-K1 cells without
* neutralisation/special buffering methods
**
** Dose (mM) pH after treatment Cells scored Aberrant cells
** Without S9 mix
** Initial 6h 24h
** 8 6.4 6.7 7.3 200 2.0 %
** 10 6.3 6.5 7.1 200 4.0 %
** 12 6.1 6.2 6.6 113 15.9 %
** 14 5.8 6.0 6.4 Toxic Toxic
** With S9 mix
** Initial 6h
** 6 6.4 6.9 200 1.0 %
** 8 6.3 6.7 200 2.0 %
** 10 6.1 6.3 200 20.0 %
** 12 5.9 5.8 Toxic Toxic
**
**
** Table 2: Chromosome aberration in CHO-K1 in F12 medium with 34mM NaHCO3
* as buffer
**
** Dose (mM) pH after treatment Cells scored Aberrant cells
** Without S9 mix
** Initial 6h 24h
** 20 6.1 7.1 7.3 200 0.5 %
** 25 5.8 6.8 7.1 400 0.5 %
** 27.5 5.7 6.5 6.7 200 10.5 %
** 30 5.4 6.4 6.7 Toxic Toxic
**
**
** Table 3: Chromosome aberration in CHO-K1 in F12 medium with 30mM HEPES as
* buffer
**
** Dose (mM) pH after treatment Cells scored Aberrant cells
** Without S9 mix

```
**        Initial   6h   24h
**   10          7.6      7.3  6.9      200            0.5 %
**   20          7.1      7.1  6.8      200            0.0 %
**   25          6.7      6.6  6.4      200           12.0 %
**   30          5.9      5.9  5.9     Toxic          Toxic
**
**
**   The authors made the following conclusion:
**   A positive clastogenic effect is noted when there is no pH adjustment,
*    and formic acid acidifies the culture medium. This is a pH effect but not
*    an effect of formic acid as a molecule. This is supported by the
*    following results:
**   - neutralisiation of the medium caused a loss of clastogenic activity in
*    the presence and absence of a metabolic system. This decrease was
*    observed between pH 5.8/6.0 and 6.4
**   - using F12 medium containing 34mM NaHCO3 as buffer no chromosomal
*    aberration was noted up to a concentration of 25mM (pH 5.8 initial to 7.1
*    after 24 hours)
**   - using F 12 medium containing 30mM HEPES as buffer again doses of 20mM
*    were not clastogenic.
**
**   Thus it is concluded that formic acid is negative for chromosomal
*    aberration in Chinese hamster ovary cells at physiological pH values.
F020 1480144
EOR
F002 7822
F010 5.5
F004 6
F005 RE
F006 NTP, Review of Current DHHS, DOE and EPA Research Related
**   to Toxicology und Fiscal Year Annual Plan, (1987)
F007 NTP, Review of Current DHHS, DOE and EPA Research Related
**   to Toxicology und Fiscal Year Annual Plan, (1987)
F008 HEDSET
F009 06-09-1995
F020 1356226
EOR
F002 7822
F010 5.5
F004 6
F005 RM
F006 Im Rahmen des NTP soll ein Mutagenitaetstest an L5178Y
**   Mauslymphom-Zellen durchgefuehrt werden. Ergebnisse liegen
**   bisher nicht vor.
F007 Im Rahmen des NTP soll ein Mutagenitaetstest an L5178Y
**   Mauslymphom-Zellen durchgefuehrt werden. Ergebnisse liegen
**   bisher nicht vor.
F008 HEDSET
F009 06-09-1995
F020 1356227
EOR
F002 7822
F010 5.5
F004 7
F005 RE
F006 Kleindienst, T.E. et al.: Environ. Sci. Technol. 19, 620-627
**   (1985)
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F007 Kleindienst, T.E. et al.: Environ. Sci. Technol. 19, 620-627
** (1985)
F008 HEDSET
F009 06-09-1995
F020 1356228
EOR
F002 7822
F010 5.5
F004 9
F005 RE
F006 Basler A. et al.: Arch. Toxicol. 58, 10-13 (1985)
F007 Basler A. et al.: Arch. Toxicol. 58, 10-13 (1985)
F008 AIDA
F009 15-12-1992
F020 1356229
EOR
F002 7822
F010 5.5
F004 9
F005 RM
F006 Keine erhoehte SCE-Frequenz mit und ohne S9-Mix
F007 Keine erhoehte SCE-Frequenz mit und ohne S9-Mix
F008 AIDA
F009 15-12-1992
F020 1356230
EOR
F002 7822
F010 5.5
F004 11
F005 RE
F006 Sipi, P. et al.: Mutation Research 279, 75-82 (1992)
F007 Sipi, P. et al.: Mutation Research 279, 75-82 (1992)
F008 HEDSET
F009 11-09-1995
F020 1356231
EOR
F002 7822
F010 5.5
F004 11
F005 RM
F006 statistisch signifikant erhoehte SCE-Frequenz nur in der
** hoechsten Konzentration (10 mM), sonst nicht; hierbei ist
** allerdings auch der um fast eine Einheit verminderte
** pH-Wertdurch den Zusatz von Ameisensaeure zu
** beruecksichtigen.
F007 statistisch signifikant erhoehte SCE-Frequenz nur in der
** hoechsten Konzentration (10 mM), sonst nicht; hierbei ist
** allerdings auch der um fast eine Einheit verminderte
** pH-Wertdurch den Zusatz von Ameisensaeure zu
** beruecksichtigen.
F008 HEDSET
F009 11-09-1995
F020 1356232
EOR
F002 7822
F010 5.5
F004 11

F005 TS
F006 Ameisensaeure, 98-100%
F007 Ameisensaeure, 98-100%
F008 HEDSET
F009 11-09-1995
F020 1356233
EOR
F002 7822
F010 5.5
F004 12
F005 RE
F006 Bayer AG, unveroeffentlichte Untersuchung, report no.
** 17969,25.04.89
F007 Bayer AG, unveroeffentlichte Untersuchung, report no.
** 17969,25.04.89
F008 HEDSET
F009 23-10-1995
F020 1356234
EOR
F002 7822
F010 5.5
F004 12
F005 TS
F006 Calciumformiat
F007 Calciumformiat
F008 HEDSET
F009 23-10-1995
F020 1356235
EOR
F002 7822
F010 5.5
F004 13
F005 RM
F006 Due to limitations in laboratory capacities, the report of a schedulded
* Chinese Hamster Ovary (CHO) test assaying the HPRT locus for point
* mutation will be available in July 2002.
F007 Due to limitations in laboratory capacities, the report of a schedulded
* Chinese Hamster Ovary (CHO) test assaying the HPRT locus for point
* mutation will be available in July 2002.
F020 1480132
EOR
F002 7822
F010 5.5
F004 14
F005 RE
F006 BASF AG, Dept. of Product Safety, Unpublished Study (02/102) 27 June 2002
F007 BASF AG, Dept. of Product Safety, Unpublished Study (02/102) 27 June 2002
F020 1493673
EOR
F002 7822
F010 5.5
F004 14
F005 RM
F006 Positive control (EMS and MCA) worked as expected. Negative results were
* found in both replicates with and without S-9. Mutant frequencies of the
* negative controls were within the expected range for CHO cell line.
F007 Positive control (EMS and MCA) worked as expected. Negative results were

*   found in both replicates with and without S-9. Mutant frequencies of the
*   negative controls were within the expected range for CHO cell line.
F020 1493675
EOR
F002 7822
F010 5.5
F004 14
F005 TS
F006 Formic acid 85.2 g per 100 g; water 14.3 per 100 g
F007 Formic acid 85.2 g per 100 g; water 14.3 per 100 g
F020 1493674
EOR
F002 7822
F010 5.6
F004 1
F005 RE
F006 Stumm-Tegethoff, B.F.A.: Naturwissenschaften 24, 646-647
**   (1964)
F007 Stumm-Tegethoff, B.F.A.: Naturwissenschaften 24, 646-647
**   (1964)
F008 HEDSET
F009 06-09-1995
F020 1356236
EOR
F002 7822
F010 5.6
F004 1
F005 RE
F006 Stumm-Tegethoff, B.F.A.: Theor. Appl. Genetics 39, 330-334
**   (1969)
F007 Stumm-Tegethoff, B.F.A.: Theor. Appl. Genetics 39, 330-334
**   (1969)
F008 HEDSET
F009 06-09-1995
F020 1356237
EOR
F002 7822
F010 5.6
F004 1
F005 RM
F006 Positiv bei inhalativer Exposition und Zufuhr im Futter mit
**   Mutationsraten von 1.31 und 1.11% im Vergleich zur
**   Kontrollemit jeweils 0.15%. Wurde der pH-Wert im
**   Fuetterungsversuch auf 7.5 gepuffert, so zeigte sich keine
**   erhoehte Mutationsrat
F007 Positiv bei inhalativer Exposition und Zufuhr im Futter mit
**   Mutationsraten von 1.31 und 1.11% im Vergleich zur
**   Kontrollemit jeweils 0.15%. Wurde der pH-Wert im
**   Fuetterungsversuch auf 7.5 gepuffert, so zeigte sich keine
**   erhoehte Mutationsrate.
F008 HEDSET
F009 06-09-1995
F020 1356238
EOR
F002 7822
F010 5.7
F004 1

F005 RE
F006 Frei, J.V. und Stephens, P.: Br. J. Cancer 22, 83-92 (1968)
F007 Frei, J.V. und Stephens, P.: Br. J. Cancer 22, 83-92 (1968)
F008 HEDSET
F009 06-09-1995
F020 1356239
EOR
F002 7822
F010 5.7
F004 1
F005 RM
F006 Die Methode ist nicht akzeptabel und entspricht nicht
** heutigen Kriterien. Zudem ist die Dokumentation
** unzureichend. Die Studie ist daher nicht bewertbar.
F007 Die Methode ist nicht akzeptabel und entspricht nicht
** heutigen Kriterien. Zudem ist die Dokumentation
** unzureichend. Die Studie ist daher nicht bewertbar.
F008 HEDSET
F009 06-09-1995
F020 1356240
EOR
F002 7822
F010 5.7
F004 1
F005 RS
F006 Pinselung am Ohr mit 8% Ameisensaeure in Mineraloel. Im
** Vergleich zu Tumorpromotoren (Crotonoel, Tween 60) keine
** histologischen und histomorphometrischen Veraenderungen.
F007 Pinselung am Ohr mit 8% Ameisensaeure in Mineraloel. Im
** Vergleich zu Tumorpromotoren (Crotonoel, Tween 60) keine
** histologischen und histomorphometrischen Veraenderungen.
F008 HEDSET
F009 06-09-1995
F020 1356241
EOR
F002 7822
F010 5.7
F004 2
F005 RE
F006 Malorny, G.: Z. Ernaehrungswiss. 9, 332-339 (1969)
F007 Malorny, G.: Z. Ernaehrungswiss. 9, 332-339 (1969)
F008 HEDSET
F009 06-09-1995
F020 1356242
EOR
F002 7822
F010 5.7
F004 2
F005 RS
F006 Es wurden keine Neoplasien beobachtet. Allerdings
** entsprichtdie Versuchsdurchfuerung nicht heutigen
** Anforderungen (6 Tiere pro Gruppe). Siehe auch im Kapitel:
** Toxizitaet bei wiederholter Verabreichung.
F007 Es wurden keine Neoplasien beobachtet. Allerdings
** entsprichtdie Versuchsdurchfuerung nicht heutigen
** Anforderungen (6 Tiere pro Gruppe). Siehe auch im Kapitel:
** Toxizitaet bei wiederholter Verabreichung.

F008 HEDSET
F009 06-09-1995
F020 1356243
EOR
F002 7822
F010 5.7
F004 2
F005 TS
F006 Calciumformiat
F007 Calciumformiat
F008 HEDSET
F009 06-09-1995
F020 1356244
EOR
F002 7822
F010 5.7
F004 3
F005 RE
F006 Malorny, G.: Z. Ernaehrungswiss. 9, 332-339 (1969)
F007 Malorny, G.: Z. Ernaehrungswiss. 9, 332-339 (1969)
F008 HEDSET
F009 11-09-1995
F020 1356245
EOR
F002 7822
F010 5.7
F004 3
F005 RS
F006 Es wurden keine Neoplasien beobachtet. Allerdings
** entsprichtdie Versuchsdurchfuerung nicht heutigen
** Anforderungen (6 Tiere pro Gruppe). Siehe auch im Kapitel:
** Toxizitaet bei wiederholter Verabreichung.
F007 Es wurden keine Neoplasien beobachtet. Allerdings
** entsprichtdie Versuchsdurchfuerung nicht heutigen
** Anforderungen (6 Tiere pro Gruppe). Siehe auch im Kapitel:
** Toxizitaet bei wiederholter Verabreichung.
F008 HEDSET
F009 11-09-1995
F020 1356246
EOR
F002 7822
F010 5.7
F004 3
F005 TS
F006 Natriumformiat
F007 Natriumformiat
F008 HEDSET
F009 11-09-1995
F020 1356247
EOR
F002 7822
F010 5.8.1
F004 1
F005 RE
F006 Malorny, G.: Z. Ernaehrungswiss. 9, 332-339 (1969)
F007 Malorny, G.: Z. Ernaehrungswiss. 9, 332-339 (1969)
F008 HEDSET

F009 06-09-1995
F020 1356248
EOR
F002 7822
F010 5.8.1
F004 1
F005 RM
F006 Die Versuchsdurchf hrung entspricht nicht heutigen
** Kriterien. Zudem ist die Dokumentation unzureichend. Die
** Studie ist daher nicht bewertbar.
F007 Die Versuchsdurchf hrung entspricht nicht heutigen
** Kriterien. Zudem ist die Dokumentation unzureichend. Die
** Studie ist daher nicht bewertbar.
F008 HEDSET
F009 06-09-1995
F020 1356249
EOR
F002 7822
F010 5.8.1
F004 1
F005 RS
F006 Kein Einfluss auf Fertilitaet und Nachkommenschaft ueber
** mehrere Generationen. Kein Hinweis auf teratogene Wirkung.
** Gemessen wurde die Fertilitaet der Muttertiere, das
** Geburtsgewicht und der Gewichtsverlauf der Nachkommen.
F007 Kein Einfluss auf Fertilitaet und Nachkommenschaft ueber
** mehrere Generationen. Kein Hinweis auf teratogene Wirkung.
** Gemessen wurde die Fertilitaet der Muttertiere, das
** Geburtsgewicht und der Gewichtsverlauf der Nachkommen.
F008 HEDSET
F009 06-09-1995
F020 1356250
EOR
F002 7822
F010 5.8.1
F004 1
F005 TS
F006 Calciumformiat
F007 Calciumformiat
F008 HEDSET
F009 06-09-1995
F020 1356251
EOR
F002 7822
F010 5.8.1
F004 2
F005 RE
F006 Leach, C.L. et al.: The Toxicologist 9 (No.1), 144 (1989),
** abstract no. 575
F007 Leach, C.L. et al.: The Toxicologist 9 (No.1), 144 (1989),
** abstract no. 575
F008 HEDSET
F009 08-09-1995
F020 1356252
EOR
F002 7822
F010 5.8.1

F004 2
F005 RE
F006 NTP Technical Report No. 19, Formic Acid, NIH-Publication
** 92-3342 (July 1992)
F007 NTP Technical Report No. 19, Formic Acid, NIH-Publication
** 92-3342 (July 1992)
F008 HEDSET
F009 08-09-1995
F020 1356253
EOR
F002 7822
F010 5.8.1
F004 2
F005 RM
F006 Pro Gruppe wurden 10 maennliche und 10 weibliche Tiere
** eingesetzt. Die Untersuchung wurde zusammen mit einer
** subchronischen Studie durchgefuehrt (siehe Kapitel 5.4).
** Untersucht wurden das Gewicht der linken Nebenhoden,
** Spermienmotilitaet un
F007 Pro Gruppe wurden 10 maennliche und 10 weibliche Tiere
** eingesetzt. Die Untersuchung wurde zusammen mit einer
** subchronischen Studie durchgefuehrt (siehe Kapitel 5.4).
** Untersucht wurden das Gewicht der linken Nebenhoden,
** Spermienmotilitaet und -konzentration bzw. Vaginalzytologie
** und Oestruszyklus.
F008 HEDSET
F009 08-09-1995
F020 1356254
EOR
F002 7822
F010 5.8.1
F004 2
F005 RS
F006 Es zeigten sich keine expositionsbedingten Auswirkungen der
** Ameisensaeure auf die Spermienmotilitaet, die
** Spermienkonzentration, das Hoden- und Nebenhodengewicht
** bzw.auf die Laenge der Oestruszyklen.
F007 Es zeigten sich keine expositionsbedingten Auswirkungen der
** Ameisensaeure auf die Spermienmotilitaet, die
** Spermienkonzentration, das Hoden- und Nebenhodengewicht
** bzw.auf die Laenge der Oestruszyklen.
F008 HEDSET
F009 08-09-1995
F020 1356255
EOR
F002 7822
F010 5.8.1
F004 2
F005 TS
F006 Ameisensaeure, ca. 95% mit ca. 5% Wasser
F007 Ameisensaeure, ca. 95% mit ca. 5% Wasser
F008 HEDSET
F009 08-09-1995
F020 1356256
EOR
F002 7822
F010 5.8.1

F004 3
F005 RE
F006 Leach, C.L. et al.: The Toxicologist 9 (No.1), 144 (1989),
** abstract no. 575
F007 Leach, C.L. et al.: The Toxicologist 9 (No.1), 144 (1989),
** abstract no. 575
F008 HEDSET
F009 08-09-1995
F020 1356257
EOR
F002 7822
F010 5.8.1
F004 3
F005 RE
F006 NTP Technical Report No. 19, Formic Acid, NIH-Publication
** 92-3342 (July 1992)
F007 NTP Technical Report No. 19, Formic Acid, NIH-Publication
** 92-3342 (July 1992)
F008 HEDSET
F009 08-09-1995
F020 1356258
EOR
F002 7822
F010 5.8.1
F004 3
F005 RM
F006 Pro Gruppe wurden 10 maennliche und 10 weibliche Tiere
** eingesetzt. Die Untersuchung wurde zusammen mit einer
** subchronischen Studie durchgefuehrt (siehe Kapitel 5.4).
** Untersucht wurden das Gewicht der linken Nebenhoden,
** Spermienmotilitaet un
F007 Pro Gruppe wurden 10 maennliche und 10 weibliche Tiere
** eingesetzt. Die Untersuchung wurde zusammen mit einer
** subchronischen Studie durchgefuehrt (siehe Kapitel 5.4).
** Untersucht wurden das Gewicht der linken Nebenhoden,
** Spermienmotilitaet und -konzentration bzw. Vaginalzytologie
** und Oestruszyklus.
F008 HEDSET
F009 08-09-1995
F020 1356259
EOR
F002 7822
F010 5.8.1
F004 3
F005 RS
F006 Es zeigten sich keine expositionsbedingten Auswirkungen der
** Ameisensaeure auf, das Hoden- und Nebenhodengewicht bzw. auf
** die Laenge der Oestruszyklen. Die Spermienmotilitaet war,
** bedingt durch den hohen Motilitaetswert der Kontrollgruppe,
** i
F007 Es zeigten sich keine expositionsbedingten Auswirkungen der
** Ameisensaeure auf, das Hoden- und Nebenhodengewicht bzw. auf
** die Laenge der Oestruszyklen. Die Spermienmotilitaet war,
** bedingt durch den hohen Motilitaetswert der Kontrollgruppe,
** in allen Expositionsgruppen vermindert. Im Vergleich zur
** historischenKontrolle zeigten sich keine substanzbedingten
** Einfluesse.

F008 HEDSET
F009 08-09-1995
F020 1356260
EOR
F002 7822
F010 5.8.1
F004 3
F005 TS
F006 Ameisensaeure, ca. 95% mit ca. 5% Wasser
F007 Ameisensaeure, ca. 95% mit ca. 5% Wasser
F008 HEDSET
F009 08-09-1995
F020 1356261
EOR
F002 7822
F010 5.8.2
F004 2
F005 RE
F006 Stedman, D.B. und Welsch, F.: Tox. Lett. 45, 111-117 (1989)
F007 Stedman, D.B. und Welsch, F.: Tox. Lett. 45, 111-117 (1989)
F008 HEDSET
F009 11-09-1995
F020 1356262
EOR
F002 7822
F010 5.8.2
F004 2
F005 RS
F006 Die Inkubation von CD-1 Mausembryo-Zellen (11. Tag der
** Traechtigkeit) in vitro in serumfreiem Medium mit 1mM
** Na-formiat fuehrte nur zu einer sehr geringen, nicht
** signifikanten Beeintraechtigung des 3H-Thymidineinbaus.
** Weiterhin wurde die st
F007 Die Inkubation von CD-1 Mausembryo-Zellen (11. Tag der
** Traechtigkeit) in vitro in serumfreiem Medium mit 1mM
** Na-formiat fuehrte nur zu einer sehr geringen, nicht
** signifikanten Beeintraechtigung des 3H-Thymidineinbaus.
** Weiterhin wurde die starke Senkung des Thymidineinbaus
** durchden teratogenen Stoff Methoxyessigsaeure bei
** gemeinsamer Inkubation mit 1mM Na-formiat stark
** abgeschwaecht.
F008 HEDSET
F009 11-09-1995
F020 1356263
EOR
F002 7822
F010 5.8.2
F004 2
F005 TS
F006 Natriumformiat
F007 Natriumformiat
F008 HEDSET
F009 11-09-1995
F020 1356264
EOR
F002 7822
F010 5.8.2

F004 3
F005 RE
F006 Andrews, J.E. et al.: Toxic. in Vitro 7 (6), 757-762 (1993)
F007 Andrews, J.E. et al.: Toxic. in Vitro 7 (6), 757-762 (1993)
F008 HEDSET
F009 30-10-1995
F020 1356265
EOR
F002 7822
F010 5.8.2
F004 3
F005 RS
F006 In Ratten-Embryokulturen (Sprague-Dawley Ratten, Tag 9.5
** derTraechtigkeit) wurde die Auswirkung des pH-Wertes (8.13,
** 7.75, 7.00, 6.50, 6.00) auf die in vitro Teratogenitaet von
** Natriumformiat (0.2, 0.4, 0.8, 1.2, 1.6 mg/ml) untersucht.
** Zahl
F007 In Ratten-Embryokulturen (Sprague-Dawley Ratten, Tag 9.5
** derTraechtigkeit) wurde die Auswirkung des pH-Wertes (8.13,
** 7.75, 7.00, 6.50, 6.00) auf die in vitro Teratogenitaet von
** Natriumformiat (0.2, 0.4, 0.8, 1.2, 1.6 mg/ml) untersucht.
** Zahlreiche embryonale Entwicklungsparameter zeigten
** hierbei,dass bereits der abnehmende pH-Wert einen Einfluss
** auf die Embryonalentwicklung in diese Testsystem ausuebte.
** In der hoechsten Konzentration waren die Parameter
** "crown-rump length" (CRL), Kopfgroesse (HL), Somitenzahl
** (SN), Entwicklungsindex (DS) und Proteinkonzentration
** unabhaengig vom pH-Wert im Inkubationsmedium signifikant
** vermindert. Beieiner Testsubstanzkonzentration von 0.8 und
** 1.2 mg/ml waren diese Parameter bei niedrigem pH signifikant
** vermindert. Auch bei einer Substanzkonzentration von 0.4 und
** 0.2 mg/ml zeigte sich noch eine signifikante Verminderung
** von CRL, HL und Proteinkonzentration bei pH 6.5 im Medium.
** Zusammenfassend zeigte sich in diesem Testsystem sowohl
** eineAbhaengigkeit der embryonalen Entwicklungsparameter und
** der Embryoletalitaet von der Formiatkonzentration als auch
** vom pH-Wert im Inkubationsmedium.
F008 HEDSET
F009 30-10-1995
F020 1356266
EOR
F002 7822
F010 5.8.2
F004 3
F005 TS
F006 Natriumformiat
F007 Natriumformiat
F008 HEDSET
F009 30-10-1995
F020 1356267
EOR
F002 7822
F010 5.8.2
F004 4
F005 RE
F006 Andrews, J.E. et al.: Teratology 51, 243-251 (1995)
F007 Andrews, J.E. et al.: Teratology 51, 243-251 (1995)

F008 HEDSET
F009 30-10-1995
F020 1356268
EOR
F002 7822
F010 5.8.2
F004 4
F005 RE
F006 Ebron-McCoy, M.T. et al.: Teratology 49, 393 (1994),
** abstract Nr. P32
F007 Ebron-McCoy, M.T. et al.: Teratology 49, 393 (1994),
** abstract Nr. P32
F008 HEDSET
F009 30-10-1995
F020 1356269
EOR
F002 7822
F010 5.8.2
F004 4
F005 RS
F006 Ratten-Embryokulturen (9. Traechtigkeitstag) wurden mit den
** Testsubstanzen behandelt. Der pH-Wert des Mediums wurde
** nachZugabe der Substanz nicht mehr korrigiert. Sowohl nach
** 24 als auch nach 48 h Inkubation mit Natriumformiat zeigte
** sichei
F007 Ratten-Embryokulturen (9. Traechtigkeitstag) wurden mit den
** Testsubstanzen behandelt. Der pH-Wert des Mediums wurde
** nachZugabe der Substanz nicht mehr korrigiert. Sowohl nach
** 24 als auch nach 48 h Inkubation mit Natriumformiat zeigte
** sicheine signifikante und konzentrationsabhaengige
** Verminderung der Entwicklungsparameter Dottersackdurchmesser
** (YSD), "crown-rump length" (CRL), Kopfgroesse (HL),
** Somitenzahl (SN) und Entwicklungsindex (DEVSC). Die
** Embryoletalitaet warnur nach 48 h Inkubation in der
** hoechsten Konzentration signifikant erhoeht. Die Zahl der
** Anomalien (hauptsaechlich ZNS: offener vorderer und hinterer
** Neuroporus, erratische Nervennaht) war signifikant erhoeht
** bei 1.6 und 2.0 mg/ml nach 24 h und bei 0.8 und 2.0 mg/ml
** nach 48 h Inkubation. Protein- und DNA-Gehalt zeigte
** signifikante konzentrationsabhaengige Verminderung.
** Inkubationen mit Ameisensaeure zeigte ebenfalls signifikante
** und konzentrationsabhaengige Vermiderung von YSD, CRL, HL,
** SN und DEVSC nach 24 h Inkubation und von CRL, HL, SOM und
** DEVSC nach 48 h. Die Embryoletalitaet war signifikant
** erhoeht in der hoechsten Konzentration nach 24 h und in den
** beiden hoechsten Konzentrationen nach 48 h Inkubation.
** Protein- und DNA-Konzentrationen zeigten signifikante und
** konzentrationsabhaengige Abnahmem in beiden Faellen. Die
** Zahl der Anomalien (offener vorderer und hinterer
** Neuroporus, Rotationsdefekte, vergroesserter
** Oberkieferfortsatz) zeigte signifikante Erhoehung nur bei
** 0.81 mg/ml nach 48 h Inkubation.
** Zusammenfassend zeigten sich sowohl bei Formiat als auch
** beiAmeisensaeure in diesem Testsystem
** konzentrationsabhaengige embryotoxische und dysmorphe
** Veraenderungen in der Kultur.
F008 HEDSET

F009 30-10-1995
F020 1356270
EOR
F002 7822
F010 5.8.2
F004 4
F005 TS
F006 Ameisensaeure und Natriumformiat
F007 Ameisensaeure und Natriumformiat
F008 HEDSET
F009 30-10-1995
F020 1356271
EOR
F002 7822
F010 5.8.2
F004 5
F005 RE
F006 Andrews, J.E. et al.: Teratology 51, 243-251 (1995)
F007 Andrews, J.E. et al.: Teratology 51, 243-251 (1995)
F008 HEDSET
F009 30-10-1995
F020 1356272
EOR
F002 7822
F010 5.8.2
F004 5
F005 RE
F006 Ebron-McCoy, M.T. et al.: Teratology 49, 393 (1994),
** abstract Nr. P32
F007 Ebron-McCoy, M.T. et al.: Teratology 49, 393 (1994),
** abstract Nr. P32
F008 HEDSET
F009 30-10-1995
F020 1356273
EOR
F002 7822
F010 5.8.2
F004 5
F005 RS
F006 Maus-Embryokulturen (8. Traechtigkeitstag) wurden mit den
** Testsubstanzen behandelt. Der pH-Wert des Mediums wurde
** nachZugabe der Substanzen nicht mehr korrigiert. Sowohl mit
** Natriumformiat als auch mit Ameisensaeure zeigte sich eine
** signifi
F007 Maus-Embryokulturen (8. Traechtigkeitstag) wurden mit den
** Testsubstanzen behandelt. Der pH-Wert des Mediums wurde
** nachZugabe der Substanzen nicht mehr korrigiert. Sowohl mit
** Natriumformiat als auch mit Ameisensaeure zeigte sich eine
** signifikante und konzentrationsabhaengige Verminderung der
** Entwicklungsparameter Dottersackdurchmesser (YSD),
** "crown-rump length" (CRL), Kopfgroesse (HL), Somitenzahl
** (SN) und Entwicklungsindex (DEVSC). Die Embryoletalitaet
** warim Falle der Inkubation mit Natriumformiat nicht
** signifikanterhoeht; in der hoechsten Konzentration zeigte
** sich eine signifikante Inzidenz von Anomalien des ZNS
** (offener vorderer und hinterer Neuroporus, erratische
** Neuralnaht), vergroessertes Perikard, vergroesserter

**   Oberkieferfortsatz und verzoegerte Herzentwicklung. Im Falle
**   der Inkubation mitAmeisensaeure war die Embryoletalitaet in
**   den drei hoechstenKonzentrationen signifikant erhoeht; die
**   Zahl der Anomalien war ab einer Konzentration >=0.54 mg/ml
**   signifikant erhoeht und betrug bei 1.6 mg/ml 100%. Sowohl
**   mit Natriumformiat alsauch mit Ameisensaeure zeigte sich
**   eine signifikante und konzentrationsabhaengige Verminderung
**   von Protein- und DNA-Konzentration. YSD, CRL, HL, SOM und
**   DEVSC zeigten einensignifikanten Trend zu Verminderung.
**   Zusammenfassend zeigten sich sowohl bei Formiat als auch
**   beiAmeisensaeure in diesem Testsystem
**   konzentrationsabhaengige embryotoxische und dysmorphe
**   Veraenderungen in der Kultur. Im Speziesvergleich mit der
**   Ratte (siehe vorheriger Eintrag)zeigten sich keine
**   quantitativen und qualitativen Unterschiede.
F008 HEDSET
F009 30-10-1995
F020 1356274
EOR
F002 7822
F010 5.8.2
F004 5
F005 TS
F006 Ameisensaeure und Natriumformiat
F007 Ameisensaeure und Natriumformiat
F008 HEDSET
F009 30-10-1995
F020 1356275
EOR
F002 7822
F010 5.8.2
F004 6
F005 RE
F006 Dorman, D.C. et al.: Teratology 52, 30-40 (1995)
F007 Dorman, D.C. et al.: Teratology 52, 30-40 (1995)
F008 HEDSET
F009 30-10-1995
F020 1356276
EOR
F002 7822
F010 5.8.2
F004 6
F005 RS
F006 Maus-Embryokulturen (8. Traechtigkeitstag) wurden mit den
**   Testsubstanzen behandelt. Der pH-Wert des Mediums wurde
**   nachZugabe der Substanzen nicht mehr korrigiert. Es zeigte
**   sich eine signifikante und konzentrationsabhaengige
**   Verminderung de
F007 Maus-Embryokulturen (8. Traechtigkeitstag) wurden mit den
**   Testsubstanzen behandelt. Der pH-Wert des Mediums wurde
**   nachZugabe der Substanzen nicht mehr korrigiert. Es zeigte
**   sich eine signifikante und konzentrationsabhaengige
**   Verminderung der Entwicklungsparameter Dottersackdurchmesser
**   und "crown-rump length". Das relative embryonale Wachstum
**   und die Rotation (75% Drehung bei den substanzbehandelten
**   Embryonen im Vgl. zu 90% bei der Kontrolle) waren
**   verzoegert. Es wurden weiterhin konzentrationsabhaengige

**   dysmorphogene Effekte wie Dysrhaphie (Verschlussstoerung
**   desSchaedels), mit starker und signifikanter Auspraegung nur
**   inder hoechsten Konzentration, sowie eine
**   Entwicklungsstoerungder Neuralanlage festgestellt.
F008 HEDSET
F009 30-10-1995
F020 1356277
EOR
F002 7822
F010 5.8.2
F004 6
F005 TS
F006 Natriumformiat
F007 Natriumformiat
F008 HEDSET
F009 30-10-1995
F020 1356278
EOR
F002 7822
F010 5.8.2
F004 7
F005 RE
F006 Dorman, D.C. et al.: Teratology 52, 30-40 (1995)
F007 Dorman, D.C. et al.: Teratology 52, 30-40 (1995)
F008 HEDSET
F009 30-10-1995
F020 1356279
EOR
F002 7822
F010 5.8.2
F004 7
F005 RS
F006 In einer Pilot-Studie wurde Natriumformiat in Dosen von 25,
**   250, 500 und 750 mg/kg am 8. Traechtigkeitstag per
**   Schlundsonde an CD-1 Maeuse verabreicht. Hierbei sollte die
**   Formiatdosis ermittelt werden, die notwendig ist um eine
**   Formiatkonze
F007 In einer Pilot-Studie wurde Natriumformiat in Dosen von 25,
**   250, 500 und 750 mg/kg am 8. Traechtigkeitstag per
**   Schlundsonde an CD-1 Maeuse verabreicht. Hierbei sollte die
**   Formiatdosis ermittelt werden, die notwendig ist um eine
**   Formiatkonzentration im Blut zu erzeugen, die bei der
**   Inhalation von 10000 ppm Methanol, 6h/d erreicht wird.
**   DieseBlutformiatkonzentration wurde bei 750 mg/kg erreicht.
**
**   In der Hauptuntersuchung mit 750 mg/kg zeigten sich
**   maximalematernale Formiatkonzentrationen in Plasma (1.05 mM)
**   und Dezidua (2 mmol/kg), vergleichbar derer nach einer
**   inhalativen Methanolexposition (10000 bzw. 15000 ppm,
**   6h/d).Es wurde keine signifikant erhoehte Inzidenz von
**   ZNS-Defekten (offene vordere Neuralrohre) beobachtet. Die
**   Zahl der roten Blutkoerperchen und die
**   Dezidua-Folatkonzentration waren unveraendert.
**
**   Die Studie wurde durchgefuehrt, um das proximale Teratogen
**   bei der Methanolexposition zu ermitteln. Nach Angabe der
**   Autoren zeigte die vorliegende Untersuchung, dass nicht das

**   Stoffwechselprodukt Formiat, sondern Methanol selbst bei
**   traechtigen CD-1 Maeusen, die gegenueber hohen
**   Methanolkonzentrationen exponiert wurden, die teratogene
**   Wirkung (Exencephalie) ausuebt.
F008 HEDSET
F009 30-10-1995
F020 1356280
EOR
F002 7822
F010 5.8.2
F004 7
F005 TS
F006 Natriumformiat
F007 Natriumformiat
F008 HEDSET
F009 30-10-1995
F020 1356281
EOR
F002 7822
F010 5.8.2
F004 8
F005 RE
F006 Andrews, J.E. et al., Teratology, 51, 156-202, Abstr. 3
**   (1995)
F007 Andrews, J.E. et al., Teratology, 51, 156-202, Abstr. 3
**   (1995)
F008 HEDSET
F020 1356282
EOR
F002 7822
F010 5.8.2
F004 8
F005 RM
F006 The effects of the combination of formic acid and methanol
**   was investigated in the whole embroy culture. Gestational
**   day 9 rat embryos were exposed to various concentrations of
**   methanol and formic acid and the degree of embryotoxicity
**   was c
F007 The effects of the combination of formic acid and methanol
**   was investigated in the whole embroy culture. Gestational
**   day 9 rat embryos were exposed to various concentrations of
**   methanol and formic acid and the degree of embryotoxicity
**   was compared following 48 h of exposure using developmental
**   score (DEVSC). Increasing concentrations of either methanol
**   or formate resulted in significant decreases in DEVSC.
**   Exposure to the combination of methanol and formate was less
**   toxic than would have been expected based on the single
**   concentration additivity which suggested an antagonistic
**   activity. This observation was found for embryonic crown
**   length, head length, somite number and DNA concentration.
F008 HEDSET
F020 1356283
EOR
F002 7822
F010 5.8.2
F004 8
F005 TS

F006 formic acid, probably neutralized, no further data
F007 formic acid, probably neutralized, no further data
F008 HEDSET
F020 1356284
EOR
F002 7822
F010 5.8.2
F004 9
F005 RE
F006 Brown-Woodman, P.D.C. et al., Teratology, 52, 233-243,
** (1995)
F007 Brown-Woodman, P.D.C. et al., Teratology, 52, 233-243,
** (1995)
F008 HEDSET
F020 1356285
EOR
F002 7822
F010 5.8.2
F004 9
F005 RM
F006 In the study, the embryotoxicity of methanol and formic acid
** was evaluated using rat embryo culture. Rat embryos were
** explanted at day 10 of gestation and cultured. The obtained
** results showed that both methanol and formic acid have a
** conce
F007 In the study, the embryotoxicity of methanol and formic acid
** was evaluated using rat embryo culture. Rat embryos were
** explanted at day 10 of gestation and cultured. The obtained
** results showed that both methanol and formic acid have a
** concentration dependent embryotoxic effect on the developing
** embryo in vitro. The no-effect-concentration of formic acid
** was 7.74 umol/ml while a concentration of 18.66 umol/ml was
** associated with severe embryotoxicity. When embryos were
** grown in sera containing 18.66 umol sodium formate/ml or in
** sera adjusted with hydrochloric acid to pH-values similar to
** those achieved with formic acid, the results indicated that
** both low pH and formate contributed to the embryotoxicity of
** formic acid. The authors concluded that embryotoxicity due
** to low pH or high formate level would only occur after
** severe methanol intoxication.
F008 HEDSET
F020 1356286
EOR
F002 7822
F010 5.8.2
F004 9
F005 TS
F006 formic acid (89-91%), sodium formate
F007 formic acid (89-91%), sodium formate
F008 HEDSET
F020 1356287
EOB
C
X

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F002 Y26-001
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F001 544-17-2
F002 Y26-001
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B006 SUBST_IDENT_TAB
F001 107-31-3
F002 Y28-001
F003 Y27-001
F004 107-31-3
F005 1
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F001 107-31-3
F002 Y28-002
F003 Y27-006
F004 methyl formate
F005 2
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F001 107-31-3
F002 Y28-001
F003 Y27-002
F004 203-481-7
F005 3
EOR
F001 107-31-3
F002 Y28-002
F003 Y27-030
F004 Formic acid, methyl ester
F005 4
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F001 107-31-3
F002 Y28-003
F003 Y27-003
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F004 C2H4O2
F005 102
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F001 141-53-7
F002 Y28-001
F003 Y27-001
F004 141-53-7
F005 1
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F001 141-53-7
F002 Y28-002
F003 Y27-006
F004 sodium formate
F005 2
EOR
F001 141-53-7
F002 Y28-001
F003 Y27-002
F004 205-488-0
F005 3
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F001 141-53-7
F002 Y28-002
F003 Y27-030
F004 Formic acid, sodium salt
F005 4
EOR
F001 141-53-7
F002 Y28-003
F003 Y27-003
F004 CH2O2.Na
F005 102
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F001 544-17-2
F002 Y28-001
F003 Y27-001
F004 544-17-2
F005 1
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F001 544-17-2
F002 Y28-002
F003 Y27-006
F004 calcium diformate
F005 2
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F001 544-17-2
F002 Y28-001
F003 Y27-002
F004 208-863-7
F005 3
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F001 544-17-2
F002 Y28-002
F003 Y27-030
F004 Formic acid, calcium salt
F005 4
EOR

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F002 Y28-003
F003 Y27-003
F004 CH2O2.1/2Ca
F005 102
EOB
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B003 DS_ADMIN_TAB
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F009 N
F005 12032821
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F007 12032821
F008 12-12-2000
F003 02-03-2003
F102 A35-01
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F002 11
F001 141-53-7
F009 N
F005 12032821
F006 25-05-2001
F007 12032821
F008 25-05-2001
F003 02-03-2003
F102 A35-01
EOR
F002 22
F001 544-17-2
F009 N
F005 12035512
F006 24-10-2002
F007 12035512
F008 24-10-2002
F003 02-03-2003
F102 A35-01
EOB
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B004 COMPANY_TAB
F001 12032821
F002 A05-03
F003 Celanese Ltd
F004 1601 W. LBJ Freeway
F005 Dallas TX
F006 75381
F008 A31-024
EOR
F001 12035512
F003 Toxicology and Regulatory Affairs
F004 1201 Anise Court
F005 Freeburg, IL
F006 62243-2118
F008 A31-024
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B052 DS_COMPONENT_JOIN_TAB
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F004 2
F005 2
F006 20-12-2001
F007 30-01-2001
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F002 0
F003 1.0.1
F004 3
F005 3
F006 25-05-2001
F007 25-05-2001
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F002 0
F003 1.0.1
F004 4
F005 4
F006 20-12-2001
F007 25-05-2001
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F002 0
F003 1.0.1
F004 6
F005 6
F006 20-12-2001
F007 20-12-2001
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F001 9
F002 0
F003 1.0.1
F004 7
F005 7
F006 20-12-2001
F007 20-12-2001
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F003 1.1.1
F004 1
F005 1
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F007 13-12-2000
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F007 30-01-2001
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F003 1.2
F004 2
F005 2
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F007 30-01-2001
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F002 0
F003 1.2
F004 3
F005 3
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F007 30-01-2001
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F003 1.2
F004 4
F005 4
F006 30-01-2001
F007 30-01-2001
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F001 9
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F003 1.2
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F005 5
F006 30-01-2001
F007 30-01-2001
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F001 9
F002 0
F003 1.2
F004 6
F005 6
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F007 30-01-2001
EOR
F001 9
F002 0
F003 1.2
F004 7
F005 7
F006 30-01-2001

F007 30-01-2001
EOR
F001 9
F002 0
F003 1.2
F004 8
F005 8
F006 30-01-2001
F007 30-01-2001
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F007 13-12-2000
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F003 2.1
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F007 18-11-2001
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F002 0
F003 2.2
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F007 16-12-2000
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F003 2.2
F004 2
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F007 18-11-2001
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F003 2.3
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F003 2.3
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F005 2
F006 18-11-2001
F007 18-11-2001

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F003 2.4
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F005 2
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F007 18-11-2001
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F001 9
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F003 2.5
F004 1
F005 1
F006 19-11-2001
F007 23-05-2001
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F001 9
F002 0
F003 2.5
F004 2
F005 2
F006 19-11-2001
F007 23-05-2001
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F003 2.5
F004 3
F005 3
F006 23-05-2001
F007 23-05-2001
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F003 2.6.1
F004 1
F005 1
F006 18-11-2001
F007 23-05-2001
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F003 2.6.1
F004 2
F005 2
F006 18-11-2001
F007 18-11-2001
EOR
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F005 1
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F007 23-05-2001
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F003 3.1.2
F004 1
F005 1
F006 18-02-2003
F007 23-05-2001
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F002 0
F003 3.1.2
F004 2
F005 2
F006 18-02-2003
F007 09-07-2001
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F003 3.1.2
F004 3
F005 3
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F007 18-02-2003
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F005 1
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F007 23-05-2001
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F003 3.3.2
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F005 1
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F007 25-05-2001
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F005 1
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F007 23-05-2001
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F007 25-06-2001
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F007 23-05-2001
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F003 4.1
F004 2
F005 2
F006 28-02-2003
F007 28-02-2003
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F001 9
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F003 4.1
F004 3
F005 3
F006 01-03-2003
F007 01-03-2003
EOR
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F002 0
F003 4.1
F004 4
F005 4
F006 01-03-2003
F007 01-03-2003
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F003 4.2
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F007 23-05-2001
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F003 4.2
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F007 23-05-2001
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F002 0

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F006 01-03-2003
F007 28-02-2003
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F003 4.2
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F007 01-03-2003
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F007 16-12-2000
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F003 4.3
F004 2
F005 2
F006 02-03-2003
F007 28-02-2003
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F007 01-03-2003
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F007 01-03-2003
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F003 5.1.1
F004 1
F005 1
F006 20-02-2003
F007 16-12-2000
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F003 5.1.1

F004 2
F005 2
F006 24-05-2001
F007 24-05-2001
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F003 5.1.2
F004 1
F005 1
F006 13-07-2001
F007 22-05-2001
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F002 0
F003 5.1.2
F004 2
F005 2
F006 23-05-2001
F007 22-05-2001
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F002 0
F003 5.1.2
F004 3
F005 3
F006 23-05-2001
F007 23-05-2001
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F001 9
F002 0
F003 5.1.3
F004 1
F005 1
F006 11-09-2001
F007 23-05-2001
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F001 9
F002 0
F003 5.10
F004 1
F005 1
F006 21-09-2001
F007 21-09-2001
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F001 9
F002 0
F003 5.10
F004 2
F005 2
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F007 21-09-2001
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F001 9
F002 0
F003 5.10
F004 3

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F006 21-09-2001
F007 21-09-2001
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F002 0
F003 5.4
F004 1
F005 1
F006 19-11-2001
F007 12-07-2001
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F001 9
F002 0
F003 5.4
F004 2
F005 2
F006 19-11-2001
F007 19-11-2001
EOR
F001 9
F002 0
F003 5.5
F004 1
F005 1
F006 09-07-2001
F007 24-05-2001
EOR
F001 9
F002 0
F003 5.5
F004 2
F005 2
F006 12-07-2001
F007 24-05-2001
EOR
F001 9
F002 0
F003 5.6
F004 1
F005 1
F006 24-05-2001
F007 24-05-2001
EOB
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B051 DS_COMPONENT_TAB
F001 9
F002 0
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F005 12-12-2000
F006 12032821
F007 12-12-2000
F009 A35-01
EOB
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B115 GI_COMPANY_TAB
F001 9
F002 1
F003 20-12-2001
F004 IUC31
F021 2
F007 A34-01
F008 Celanese Ltd
EOR
F001 9
F002 2
F003 20-12-2001
F004 IUC31
F007 A34-01
F008 Hercules Inc
EOR
F001 9
F002 3
F003 25-05-2001
F004 IUC31
F021 1
F007 A34-02
F008 American Chemistry Council, Formates Panel
F009 1300 Wilson Boulevard
F010 Arlington, VA
F011 22209
F013 A31-024
EOR
F001 9
F002 4
F003 20-12-2001
F004 IUC31
F021 3
F007 A34-01
F008 Bayer Corporation
EOR
F001 9
F002 6
F003 20-12-2001
F004 IUC31
F007 A34-01
F008 BASF Corporation
EOR
F001 9
F002 7
F003 20-12-2001
F004 IUC31
F007 A34-01
F008 GEO Specialty Chemicals
EOB
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B101 GI_GENERAL_INFORM_TAB
F001 9
F002 1
F003 13-12-2000
F004 IUC31

F010 A04-04
F011 A19-02
EOB
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B102 GI_SYNONYM_TAB
F001 9
F002 1
F003 30-01-2001
F004 IUC31
F007 Ameisensaeuremethylester
EOR
F001 9
F002 2
F003 30-01-2001
F004 IUC31
F007 Formic Acid Methyl ester
EOR
F001 9
F002 3
F003 30-01-2001
F004 IUC31
F007 Formic acid, methyl ester (6CI, 8CI, 9CI)
EOR
F001 9
F002 4
F003 30-01-2001
F004 IUC31
F007 Methanoic acid methyl ester
EOR
F001 9
F002 5
F003 30-01-2001
F004 IUC31
F007 Methyl formate
EOR
F001 9
F002 6
F003 30-01-2001
F004 IUC31
F007 Methyl methanoate
EOR
F001 9
F002 7
F003 30-01-2001
F004 IUC31
F007 Methylformiat
EOR
F001 9
F002 8
F003 30-01-2001
F004 IUC31
F007 R 611
EOB
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B201 PC_MELTING_TAB
F001 9
F002 1

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F003 18-11-2001
F004 IUC31
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F016 2
F007 A02-03
F008 -100.4
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F001 9
F002 2
F003 19-11-2001
F004 IUC31
F015 A36-003
F016 1
F007 A02-06
F008 -100
EOB
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B202 PC_BOILING_TAB
F001 9
F002 1
F003 18-11-2001
F004 IUC31
F016 A36-003
F017 2
F007 A02-03
F008 32.3
F010 760
EOR
F001 9
F002 2
F003 18-11-2001
F004 IUC31
F016 A36-003
F017 1
F007 A02-03
F008 31.5
F010 760
EOB
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B203 PC_DENSITY_TAB
F001 9
F002 1
F003 18-11-2001
F004 IUC31
F016 A36-003
F017 2
F007 P05-02
F008 A02-03
F009 .968
F011 P18-01
F012 20
EOR
F001 9
F002 2
F003 18-11-2001
F004 IUC31
F016 A36-003
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F017 1
F007 P05-03
F008 A02-03
F009 .987
F012 15
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B204 PC_VAPOUR_TAB
F001 9
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F004 IUC31
F015 A36-003
F016 1
F007 A02-03
F008 644
F010 P02-01
F011 20
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F001 9
F002 2
F003 19-11-2001
F004 IUC31
F015 A36-003
F016 2
F007 A02-03
F008 780
F011 25
EOB
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B205 PC_PARTITION_TAB
F001 9
F002 1
F003 19-11-2001
F004 IUC31
F014 A36-003
F015 1
F007 A02-03
F008 -.21
F010 25
F011 P07-02
F012 1988
F013 A03-02
EOR
F001 9
F002 2
F003 19-11-2001
F004 IUC31
F014 A36-003
F015 2
F007 A02-03
F008 .03
EOR
F001 9
F002 3
F003 23-05-2001
F004 IUC31
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F007 A02-03
F008 -.17
F011 P07-04
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B206 PC_WATER_SOL_TAB
F001 9
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F004 IUC31
F023 A36-003
F024 1
F007 A02-03
F008 P08-01
F009 300
F011 20
F012 A02-03
F013 4
F014 5
F015 200
F016 P08-01
F017 20
EOR
F001 9
F002 2
F003 18-11-2001
F004 IUC31
F023 A36-003
F024 2
F007 A02-03
F008 P08-04
F009 30
EOB
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B301 EN_PHOTODEGRADATION_TAB
F001 9
F002 1
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F004 IUC31
F045 A36-003
F008 F01-01
F034 F06-03
F035 1500000
F036 F07-02
F044 A02-03
EOB
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B302 EN_STABILITY_IN_WATER_TAB
F001 9
F002 1
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F004 IUC4
F040 A36-003
F041 3
F007 A01-02
F008 F08-01
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F009 F09-08
F010 2001
F016 A02-03
F018 5.1
F019 F05-01
F020 25
F026 8
F027 A02-03
F029 12.3
F030 F05-02
F031 25
F039 A03-01
EOR
F001 9
F002 2
F003 18-02-2003
F004 IUC4
F040 A36-003
F041 2
F008 F08-01
F016 A02-03
F018 52
F019 F05-02
F020 25
F021 A02-03
F023 .5
F024 F05-02
F025 25
EOR
F001 9
F002 3
F003 26-02-2003
F004 IUC4
F040 A36-003
F041 1
F008 F08-01
F009 F09-08
F016 A02-03
F018 67.3
F019 F05-02
F020 20.2
F021 A02-03
F023 40
F024 F05-03
F025 20.2
EOB
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B303 EN_STABILITY_IN_SOIL_TAB
F001 9
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F003 18-11-2001
F004 IUC31
F054 A36-003
F008 F11-03
EOB
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B306 EN_DISTRIBUTION_TAB
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F004 IUC31
F010 A36-003
F007 F24-02
F008 F23-03
F009 2001
EOB
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B308 EN_BIODEGRADATION_TAB
F001 9
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F003 18-11-2001
F004 IUC31
F047 A36-005
F048 2
F008 F25-01
F011 F27-0137
F015 A02-04
F017 90
F018 7
F019 F05-01
EOR
F001 9
F002 2
F003 09-07-2001
F004 IUC31
F047 A36-002
F048 1
F008 F25-01
F010 1997
F011 F27-0145
F012 51.7
F013 F28-02
F014 F29-03
F015 A02-03
F016 100
F017 90
F018 28
F019 F05-01
F020 F30-03
F021 A02-03
F023 77
F024 7
F025 F31-01
F026 A02-03
F028 91
F029 14
F030 F31-01
F031 A02-03
F033 93
F034 21
F035 F31-01
F036 A02-03
F038 93
F039 28
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F058 72
F059 14
F060 F31-01
F061 A02-03
F063 91
F064 28
F065 F31-01
F046 A03-03
F049 20
F050 F28-02
F051 F29-02
F052 28
F053 F05-01
F066 E36-001
EOB
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B401 EC_FISHTOX_TAB
F001 9
F002 1
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F004 IUC31
F033 A36-003
F008 E01-05
F009 E02-0075
F010 E03-05
F011 1989
F012 96
F013 E04-02
F014 E05-02
F015 A02-03
F016 46
F018 A02-03
F019 46
F021 A02-06
F022 120
F024 A02-02
F025 215
F031 A03-01
F043 E35-02
F044 E35-02
F045 E35-02
F046 E35-02
EOR
F001 9
F002 2
F003 28-02-2003
F004 IUC4
F033 A36-002
F007 A01-03
F008 E01-05
F009 E02-0075
F010 E03-05: Determination of the effect of water constituents on fish, DIN
*    38412 part 15
F011 1982
F012 96
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F013 E04-02
F014 E05-02
F021 A02-04
F022 100
F031 A03-01
F032 A03-02
F045 E35-02
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F001 9
F002 3
F003 01-03-2003
F004 IUC4
F033 A36-002
F007 A01-03: Hydrolysis Product
F008 E01-02
F009 E02-0070
F012 96
F013 E04-02
F014 E05-02
F021 A02-03
F022 15400
F031 A03-03
F032 A03-02
F045 E35-01
EOR
F001 9
F002 4
F003 01-03-2003
F004 IUC4
F033 A36-002
F007 A01-03: Hydrolysis Product
F008 E01-02
F009 E02-0119
F012 96
F013 E04-02
F014 E05-02
F021 A02-03
F022 29400
F031 A03-03
F032 A03-02
F045 E35-01
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B402 EC_DAPHNIATOX_TAB
F001 9
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F004 IUC4
F032 A36-003
F033 1
F008 E06-0010
F009 E07-01
F010 1988
F011 48
F012 E04-02
F013 E05-02
F017 A02-03

F018 500
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F021 500
F023 A02-04
F024 500
F030 A03-01
F031 A03-01
F042 E01-05
F044 E35-02
F045 E35-02
F046 E35-02
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F001 9
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F003 01-03-2003
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F032 A36-003
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F008 E06-0033: Chaetogammarus marinus
F011 96
F012 E04-02
F013 E05-02
F014 A02-03
F015 32
F017 A02-03
F018 320
F042 E01-04
F043 E35-02
F044 E35-02
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F007 A01-03: Hydrolysis Product
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F013 E05-02
F014 A02-03
F015 120
F017 A02-03
F018 247
F020 A02-04
F021 1050
F030 A03-03
F031 A03-03
F042 E01-02
F043 E35-02
F044 E35-02
F045 E35-02
EOR
F001 9
F002 4
F003 01-03-2003

F004 IUC4
F032 A36-002
F033 4
F007 A01-03: Hydrolysis Product
F008 E06-0010
F009 E07-04: DIN 38412
F011 48
F012 E04-02
F013 E05-02
F020 A02-04
F021 10000
F042 E01-05
F045 E35-01
EOB
C
B403 EC_ALGAETOX_TAB
F001 9
F002 1
F003 24-05-2001
F004 IUC31
F036 A36-003
F008 E08-0055
F009 E09-04: Scenedesmus-Zellvermehrungs Hemmtest, DIN 38412 Teil 9,
F012 96
F013 E04-02
F014 E05-02
F027 A02-03
F028 190
F030 EC20
F031 A02-03
F032 90
F050 E35-01
F051 E35-01
EOR
F001 9
F002 2
F003 02-03-2003
F004 IUC4
F036 A36-002
F008 E08-0056
F011 E10-02
F012 96
F013 E04-02
F014 E05-02
F015 A02-03
F016 125
F024 A02-03
F025 99
F027 A02-03
F028 790
F034 A03-03
F046 E35-02
F049 E35-01
F050 E35-01
EOR
F001 9
F002 3

F003 01-03-2003
F004 IUC4
F036 A36-002
F007 A01-03: Hydrolysis Product
F008 E08-0050
F009 E09-03
F011 E10-02
F012 840
F013 E04-02
F014 E05-02
F015 A02-04
F016 100
F018 A02-04
F019 100
F024 A02-03
F025 600
F046 E35-01
F047 E35-01
F049 E35-01
EOR
F001 9
F002 4
F003 01-03-2003
F004 IUC4
F008 E08-0056
F011 E10-02
F012 96
F014 E05-02
EOB
C
B501 TO_ACUTE_ORAL_TAB
F001 9
F002 1
F003 20-02-2003
F004 IUC4
F017 A36-003
F018 1
F008 T01-03
F009 T02-24
F011 1979
F012 A02-06
F013 1500
F015 T04-01
F016 A03-01
F019 T24-03
F022 T23-42
EOR
F001 9
F002 2
F003 24-05-2001
F004 IUC31
F008 T01-03
F009 T02-23
F011 1972
F012 A02-03
F013 1600
F015 T04-01

EOB
C
B502 TO_ACUTE_INHAL_TAB
F001 9
F002 1
F003 13-07-2001
F004 IUC31
F019 A36-003
F020 1
F007 A01-01
F008 T05-03
F009 T02-24
F010 T06-03
F011 1988
F012 A02-04
F013 21
F015 T07-01
F016 4
F018 A03-03
F021 T24-03
F024 T23-42
EOR
F001 9
F002 2
F003 23-05-2001
F004 IUC31
F019 A36-003
F020 2
F007 A01-03
F008 T05-03
F009 T02-24
F010 T06-03
F011 1979
F012 A02-04
F013 5.2
F015 T07-01
F016 4
F017 T08-01
F018 A03-01
F021 T24-03
F022 20
F024 T23-42
EOR
F001 9
F002 3
F003 23-05-2001
F004 IUC31
F019 A36-005
F020 3
F008 T05-05
F009 T02-19
F011 1941
F018 A03-01
F021 T24-04
F024 T23-47
EOB
C

B503 TO_ACUTE_DERMAL_TAB
F001 9
F002 1
F003 11-09-2001
F004 IUC31
F017 A36-005
F008 T01-03
F009 T02-24
F011 1978
F012 A02-04
F013 4000
F015 T04-02
EOB
C
B508 TO_REPEATED_DOSE_TAB
F001 9
F002 1
F003 19-11-2001
F004 IUC31
F030 A36-005
F008 T02-24
F009 T23-46
F010 T24-04
F011 T25-02
F014 1.5 years
F015 Continuous
F016 none
F017 1% (= 274 mg/animal formate or 185 mg/animal calculated to formic acid
* according to the authors)
F018 T27-02
F029 A03-01
EOR
F001 9
F002 2
F003 19-11-2001
F004 IUC31
F030 A36-003
F008 T02-24
F009 T23-46
F010 T24-03
F011 T25-02
F014 Lifelong
F015 Daily
F017 200 mg/kg/day
F018 T27-05
F019 A02-03
F020 200
F022 T28-02
F029 A03-01
EOB
C
B509 TO_GENETIC_IN_VITRO_TAB
F001 9
F002 1
F003 09-07-2001
F004 IUC31
F016 A36-003

F017 2
F008 T30-01
F009 T31-10
F010 1989
F011 Salmonella typhimurium TA 1535 TA100 TA1537 TA98
F012 T32-03
F014 A03-01
F015 20 to 5000 ug/plate
F018 no cytotoxicity reported
EOR
F001 9
F002 2
F003 12-07-2001
F004 IUC31
F016 A36-002
F017 1
F008 T30-01
F010 1989
F011 Salmonella typhimurium TA 1535 TA100 TA1537 TA1538 TA98
F012 T32-03
F014 A03-03
F015 0, 667,1000, 3333, 6667, 10000 micrograms/plate
F018 No appreciable toxicity up to 10000 micrograms per plate
EOB
C
B510 TO_GENETIC_IN_VIVO_TAB
F001 9
F002 1
F003 24-05-2001
F004 IUC31
EOB
C
B515 TO_HUMAN_EXPERIENCE_TAB
F001 9
F002 1
F003 21-09-2001
F004 IUC31
EOR
F001 9
F002 2
F003 21-09-2001
F004 IUC31
F010 1
EOR
F001 9
F002 3
F003 21-09-2001
F004 IUC31
EOB
C
B601 TEXT_TAB
F002 9
F010 2.1
F004 1
F005 RE
F006 BASF AG, Sicherheitsdatenblatt Methylformiat (08.03.1994)
F007 BASF AG, Sicherheitsdatenblatt Methylformiat (08.03.1994)

F020 2037
EOR
F002 9
F010 2.1
F004 2
F005 RE
F006 The Merck Index, 10th Edition (1983) Rahway, New Jersey. p.
** 870
F007 The Merck Index, 10th Edition (1983) Rahway, New Jersey. p.
** 870
F020 2038
EOR
F002 9
F010 2.1
F004 2
F005 RM
F006 Handbook value
F007 Handbook value
F020 2039
EOR
F002 9
F010 2.2
F004 1
F005 RE
F006 BASF Ag, Sicherheitsdatenblatt Methylformiat (08.03.1994)
F007 BASF Ag, Sicherheitsdatenblatt Methylformiat (08.03.1994)
F020 2040
EOR
F002 9
F010 2.2
F004 2
F005 RE
F006 The Merck Index, 10th Edition (1983) Rahway, New Jersey. p.
** 870
F007 The Merck Index, 10th Edition (1983) Rahway, New Jersey. p.
** 870
F020 2041
EOR
F002 9
F010 2.2
F004 2
F005 RM
F006 Handbook value
F007 Handbook value
F020 2042
EOR
F002 9
F010 2.3
F004 1
F005 RE
F006 BASF AG, Sicherheitsdatenblatt Methylformiat (08.03.1994)
F007 BASF AG, Sicherheitsdatenblatt Methylformiat (08.03.1994)
F020 2043
EOR
F002 9
F010 2.3
F004 2

F005 RE
F006 The Merck Index, 10th Edition (1983) Rahway, New Jersey. p.
** 870
F007 The Merck Index, 10th Edition (1983) Rahway, New Jersey. p.
** 870
F020 2044
EOR
F002 9
F010 2.3
F004 2
F005 RM
F006 Handbook value
F007 Handbook value
F020 2045
EOR
F002 9
F010 2.4
F004 1
F005 RE
F006 BASF AG, Sicherheitsdatenblatt Methylformiat (08.03.1994)
F007 BASF AG, Sicherheitsdatenblatt Methylformiat (08.03.1994)
F020 2046
EOR
F002 9
F010 2.4
F004 2
F005 RE
F006 Daubert TE, Danner, RP. Physical and Thermodynamic
** Properties of Pure Chemicals Data Compilation. Washington,
** D.C.: Taylor and Francis, 1989 as cited in Hazardous
** Substance Data Base update of 2/08/2000
F007 Daubert TE, Danner, RP. Physical and Thermodynamic
** Properties of Pure Chemicals Data Compilation. Washington,
** D.C.: Taylor and Francis, 1989 as cited in Hazardous
** Substance Data Base update of 2/08/2000
F020 2047
EOR
F002 9
F010 2.4
F004 2
F005 RM
F006 Given as 585.7 mm Hg, converted to hPa
F007 Given as 585.7 mm Hg, converted to hPa
F020 2048
EOR
F002 9
F010 2.5
F004 1
F005 RE
F006 BASF AG, Analytisches Labor; unveroeffentlichte Untersuchung
** (J.Nr. 130365/01 vom 12.07.1988)
F007 BASF AG, Analytisches Labor; unveroeffentlichte Untersuchung
** (J.Nr. 130365/01 vom 12.07.1988)
F020 2049
EOR
F002 9
F010 2.5

F004 1
F005 RE
F006 BASF AG, Sicherheitsdatenblatt Methylformiat (08.03.1994)
F007 BASF AG, Sicherheitsdatenblatt Methylformiat (08.03.1994)
F020 2050
EOR
F002 9
F010 2.5
F004 2
F005 RE
F006 Hansch. C., A. Leo and D. Hoekman. 1995. Exploring QSAR.
** Hydrophobic, Electronic, and Steric Constants. ACS
** Professional Reference Book. Washington, DC: American
** Chemical Society.
F007 Hansch. C., A. Leo and D. Hoekman. 1995. Exploring QSAR.
** Hydrophobic, Electronic, and Steric Constants. ACS
** Professional Reference Book. Washington, DC: American
** Chemical Society.
F020 2051
EOR
F002 9
F010 2.5
F004 2
F005 RM
F006 Literature value
F007 Literature value
F020 2052
EOR
F002 9
F010 2.5
F004 3
F005 RE
F006 EPIWIN 3.04 Calculation
F007 EPIWIN 3.04 Calculation
F020 2053
EOR
F002 9
F010 2.6.1
F004 1
F005 RE
F006 BASF AG, Sicherheitsdatenblatt Methylformiat (08.03.1994)
F007 BASF AG, Sicherheitsdatenblatt Methylformiat (08.03.1994)
F020 2054
EOR
F002 9
F010 2.6.1
F004 2
F005 RE
F006 The Merck Index, 10th Edition (1983) Rahway, New Jersey. p.
** 870
F007 The Merck Index, 10th Edition (1983) Rahway, New Jersey. p.
** 870
F020 2055
EOR
F002 9
F010 2.6.1
F004 2

F005 RM
F006 Handbook value
F007 Handbook value
F020 2056
EOR
F002 9
F010 3.1.1
F004 1
F005 RE
F006 EPIWIN 3.05, Syracuse Research Corp, Syracuse NY 13210
F007 EPIWIN 3.05, Syracuse Research Corp, Syracuse NY 13210
F020 2057
EOR
F002 9
F010 3.1.1
F004 1
F005 RL
F006 Calculated by an acceptable method.
F007 Calculated by an acceptable method.
F020 2058
EOR
F002 9
F010 3.1.1
F004 1
F005 RM
F006 ca. 50 % after 71 day
**
** Based on 12-hour day
F007 ca. 50 % after 71 day
**
** Based on 12-hour day
F020 2059
EOR
F002 9
F010 3.1.1
F004 1
F005 RS
F006 Rate Constant: 0.227 (+/-0.034)*10-12 cm^3/molecule*sec
** at 296 K
F007 Rate Constant: 0.227 (+/-0.034)*10-12 cm^3/molecule*sec
** at 296 K
F020 2060
EOR
F002 9
F010 3.1.2
F004 1
F005 RE
F006 Calculated using HYDROWIN v 1.67 as found in EPIWIN 3.05
F007 Calculated using HYDROWIN v 1.67 as found in EPIWIN 3.05
F020 2061
EOR
F002 9
F010 3.1.2
F004 1
F005 RM
F006 These vlaues are directly from from the HYDROWIN 1.67
** program and are based on the Kb calculated by HYDROWIN

```
F007 These vlaues are directly from from the HYDROWIN 1.67
**   program and are based on the Kb calculated by HYDROWIN
F020 2062
EOR
F002 9
F010 3.1.2
F004 2
F005 ME
F006 Calculated from experimental Kb
F007 Calculated from experimental Kb
F020 2063
EOR
F002 9
F010 3.1.2
F004 2
F005 RE
F006 From table in HYDROWIN v1.67 Syracuse Research Corporation
**   2001
F007 From table in HYDROWIN v1.67 Syracuse Research Corporation
**   2001
F020 2064
EOR
F002 9
F010 3.1.2
F004 2
F005 RL
F006 Calculated from experimental data by an acceptable method.
F007 Calculated from experimental data by an acceptable method.
F020 2065
EOR
F002 9
F010 3.1.2
F004 2
F005 RM
F006 These are calculated t1/2 values using a value for Kb found
**   in the literature.  The pH 4 t1/2 was not calculated because
**   there is also a mechanism for acid based hydrolysis and the
**   vale derived for the base hydrolysis rate constant may give
F007 These are calculated t1/2 values using a value for Kb found
**   in the literature.  The pH 4 t1/2 was not calculated because
**   there is also a mechanism for acid based hydrolysis and the
**   vale derived for the base hydrolysis rate constant may give
**   an unreliable estimate.
F020 2066
EOR
F002 9
F010 3.1.2
F004 2
F005 RS
F006 Experimental Kb = 36.6 L/mol-sec
F007 Experimental Kb = 36.6 L/mol-sec
F020 2067
EOR
F002 9
F010 3.1.2
F004 3
F005 ME
```

F006
** Half life calculated from the k(b) published by Humphreys and Hammett
* (1955). This value was determined using a stirred-flow reactor at a
* methyl formate concentration of 0.01 to 0.06 mole/L in water. The k(b)
* was determined at 10, 20 and
F007
** Half life calculated from the k(b) published by Humphreys and Hammett
* (1955). This value was determined using a stirred-flow reactor at a
* methyl formate concentration of 0.01 to 0.06 mole/L in water. The k(b)
* was determined at 10, 20 and 30 deg C and at two concentrations at 20 deg
* C. Enthalpy and entropy of activation were determined for methyl formate
* and compared to that for methyl acetate.
**
** The half -lives were calculated from the relationship:
**
** T(1/2) = 0.693/k(b) [OH]
F020 9587
EOR
F002 9
F010 3.1.2
F004 3
F005 RE
F006 Humphreys, H and Hammett, L. Rate Measurements on Fast Reactions in the
* Stirred Flow Reactor: the Alkaline Hydrolysis of Methyl and Ethyl
* Formate. J. Am Chem Soc. 78: 521-524 (1956)
F007 Humphreys, H and Hammett, L. Rate Measurements on Fast Reactions in the
* Stirred Flow Reactor: the Alkaline Hydrolysis of Methyl and Ethyl
* Formate. J. Am Chem Soc. 78: 521-524 (1956)
F020 9590
EOR
F002 9
F010 3.1.2
F004 3
F005 RM
F006 The issue of the relevance of laboratory measurements of hydrolysis rates
* to hydrolysis under environmental conditions has been discussed by Mabry
* and Mill (Critical Review of Hydrolysis of Organic Compounds in Water
* Under Environmental Con
F007 The issue of the relevance of laboratory measurements of hydrolysis rates
* to hydrolysis under environmental conditions has been discussed by Mabry
* and Mill (Critical Review of Hydrolysis of Organic Compounds in Water
* Under Environmental Conditions. J Phys. Chem. Ref. Data 7: 383-415,
* 1978). These authors deal with the issue of relevance by giving
* citations that show where rates of hydrolysis have been measure under
* laboratory conditions in pure water and in natural waters, there is a
* high degree of correlation. Likewise they demonstrate that laboratory
* measurements of rates using millimolar concentrations of chemicals are
* applicable to environmental situations where the concentrations may be
* several orders of magnitude lower. They note that it is "axiomatic that
* rate processes found to be simple at high concentrations remain so at low
* concentrations".
**
** This discussion and the specific inclusion of methyl formate in the Mabry
* and Mill review paper provides credibility that the laboratory
* measurements can be relied upon to estimate hydrolysis rates in the
* environment.
F020 9589

EOR
F002 9
F010 3.1.2
F004 3
F005 RS
F006 Results:
**
** The Hammett determinations gave the following k(b) values:
**

Temp.	Conc	k(b) (L/mole-sec)
10.04	0.01	15.1
20.15	0.01	28.6
20.08	0.06	27.9
29.97	0.01	50.9

**
** Temp in deg C
** Concentration in M
**
** From these the Enthalpy
F007 Results:
**
** The Hammett determinations gave the following k(b) values:
**

Temp.	Conc	k(b) (L/mole-sec)
10.04	0.01	15.1
20.15	0.01	28.6
20.08	0.06	27.9
29.97	0.01	50.9

**
** Temp in deg C
** Concentration in M
**
** From these the Enthalpy of Activation was determined to be 9.81 kcal and
* the Entropy of Activation was determined to be -18.41 cal/deg and k(b)
* was determined to be 38.4 L/mole-sec, all at 25 deg C.
**
** Hammett also determined these parameters for ethyl formate and found the
* k(b) for that material to be 2.82 L/mole-sec at 25 deg C. He further
* compared the hydrolysis reaction rates of methyl acetate to that of
* methyl formate and found that the difference was accounted for mainly by
* differences in Enthalpy of Activation. He proceeded to discourse about
* charge separations and the effect of ionic bonding to the solvent on
* entropy of activation. This thorough analysis lends credibility to the
* accuracy of the k(b) determination. Furthermore, Hammett shows that the
* contribution to hydrolysis from the reaction of esters with water is so
* slow that it can be ignored relative to the reaction with hydroxyl
* radical at environmentally important pH values.
**
** To keep as close to the original data as possible, the half-lives at pH
* 7.0 and pH 8.0 were calculated with the data derives from the 0.01 M
* determination at 20.15 deg C.
**
** Using an [OH] of 1e-7 at pH 7 the half live is projected to be 67.3 hours
* (2.8 days) at pH 7 and 6.7 hours at pH 8.0 where the concentration of
* [OH] is tenfold higher.
F020 9588
EOR

```
F002 9
F010 3.1.2
F004 3
F005 TS
F006 Methyl Formate
F007 Methyl Formate
F020 9586
EOR
F002 9
F010 3.1.3
F004 1
F005 RE
F006 Lyman,W.J. et al., Handbook of Chemical Property Estima–
**   tion Methods, NY, McGraw–Hill, 4–9, (1982), zitiert nach:
**   HSDB 07/1993
F007 Lyman,W.J. et al., Handbook of Chemical Property Estima–
**   tion Methods, NY, McGraw–Hill, 4–9, (1982), zitiert nach:
**   HSDB 07/1993
F020 2068
EOR
F002 9
F010 3.1.3
F004 1
F005 RL
F006 Calculated with an acceptable method.
F007 Calculated with an acceptable method.
F020 2069
EOR
F002 9
F010 3.1.3
F004 1
F005 RM
F006 Based upon an estimated Koc of 5, methyl formate is ex–
**   pected to leach readily in soil.
**   Source: BASF AG Ludwigshafen
F007 Based upon an estimated Koc of 5, methyl formate is ex–
**   pected to leach readily in soil.
**   Source: BASF AG Ludwigshafen
F020 2070
EOR
F002 9
F010 3.3.2
F004 1
F005 ME
F006 EPIWIN level III model with measured VP, Herry's Law
**   constant and Kow
F007 EPIWIN level III model with measured VP, Herry's Law
**   constant and Kow
F020 2071
EOR
F002 9
F010 3.3.2
F004 1
F005 RE
F006 Calculated using the Level III model contained in EPIWIN
**   3.05  Syracuse Research Corporation 2001.
F007 Calculated using the Level III model contained in EPIWIN
```

```
**   3.05  Syracuse Research Corporation 2001.
F020 2072
EOR
F002 9
F010 3.3.2
F004 1
F005 RM
F006 Values for half-lives of air, water and soil were adjusted
**   from the defaults based on available data. The experimental
**   Ko/w and vapor pressure was also used in the calculation.
F007 Values for half-lives of air, water and soil were adjusted
**   from the defaults based on available data. The experimental
**   Ko/w and vapor pressure was also used in the calculation.
F020 2073
EOR
F002 9
F010 3.3.2
F004 1
F005 RS
F006   Chem Name   : Methyl Formate
**     Molecular Wt: 60.05
**     Henry's LC  : 0.000223 atm-m3/mole (Henry database)
**     Vapor Press : 586 mm Hg  (user-entered)
**     Log Kow     : -0.21  (user-entered)
**     Soil Koc    : 0.253  (calc by model)
**
**
**      Concentra
F007   Chem Name   : Methyl Formate
**     Molecular Wt: 60.05
**     Henry's LC  : 0.000223 atm-m3/mole (Henry database)
**     Vapor Press : 586 mm Hg  (user-entered)
**     Log Kow     : -0.21  (user-entered)
**     Soil Koc    : 0.253  (calc by model)
**
**
**      Concentration   Half-Life           Emissions
**                      (%)         (hr)        (kg/hr)
**      Air       35.9        1180        1000
**      Water     36.9        120         1000
**      Soil            27.1        120         1000
**      Sediment  0.0618            1440        0
**
**
**
**         Fugacity  Reaction    Advection   Reaction
**   Advection
**          (atm)     (kg/hr)     (kg/hr)   (percent)
**   (percent)
**   Air    5.57e-010    80.7      1.37e+003  2.69        45.6
**
**
**   Water 2.61e-009     812       141        27.1        4.68
**
**
**   Soil  6.93e-008     598         0          19.9         0
**
```

```
**
**   Sed   2.17e-009    0.113     0.00471    0.00378     0.000157
**
**
**
**
**
**
**
**
**
**
**      Persistence Time: 127 hr
**      Reaction Time:    256 hr
**      Advection Time:   252 hr
**      Percent Reacted:  49.7
**      Percent Advected: 50.3
**
**      Half-Lives (hr), (based upon user-entry):
**         Air:      1176
**         Water:    120
**         Soil:     120
**         Sediment: 1440
**
**      Advection Times (hr):
**         Air:      100
**         Water:    1000
**         Sediment: 5e+0
F020 2074
EOR
F002 9
F010 3.5
F004 1
F005 CL
F006 The material is biodegradable
F007 The material is biodegradable
F020 2075
EOR
F002 9
F010 3.5
F004 1
F005 RE
F006 BASF AG, Labor Oekologie; unveroeffentlichte Untersuchung
F007 BASF AG, Labor Oekologie; unveroeffentlichte Untersuchung
F020 2076
EOR
F002 9
F010 3.5
F004 2
F005 CL
F006 The test material is readily biodegradable
F007 The test material is readily biodegradable
F020 2077
EOR
F002 9
F010 3.5
F004 2
F005 ME
```

F006 The protocol was the same as the current ISO 14593 [Water
** quality -- Evaluation of ultimate aerobic biodegradability
** of organic compounds in aqueous medium -- Method by analysis
** of inorganic carbon in sealed vessels (CO2 headspace test)]
** bu
F007 The protocol was the same as the current ISO 14593 [Water
** quality -- Evaluation of ultimate aerobic biodegradability
** of organic compounds in aqueous medium -- Method by analysis
** of inorganic carbon in sealed vessels (CO2 headspace test)]
** but was conducted prior to the ISO protocol being accepted
** as an international standard. The procedure was also in
** accord with the current EPA guideline OPPTS 835.3120
** (Sealed-Vessel CO2 Production Test).
F020 2078
EOR
F002 9
F010 3.5
F004 2
F005 RE
F006 BASF AG, Labor Oekologie und Umweltanalytic, Prufung der
** biologischen Abbaubarkeit von Methylformate, rein im
** CO2-Headspace-Test nach GLP, EN 45001 und ISO 9002,
** unpublished report 1997
F007 BASF AG, Labor Oekologie und Umweltanalytic, Prufung der
** biologischen Abbaubarkeit von Methylformate, rein im
** CO2-Headspace-Test nach GLP, EN 45001 und ISO 9002,
** unpublished report 1997
F020 2079
EOR
F002 9
F010 3.5
F004 2
F005 RS
F006 Although the data fulfilled all OECD criteria for ready
** biodegradation of the material, the initial report only
** classified the material, "biologically degradable". This
** was because at the time the report was written the official
** method was
F007 Although the data fulfilled all OECD criteria for ready
** biodegradation of the material, the initial report only
** classified the material, "biologically degradable". This
** was because at the time the report was written the official
** method was still in the design phase. Since it is now an
** international standard, the classification can now be
** evaluated as "Readily Biodegradable" based on the data
** presented for both the CO2 evolution and the removal of DOC.
F020 2080
EOR
F002 9
F010 3.5
F004 2
F005 TS
F006 Methyl formate, purity 97.3%
F007 Methyl formate, purity 97.3%
F020 2081
EOR
F002 9

F010 4.1
F004 1
F005 CL
F006 The 24-hour LC50 for methyl formate in this study is > 100
** mg/L.
F007 The 24-hour LC50 for methyl formate in this study is > 100
** mg/L.
F020 2082
EOR
F002 9
F010 4.1
F004 1
F005 ME
F006 Based on a range-finding study, concentrations were fixed at
** 10.0, 21.5, 46.4, 100 and 215 mg/L. Test material was
** directly added to reconstituted fresh water (total hardness
** 2.5 mmol/L, acid capacity 0.8 mmol/L, pH about 8). Fish,
** body len
F007 Based on a range-finding study, concentrations were fixed at
** 10.0, 21.5, 46.4, 100 and 215 mg/L. Test material was
** directly added to reconstituted fresh water (total hardness
** 2.5 mmol/L, acid capacity 0.8 mmol/L, pH about 8). Fish,
** body length 6.3 to 7.5 cm, were added to 10 liter containers
** of water in groups of 10 at each concentration plus control
** using all-glass aquaria at 21° C. Mortality was determined
** at 1, 4, 24, 48, 72, and 96 hours.
F020 2083
EOR
F002 9
F010 4.1
F004 1
F005 RM
F006
** The volatility of methyl formate is a concern in this static
** study using nominal concentrations of methyl formate. As no
** analytical measurements were conducted, the final
** concentration of methyl formate may have been much lower due
** to vola
F007
** The volatility of methyl formate is a concern in this static
** study using nominal concentrations of methyl formate. As no
** analytical measurements were conducted, the final
** concentration of methyl formate may have been much lower due
** to volatilization and base-catalyzed hydrolysis. The
** 24-hour result is considered reliable. The lack of
** additional mortality after 48 hours is consistent with
** volatilization or hydrolysis. The predicted Henry's Law
** constant indicates that volatilization will be relative slow
** in comparison to the duration of the test. Hydrolysis,
** however, might be a significant means of test material loss.
** The half live for hydrolysis calculated from the hydroxyl
** ion concentration at pH 7.4 (the nominal pH during the test)
** and the Kb of 15.7 L/mol-sec (derived from Hydrowin) is 48
** hours. Therefore, significant loss of test material to
** hydrolysis is expected during the 96 hours of the test. The
** concentration of non-hydrolyzed test material at the end of
** the test would be about 25% of the original.

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**
**   The result is supported by the ECOSAR prediction using the
**   ester model of a 96-hour LC50 of 132 mg/L. This is of the
**   same magnitude as the highest concentration of Methyl
**   formate (500 mg/L) reduced by hydrolysis and evaporation to
**   the range of 100 mg/L by the end of the 96-hour stud
F020 2084
EOR
F002 9
F010 4.1
F004 1
F005 RS
F006
**   Mortality was as follows:
**
**   Nominal
**   Conc   # fish      2h    4h    24    48    72    96
**   10.0     10  0     0     0     0     0     0
**   21.5     10  0     0     0     0     0     0
**   46.4     10  0     0     0     0     0     0
**   100.0    10  0     0     1     3     3     3
**   215.0    10  0     0     10    10    10    10
**
**   Adverse clinical sighs were limited to "tumbling" for the
F007
**   Mortality was as follows:
**
**   Nominal
**   Conc   # fish      2h    4h    24    48    72    96
**   10.0     10  0     0     0     0     0     0
**   21.5     10  0     0     0     0     0     0
**   46.4     10  0     0     0     0     0     0
**   100.0    10  0     0     1     3     3     3
**   215.0    10  0     0     10    10    10    10
**
**   Adverse clinical sighs were limited to "tumbling" for the
**   100 mg/L group at the 24 hour observation and the 215 mg/L
**   group at the 4 hour observation
**
**   Oxygen levels and pH remained within normal ranges
**   throughout the study. The recorded temperature remained at
**   21° C at all measurements.
**
**   The ca 115 mg/L LC50 was interpolated from these data
F020 2085
EOR
F002 9
F010 4.1
F004 1
F005 SO
F006 BASF AG Ludwigshafen
F007 BASF AG Ludwigshafen
F020 2086
EOR
F002 9
F010 4.1
F004 1
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F005 TS
F006 Methyl formate, purity 97.7%
F007 Methyl formate, purity 97.7%
F020 2087
EOR
F002 9
F010 4.1
F004 2
F005 ME
F006 Dilution water was reconstituted freshwater with a total hardness of 2.5
* mmol/L, acid capacity of 0.8 mmol/L, a 4:1 ration of Ca:Mg. A 10:1 ratio
* of Na:K, and a pH of about 8.0.
**
** Fish ranging from 6.0 to 7.2 cm were tested, 10 per concentr
F007 Dilution water was reconstituted freshwater with a total hardness of 2.5
* mmol/L, acid capacity of 0.8 mmol/L, a 4:1 ration of Ca:Mg. A 10:1 ratio
* of Na:K, and a pH of about 8.0.
**
** Fish ranging from 6.0 to 7.2 cm were tested, 10 per concentration level
* at a loading of 2.8 grams of fish per L. of test water. The test
* temperature was 20°C and all glass aquaria containing 10 L water were
* utilized. Fish were not fed during the test.
**
** Oxygen levels of the test water were measured at 0, 24, 48, 72 and 96
* hours and was between 7.8 and 8.9 mg/L for all readings without any trend
* toward lower levels with increasing time or concentration.
**
** Without pH adjustment the following pH level at study initiation was
* measured 7.5, 7.0, 4.3 and 3.3; at 10, 21.5, 46.4 and 100 mg/L,
* respectively. In the 100 mg/L test where the pH was adjusted, the
* initial pH was 7.2 and the final pH at 96 hours was 7.5.
**
F020 10194
EOR
F002 9
F010 4.1
F004 2
F005 RE
F006 BASF AG, Dept. of Toxicology, unpublished study (88/218) Mar. 30, 1989
F007 BASF AG, Dept. of Toxicology, unpublished study (88/218) Mar. 30, 1989
F020 10197
EOR
F002 9
F010 4.1
F004 2
F005 RL
F006 The study was conducted according to an appropriate guideline and used
* scientifically defensible methodology.
F007 The study was conducted according to an appropriate guideline and used
* scientifically defensible methodology.
F020 10198
EOR
F002 9
F010 4.1
F004 2
F005 RM
F006 To assess the effect of the relatively low pH on the golden orfe the

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*    highest test concentration (100 mg/l) was investigated in parallel after
*    adjusting the pH with NaOH approximately to the pH of the control. After
*    the pH adjustment, 100 mg
F007 To assess the effect of the relatively low pH on the golden orfe the
*    highest test concentration (100 mg/l) was investigated in parallel after
*    adjusting the pH with NaOH approximately to the pH of the control. After
*    the pH adjustment, 100 mg/l was tolerated without mortality and
**   without any symptoms. The low pH is considered responsible for the
*    mortality at 100 mg/L without pH adjustment.
F020 10196
EOR
F002 9
F010 4.1
F004 2
F005 RS
F006
**   Under pH unadjusted conditions, 96-hour mortality was 100% at 100 mg/L
*    and 0% at all other concentrations.  No significant in-life signs were
*    reported.
**
**   Under pH-adjusted conditions, mortality was 0% at 100 mg/L and 0% in the
*    control. No a
F007
**   Under pH unadjusted conditions, 96-hour mortality was 100% at 100 mg/L
*    and 0% at all other concentrations.  No significant in-life signs were
*    reported.
**
**   Under pH-adjusted conditions, mortality was 0% at 100 mg/L and 0% in the
*    control. No adverse clinical signs were reported.
F020 10195
EOR
F002 9
F010 4.1
F004 2
F005 TS
F006 Formic Acid, Purity 95.3%
F007 Formic Acid, Purity 95.3%
F020 10193
EOR
F002 9
F010 4.1
F004 3
F005 ME
F006 Analytical values determined by spectrofluorimeter. Water obtained from
*    Lake Superior. Water chemistry evaluated along
**   with dissolved oxygen. Five concentrations tested.
F007 Analytical values determined by spectrofluorimeter. Water obtained from
*    Lake Superior. Water chemistry evaluated along
**   with dissolved oxygen. Five concentrations tested.
F020 10211
EOR
F002 9
F010 4.1
F004 3
F005 RE
F006 Poirier, S.H., M.L. Knuth, C.A. Anderson-Bucho, L.T. Brooke, A.R. Lima,
*    and P.J. Shubat. (1986), Comparative toxicity of methanol and
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*    N,N,-dimethylformamide to freshwater fish and invertebrates. Bull.
*    Environ.Contam. Toxicol. 37: 615-621.
F007 Poirier, S.H., M.L. Knuth, C.A. Anderson-Bucho, L.T. Brooke, A.R. Lima,
*    and P.J. Shubat. (1986), Comparative toxicity of methanol and
*    N,N,-dimethylformamide to freshwater fish and invertebrates. Bull.
*    Environ.Contam. Toxicol. 37: 615-621.
F020 10213
EOR
F002 9
F010 4.1
F004 3
F005 RS
F006 Effects were noted almost immediately at the two highest
**   concentrations. Most of the mortality was noted within 3 hours.
F007 Effects were noted almost immediately at the two highest
**   concentrations. Most of the mortality was noted within 3 hours.
F020 10212
EOR
F002 9
F010 4.1
F004 3
F005 TS
F006 Methanol (Burdick & Jackson)
F007 Methanol (Burdick & Jackson)
F020 10210
EOR
F002 9
F010 4.1
F004 4
F005 ME
F006 Five concentrations were tested. Water was from Lake Superior. Water
*    chemistry and dissolved oxygen levels were determined.
F007 Five concentrations were tested. Water was from Lake Superior. Water
*    chemistry and dissolved oxygen levels were determined.
F020 10215
EOR
F002 9
F010 4.1
F004 4
F005 RE
F006 Poirier, S.H., M.L. Knuth, C.A. Anderson-Bucho, L.T. Brooke, A.R. Lima,
*    and P.J. Shubat. (1986), Comparative toxicity of methanol and
*    N,N,-dimethylformamide to freshwater fish and invertebrates. Bull.
*    Environ.Contam. Toxicol. 37: 615-621.
F007 Poirier, S.H., M.L. Knuth, C.A. Anderson-Bucho, L.T. Brooke, A.R. Lima,
*    and P.J. Shubat. (1986), Comparative toxicity of methanol and
*    N,N,-dimethylformamide to freshwater fish and invertebrates. Bull.
*    Environ.Contam. Toxicol. 37: 615-621.
F020 10217
EOR
F002 9
F010 4.1
F004 4
F005 RS
F006 Effects were noted at the top two concentrations. Most mortality was
**   noted within the first 12 hours.
F007 Effects were noted at the top two concentrations. Most mortality was
```

```
**   noted within the first 12 hours.
F020 10216
EOR
F002 9
F010 4.1
F004 4
F005 TS
F006 Methanol (Burdick & Jackson)
F007 Methanol (Burdick & Jackson)
F020 10214
EOR
F002 9
F010 4.2
F004 1
F005 CL
F006 The 48-hour EC50 for this material is greater than 500 mg/L
**   based on nominal concentrations
F007 The 48-hour EC50 for this material is greater than 500 mg/L
**   based on nominal concentrations
F020 2088
EOR
F002 9
F010 4.2
F004 1
F005 ME
F006 The study was run in accord with the EU guideline 79/831 EWG
**   Annex C2, without any concentration analysis.  Five daphnids
**   were exposed per container with four container per
**   concentration for a total of 20 daphnids per concentration.
**   Concen
F007 The study was run in accord with the EU guideline 79/831 EWG
**   Annex C2, without any concentration analysis.  Five daphnids
**   were exposed per container with four container per
**   concentration for a total of 20 daphnids per concentration.
**   Concentrations were 0, 62.5, 125, 250 and 500 mg/L. A 500
**   mg/L stock was prepared and diluted to produce the dilution
**   series. THe test was conducted in filtered tap water with a
**   hardness of 2.7 mmol/L at a pH of 7.7 to 8.3.
F020 2089
EOR
F002 9
F010 4.2
F004 1
F005 RE
F006 BASF AG, Labor Oekologie; Bestimmung der akute Wirking von
**   Methylformate gegeguber dem Wasserfloh Daphnia magns Straus.
**   Unpublished Report (0074/88) 1988
F007 BASF AG, Labor Oekologie; Bestimmung der akute Wirking von
**   Methylformate gegeguber dem Wasserfloh Daphnia magns Straus.
**   Unpublished Report (0074/88) 1988
F020 2090
EOR
F002 9
F010 4.2
F004 1
F005 RM
F006 The test material was susceptible to volatility and
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**   base-catalyzed hydrolysis and as no analytical measurements
**   were taken, the actual concentrations during the test are
**   not known.
**
**   Concerning the possible volatility of methyl formate in th
F007 The test material was susceptible to volatility and
**   base-catalyzed hydrolysis and as no analytical measurements
**   were taken, the actual concentrations during the test are
**   not known.
**
**   Concerning the possible volatility of methyl formate in this
**   study conducted under static conditions, although methyl
**   formate has a high vapor pressure, it is hydrophilic and
**   hence binds to water reducing its rate of volatilization
**   from aqueous media. The Henry's Law constant for methyl
**   formate of 2.23E-4 atm-m3/mole (found in EPIWIN 3.05 Henry's
**   Law experimental dataset) is in a range where atmospheric
**   loss during a study will occur but probably would not be
**   highly significant under normal experimental conditions.
**
**   Base catalyzed hydrolysis, however, is expected to be a
**   significant source of test material conversion to hydrolysis
**   products. Using the measured Kb at 25° C, and a typical pH
**   reported during this study of 8.0, the initial concentration
**   of 500 mg/L would be expected to fall to about 30 mg/L after
**   24 hours (four half-lives) and to about 2 mg/L by the end of
**   the 48 hour study. As the temperature was a bit lower than
**   25°C, the levels may not have fallen as much due to
**   hydrolysis but it is expected that the vast majority of the
**   initial methyl formate would be converted to methanol and
**   formic acid by the end of the 48-hour test period.
**
**   AAlthough the concentration of test material and hydrolysis
**   products cannot be established with certainty, the results
**   are considered sufficient for characterization of the
**   toxicity of Methyl formate to invertebrates because under
**   environmental conditions rapid hydrolysis will also occur
**   and the initial level was five times the maximum level
**   recommended for a limit test under current OECD guidance.
F020 2091
EOR
F002 9
F010 4.2
F004 1
F005 RS
F006 There was no mortality at any time or concentration
**   thoughout the test.
F007 There was no mortality at any time or concentration
**   thoughout the test.
F020 2092
EOR
F002 9
F010 4.2
F004 1
F005 TS
F006 Methyl formate, purity 97%
F007 Methyl formate, purity 97%
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F020 2093
EOR
F002 9
F010 4.2
F004 2
F005 ME
F006 exposure time: 24-96 h;
** LC0 and LC100 based on nominal concentration
** organism length= 5 mm
** glass stoppered conical flasks were used
** initial pH of medium =8
** medium = sea water
** temperature: 15 deg C
** salinity: 28 o/oo
** renewal every 24 h
F007 exposure time: 24-96 h;
** LC0 and LC100 based on nominal concentration
** organism length= 5 mm
** glass stoppered conical flasks were used
** initial pH of medium =8
** medium = sea water
** temperature: 15 deg C
** salinity: 28 o/oo
** renewal every 24 hours
** Test in duplicate, 10 animals per vessel
** volume = 1000 sea water
** no analysis
** Concentrations = 1, 10, 32, 100, 320, 560, 1000 mg/L
** pH varied from 7.9 at 0 mg/L to 6.9 at 1000 mg/L
F020 2094
EOR
F002 9
F010 4.2
F004 2
F005 RE
F006 Adema,D.M.M., Aquatic toxicity of compounds that may be
** carried by ships (Marpol 1973, Annex II), A progress report
** for 1983 and 1984, Delft, TNO, 1984, (Rep.No.R84/59),
** zitiert nach: ECDIN 07/1993
F007 Adema,D.M.M., Aquatic toxicity of compounds that may be
** carried by ships (Marpol 1973, Annex II), A progress report
** for 1983 and 1984, Delft, TNO, 1984, (Rep.No.R84/59),
** zitiert nach: ECDIN 07/1993
F020 2095
EOR
F002 9
F010 4.2
F004 2
F005 TS
F006 Methyl formate, Fluka AG, Purity > 97%
F007 Methyl formate, Fluka AG, Purity > 97%
F020 2096
EOR
F002 9
F010 4.2
F004 3
F005 CL

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F006 Under these conditions, the EC50 for daphnids was greaterthan 1070 mg/L,
*    the NOEC was 122 mg/L.
F007 Under these conditions, the EC50 for daphnids was greaterthan 1070 mg/L,
*    the NOEC was 122 mg/L.
F020 10202
EOR
F002 9
F010 4.2
F004 3
F005 ME
F006 The study was conducted using a flow-through design at 5nominal
*    concentrations (60, 120, 250, 500 and 1000 mg/L)test material. Actual
*    concentrations were measured(duplicate) at the beginning and end of the
*    96-hour exposureperiod and the mea
F007 The study was conducted using a flow-through design at 5nominal
*    concentrations (60, 120, 250, 500 and 1000 mg/L)test material. Actual
*    concentrations were measured(duplicate) at the beginning and end of the
*    96-hour exposureperiod and the means were: 74, 122, 247, 447 and
*    1070mg/L.Dilution water was blended well water/RO water with ahardness of
*    178 mg/L, alkalinity of 210 mg/L, and a pH of 7.8. Twenty first-instar
*    daphnids per concentration wereexposed (four replicate chambers of five
*    daphnids at eachconcentration plus control) using a flow rate of 6.1
*    volumereplacements per day for the 1-liter test chamberscontaining five
*    daphnids each. Daphnids were observed dailyfor mortality and compound
*    related sub-lethal effects.Temperature, oxygen levels, pH and test
*    materialconcentrations were measured at 0 and 48 hours.
F020 10200
EOR
F002 9
F010 4.2
F004 3
F005 RE
F006 Analytical Biochemistry Laboratories Inc, Columbia MO. Report #38314
*    Acute Flow-Through Toxicity of Sodium Formate (C-1261) to Daphnia magna.
*    Hoechst-Celanese sponsor, March 13, 1990
F007 Analytical Biochemistry Laboratories Inc, Columbia MO. Report #38314
*    Acute Flow-Through Toxicity of Sodium Formate (C-1261) to Daphnia magna.
*    Hoechst-Celanese sponsor, March 13, 1990
F020 10203
EOR
F002 9
F010 4.2
F004 3
F005 RS
F006 The mortality and extent of sublethal effects are shown in
**   the table.
**
**                      MORTALITY
**   Nom.   Meas   24 hr   48 hr    Other
**   Conc   Conc                       Effects
**   0      0     1     1     none
**   60     74    1     1     none
**   120    122   0     0     none
**   250    247   0     0     very
F007 The mortality and extent of sublethal effects are shown in
**   the table.
**
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**                      MORTALITY
**   Nom.   Meas   24 hr   48 hr    Other
**   Conc   Conc                       Effects
**   0      0     1     1     none
**   60     74    1     1     none
**   120    122   0     0     none
**   250    247   0     0     very few
**   599    447   1     1     few
**   1000   1070  1     1     many
F020 10201
EOR
F002 9
F010 4.2
F004 3
F005 TS
F006 Sodium formate, described as white granules, received fromHoechst
*    Celanese Corporation coded C-01261. Purity notspecified.
F007 Sodium formate, described as white granules, received fromHoechst
*    Celanese Corporation coded C-01261. Purity notspecified.
F020 10199
EOR
F002 9
F010 4.2
F004 4
F005 ME
F006 The protocol followed IN 38412. Concentrations tested were from 0 to 0000
*    ppm.
**   Immobilization was the endpoint evaluated. Water chemistry was determined.
F007 The protocol followed IN 38412. Concentrations tested were from 0 to 0000
*    ppm.
**   Immobilization was the endpoint evaluated. Water chemistry was determined.
F020 10219
EOR
F002 9
F010 4.2
F004 4
F005 RE
F006 Kuhn, R., M. Pattard, K. Pemak, and A. Winter. (1989). Result of harmful
*    effects of selected water pollutants (anilines, phenols, aliphatic
*    compounds) to Daphina magna.  Water Research 23(4): 495-499.
F007 Kuhn, R., M. Pattard, K. Pemak, and A. Winter. (1989). Result of harmful
*    effects of selected water pollutants (anilines, phenols, aliphatic
*    compounds) to Daphina magna.  Water Research 23(4): 495-499.
F020 10221
EOR
F002 9
F010 4.2
F004 4
F005 RM
F006 For similar study see Calleja, M.C., G. Persoone, and P.Geadi, (1994),
*    Comparative acute toxicity of the first 50 multicentre evaluations of in
*    vitro cytotoxicity chemicals to aquatic non-vertebrates. Arch. Environ.
*    Contam. Toxicol. 26, 69
F007 For similar study see Calleja, M.C., G. Persoone, and P.Geadi, (1994),
*    Comparative acute toxicity of the first 50 multicentre evaluations of in
*    vitro cytotoxicity chemicals to aquatic non-vertebrates. Arch. Environ.
*    Contam. Toxicol. 26, 69 - 78 The L(E)C50 for methanol in Daphnia Magna
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*   was reported as 668,000 umol/L).
F020 10220
EOR
F002 9
F010 4.2
F004 4
F005 TS
F006 Methanol
F007 Methanol
F020 10218
EOR
F002 9
F010 4.3
F004 1
F005 RE
F006 BASF AG, Labor Oekologie; unveroeffentlichte Unter–
**   suchung, (0074/88)
F007 BASF AG, Labor Oekologie; unveroeffentlichte Unter–
**   suchung, (0074/88)
F020 2097
EOR
F002 9
F010 4.3
F004 1
F005 RM
F006 EC90(72h) >500 mg/l.
F007 EC90(72h) >500 mg/l.
F020 2098
EOR
F002 9
F010 4.3
F004 1
F005 SO
F006 BASF AG Ludwigshafen
F007 BASF AG Ludwigshafen
F020 2099
EOR
F002 9
F010 4.3
F004 2
F005 CL
F006 Under these conditions, the 96-hour EC50 for algal growthwas 790 mg/L and
*   the NOEC was estimated to be 125 mg/L. TheEC10 was calculated to be 99
*   mg/L from thje regressionequation.
F007 Under these conditions, the 96-hour EC50 for algal growthwas 790 mg/L and
*   the NOEC was estimated to be 125 mg/L. TheEC10 was calculated to be 99
*   mg/L from thje regressionequation.
F020 10207
EOR
F002 9
F010 4.3
F004 2
F005 ME
F006 Two preliminary toxicity tests were conducted to setconcentration levels
*   for the definitive test. In the first96-hour preliminary test, test
*   concentrations of 1, 10 or100 mg/L produced growth inhibitions of 0, 18
*   or 50%,respectively. The se

F007 Two preliminary toxicity tests were conducted to setconcentration levels
*   for the definitive test. In the first96-hour preliminary test, test
*   concentrations of 1, 10 or100 mg/L produced growth inhibitions of 0, 18
*   or 50%,respectively. The second preliminary test was started as
*   adefinitive test with triplicate cultures at concentrationsof 20, 40, 80,
*   160 or 320 mg/L. Algal cells counts in thisstudy wer 110, 110, 110, 110
*   or 86 % of the controlpopulation. Thus it was determined that there was
*   aninsufficient inhibitory response to define the IC50 and afinal
*   definitive test was set up. Algal media was inoculatedwith 1 million
*   cells of test organism into triplicate 250 mlflasks, closed with a foam
*   plug, containing 100 ml algalgrowth media. Dilutions of test material in
*   growth mediawere prepared from a 1000 mg/L stock of test material
*   ingrowth media. Flasks were incubated and agitated (100 rpm)in random
*   positions for 96 hours under 4300 Lux lighting at24 degrees C. Cell
*   counts were conducted daily for each testreplicate using a hemacytometer
*   and compound microscope.Concentration of test material in the media was
*   determinedat the beginning and end of the incubation period and
*   meanconcentrations reported. Cell counts for each replicate andcontrols
*   were subjected to analysis of variance (ANOVA)followed by Dunnett's test
*   accepting p< 0.05 as significant.IC50 values were calculated from a
*   regression plot. Tworegression plots were constructed using either the
*   mean cellcount or the log of the cell count. The regression
*   equationgiving the best fit was used to determine the IC50.
F020 10205
EOR
F002 9
F010 4.3
F004 2
F005 RE
F006 Analytical Biochemistry Laboratories Inc., Acute Toxicity of Sodium
*   Formate to Selenastrum capricornutum Printz. Report#38315, Sponsored by
*   Hoechst Celanese, March 16, 1990.
F007 Analytical Biochemistry Laboratories Inc., Acute Toxicity of Sodium
*   Formate to Selenastrum capricornutum Printz. Report#38315, Sponsored by
*   Hoechst Celanese, March 16, 1990.
F020 10209
EOR
F002 9
F010 4.3
F004 2
F005 RM
F006 Supported by a 1984 Huels study reported in IUCLID 2000, in which the
*   EC50 for Scenedesmus subspicatus was reported to be greater than or equal
*   to 1000 mg/L.
**
F007 Supported by a 1984 Huels study reported in IUCLID 2000, in which the
*   EC50 for Scenedesmus subspicatus was reported to be greater than or equal
*   to 1000 mg/L.
**
F020 10206
EOR
F002 9
F010 4.3
F004 2
F005 RS
F006 Measured concentrations were very close to nominal
**   concentrations, the concentration at termination was similar

```
**   to the starting concentration and no loss of test material
**   was apparent. Concentrations above 250 mg/L were inhibitory
**   and the d
F007 Measured concentrations were very close to nominal
**   concentrations, the concentration at termination was similar
**   to the starting concentration and no loss of test material
**   was apparent. Concentrations above 250 mg/L were inhibitory
**   and the data are shown in the table.
**
**   pH varied from 6.9 to 7.4 at initiation and 7.8 to 8.1 at 96-hours.  It
*    was not concentration dependent.
**
**
**   Mean cells counts were as follows:
**
**   Nomin      Meas             TIME (hours)
**   Conc       Conc         24     48      72      96
**   0(mg/L)    <5            2.9    12      45     140
**   63            58.3         2.0    8.2*    40     140
**   125         121           1.1*   8.3*    30*    110
**   250         243           1.3*   6.8*    28*     93*
**   500         498           0.78*  4.6*   27*     88*
**   1000      1001          0.93*  3.5*    8*     61*
**
**   Counts are in units of 10,000 cells/ml
**   * Denotes significant inhibition at p<0.0
**
**   A quadratic equation was developed using percent difference
**   in cell count from control versus ln concentration.  From
**   this equation, the EC50 was calculated to be 790 mg/L and
**   the EC10 as 99 mg/L (based on nominal concentrations). The
**   NOEC is considered to be 125 mg/L.
F020 10208
EOR
F002 9
F010 4.3
F004 2
F005 TS
F006 Sodium formate, described as white granules, received from Hoechst
*    Celanese Corporation coded C-01261. Purity not specified.
F007 Sodium formate, described as white granules, received from Hoechst
*    Celanese Corporation coded C-01261. Purity not specified.
F020 10204
EOR
F002 9
F010 4.3
F004 3
F005 RE
F006 New Energy Development Organization (NEDO) (1986). Toxicological research
*    of methanol as a fuel for power station. Tokyo, Japan. September
F007 New Energy Development Organization (NEDO) (1986). Toxicological research
*    of methanol as a fuel for power station. Tokyo, Japan. September
F020 10223
EOR
F002 9
F010 4.3
F004 3
```

F005 TS
F006 Methanol
F007 Methanol
F020 10222
EOR
F002 9
F010 4.3
F004 4
F005 CL
F006 Under these conditions, the 96-hour EC50 for algal growth was 790 mg/L
* and the NOEC was estimated to be 125 mg/L. The EC10 was calculated to be
* 99 mg/L from the regression equation.
F007 Under these conditions, the 96-hour EC50 for algal growth was 790 mg/L
* and the NOEC was estimated to be 125 mg/L. The EC10 was calculated to be
* 99 mg/L from the regression equation.
F020 10227
EOR
F002 9
F010 4.3
F004 4
F005 ME
F006 Two preliminary toxicity tests were conducted to setconcentration levels
* for the definitive test. In the first96-hour preliminary test, test
* concentrations of 1, 10 or100 mg/L produced growth inhibitions of 0, 18
* or 50%,respectively. The se
F007 Two preliminary toxicity tests were conducted to setconcentration levels
* for the definitive test. In the first96-hour preliminary test, test
* concentrations of 1, 10 or100 mg/L produced growth inhibitions of 0, 18
* or 50%,respectively. The second preliminary test was started as
* adefinitive test with triplicate cultures at concentrationsof 20, 40, 80,
* 160 or 320 mg/L. Algal cells counts in thisstudy wer 110, 110, 110, 110
* or 86 % of the controlpopulation. Thus it was determined that there was
* aninsufficient inhibitory response to define the IC50 and afinal
* definitive test was set up. Algal media was inoculatedwith 1 million
* cells of test organism into triplicate 250 mlflasks, closed with a foam
* plug, containing 100 ml algalgrowth media. Dilutions of test material in
* growth mediawere prepared from a 1000 mg/L stock of test material
* ingrowth media. Flasks were incubated and agitated (100 rpm)in random
* positions for 96 hours under 4300 Lux lighting at24 degrees C. Cell
* counts were conducted daily for each testreplicate using a hemacytometer
* and compound microscope.Concentration of test material in the media was
* determinedat the beginning and end of the incubation period and
* meanconcentrations reported. Cell counts for each replicate andcontrols
* were subjected to analysis of variance (ANOVA)followed by Dunnett's test
* accepting p< 0.05 as significant.IC50 values were calculated from a
* regression plot. Tworegression plots were constructed using either the
* mean cellcount or the log of the cell count. The regression
* equationgiving the best fit was used to determine the IC50.
F020 10225
EOR
F002 9
F010 4.3
F004 4
F005 RE
F006 Analytical Biochemistry Laboratories Inc., Acute Toxicity ofSodium
* Formate to Selenastrum capricornutum Printz. Report #38315, Sponsored by
* Hoechst Celanese, March 16, 1990.

F007 Analytical Biochemistry Laboratories Inc., Acute Toxicity ofSodium
* Formate to Selenastrum capricornutum Printz. Report #38315, Sponsored by
* Hoechst Celanese, March 16, 1990.
F020 10228
EOR
F002 9
F010 4.3
F004 4
F005 RS
F006 Measured concentrations were very close to nominal
** concentrations, the concentration at termination was similar
** to the starting concentration and no loss of test material
** was apparent. Concentrations above 250 mg/L were inhibitory
** and the d
F007 Measured concentrations were very close to nominal
** concentrations, the concentration at termination was similar
** to the starting concentration and no loss of test material
** was apparent. Concentrations above 250 mg/L were inhibitory
** and the data are shown in the table.
**
** pH varied from 6.9 to 7.4 at initiation and 7.8 to 8.1 at 96-hours. It
* was not concentration dependent.
**
**
** Mean cells counts were as follows:
**

Nomin Conc 0(mg/L)	Meas Conc <5	TIME (hours) 24	48	72	96
		2.9	12	45	140
63	58.3	2.0	8.2*	40	140
125	121	1.1*	8.3*	30*	110
250	243	1.3*	6.8*	28*	93*
500	498	0.78*	4.6*	27*	88*
1000	1001	0.93*	3.5*	8*	61*

**
** Counts are in units of 10,000 cells/ml
** * Denotes significant inhibition at p<0.0
**
** A quadratic equation was developed using percent difference
** in cell count from control versus ln concentration. From
** this equation, the EC50 was calculated to be 790 mg/L and
** the EC10 as 99 mg/L (based on nominal concentrations). The
** NOEC is considered to be 125 mg/L.
F020 10226
EOR
F002 9
F010 4.3
F004 4
F005 TS
F006 Sodium formate, described as white granules, received from Hoechst
* Celanese Corporation coded C-01261. Purity notspecified.
F007 Sodium formate, described as white granules, received from Hoechst
* Celanese Corporation coded C-01261. Purity notspecified.
F020 10224
EOR
F002 9
F010 5.1.1

F004 1
F005 CL
F006 The Acute oral LD50 for rats is about 1500 mg/kg
F007 The Acute oral LD50 for rats is about 1500 mg/kg
F020 2100
EOR
F002 9
F010 5.1.1
F004 1
F005 ME
F006 The test material in aqua dest. was administered at a volume
** of 10 mg/kg to group of 5 Sprague-Dawley rats of each sex.
** Five dose levels were administered and animals were observed
** for 14 days prior to sacrifice and necropsy. The age of rat
F007 The test material in aqua dest. was administered at a volume
** of 10 mg/kg to group of 5 Sprague-Dawley rats of each sex.
** Five dose levels were administered and animals were observed
** for 14 days prior to sacrifice and necropsy. The age of rats
** was not reported; however, bodyweights are provided.
F020 2101
EOR
F002 9
F010 5.1.1
F004 1
F005 RE
F006 BASF AG, Abteilung Toxikologie, unveroeffentlichte
F007 BASF AG, Abteilung Toxikologie, unveroeffentlichte
F020 2102
EOR
F002 9
F010 5.1.1
F004 1
F005 RS
F006 The following mortality was recorded, all deaths occurred
** within the first hour after dosing.
**
** DOSE (mg/kg) Males Females
** 2150 5/5 5/5
** 1470 2/5 2/5
** 1000 0/5 0/5
** 681 0/5 0/5
** 464 0/5 0/5
**
**
** The following clinica
F007 The following mortality was recorded, all deaths occurred
** within the first hour after dosing.
**
** DOSE (mg/kg) Males Females
** 2150 5/5 5/5
** 1470 2/5 2/5
** 1000 0/5 0/5
** 681 0/5 0/5
** 464 0/5 0/5
**
**
** The following clinical signs were reported

```
**
**   Dose   Signs
**   2150   Irregular respiration
**    Apathy
**    Staggering
**    Spastic gait
**    Cyanotic
**    Poor general appearance
**    Shortness of breath
**
**   1470   Irregular respiration
**    Apathy
**    Staggering
**    Poor general appearance
**
**   1000   Irregular respiration
**    Apathy
**    Poor general appearance
**
**   681    none reported
**
**   464    none reported
**
**
**
**   The flowing necropsy observation were reported in animals
**   dying from exposure:
**
**   Lungs:             Bloodfilled with edema
**   Stomach:     Erosion of the glandular stomach
**   Heart:       Dilation
**   Intestine:   Irritation
**
**
**   The flowing necropsy observation were reported in animals
**   dying from exposure:
**
**   All organs normal
**
**
**   Body weights were as follows:
**
**   Males: mean body weights
**
**          DAYS AFTER TREATMENT
**   Dose   0-day 2-4    7    14
**   2150   190   -     -     -
**   1470   270   300   321   344
**   1000   270   289   317   336
**   681    260   288   312   329
**   464    200   231   252   277
**
**   Females: mean body weights
**
**   Dose   0-day 2-4    7    14
**   2150   180   -     -     -
**   1470   180   192   208   211
```

```
**   1000   190   216   222   232
**   681    200   223   228   231
**   464    210   232   240   244
**
**
**   The LD50 was estimated from examination of the data as the dose that
*    produced 40% mortality in the study. There were insufficient data points
*    to apply a quantitative mathematical model.
F020 2103
EOR
F002 9
F010 5.1.1
F004 1
F005 TS
F006 methyl formate, purity 98 %
F007 methyl formate, purity 98 %
F020 2104
EOR
F002 9
F010 5.1.1
F004 2
F005 RE
F006 Munch J.C.: Industr. Med. Surg. 41 (4), 31 (1972) cited in:
**   Henschler D.: MAK–Begruendung (1974)
F007 Munch J.C.: Industr. Med. Surg. 41 (4), 31 (1972) cited in:
**   Henschler D.: MAK–Begruendung (1974)
F020 2105
EOR
F002 9
F010 5.1.1
F004 2
F005 RM
F006 The value refers to LD50/24 hours and ND50 (narcotic dose
**   50%) according to the authors.
F007 The value refers to LD50/24 hours and ND50 (narcotic dose
**   50%) according to the authors.
F020 2106
EOR
F002 9
F010 5.1.2
F004 1
F005 CL
F006 The 4-hour inhalation LC50 in rats is greater than 21 mg/L
F007 The 4-hour inhalation LC50 in rats is greater than 21 mg/L
F020 2107
EOR
F002 9
F010 5.1.2
F004 1
F005 ME
F006 Three male and three female animals were treated using
**   whole-body exposure to vapors of test material for 4 hours.
**   Animals were housed individually. Males were 8-weeks old and
**   weighed between 298 and 314 grams at the time of the
**   exposure. F
F007 Three male and three female animals were treated using
**   whole-body exposure to vapors of test material for 4 hours.
```

**   Animals were housed individually. Males were 8-weeks old and
**   weighed between 298 and 314 grams at the time of the
**   exposure. Females were 10 weeks old and weighed between 216
**   and 229 grams. The target and nominal concentrations were 20
**   mg/L. Actual concentration was measured once an hour during
**   the exposure using a MIRAN 1A Ambient Air analyzer. Mean
**   measured concentration was 21 mg/L over the 4-hour exposure.
**   Temperature during the exposure ranged from 76 to 78 °F.,
**   relative humidity ranged from 48 to 50%. Rats were observed
**   daily for adverse clinical manifestations for seven days
**   after exposure and were sacrificed without post-mortem
**   exposure.
**   -
F020 2108
EOR
F002 9
F010 5.1.2
F004 1
F005 RE
F006 BioDynamics Inc, Project 87-8030, An Acute Inhalation
**   Toxicity Study of C-1160 in the Rat. Sponsored by Hoechst-
**   Celanese, 1/06/1988
F007 BioDynamics Inc, Project 87-8030, An Acute Inhalation
**   Toxicity Study of C-1160 in the Rat. Sponsored by Hoechst-
**   Celanese, 1/06/1988
F020 2109
EOR
F002 9
F010 5.1.2
F004 1
F005 RM
F006 This study is considered key and considered reliable for
**   establishing the LC50 value even though it does not meet the
**   current OECD guideline. The study was conducted under glp
**   conditions and the nominal and measured concentrations of
**   test s
F007 This study is considered key and considered reliable for
**   establishing the LC50 value even though it does not meet the
**   current OECD guideline. The study was conducted under glp
**   conditions and the nominal and measured concentrations of
**   test substance were similar. Animals showed few serious
**   clinical signs during the exposure and recovered rapidly.
**   -
F020 2110
EOR
F002 9
F010 5.1.2
F004 1
F005 RS
F006 All animals survived the duration of the study. Observations
**   noted during exposure included lacrimation, reduced
**   activities, and eyes closed. Signs exhibited upon removal
**   from the chamber and during the two-hour poet-exposure
**   period were li
F007 All animals survived the duration of the study. Observations
**   noted during exposure included lacrimation, reduced
**   activities, and eyes closed. Signs exhibited upon removal

**   from the chamber and during the two-hour poet-exposure
**   period were limited to a few secretory signs and ano-genital
**   staining. Virtually no adverse sings were exhibited by
**   animals during the 7-day observation period. Animal weights
**   were recorded prior to exposure and at the end of the 7-day
**   observation period. All animals gained weight during this
**   period and the body weight date were considered unremarkable
**   by the study director.
**   -
F020 2111
EOR
F002 9
F010 5.1.2
F004 2
F005 ME
F006 Ten male and ten female rats were exposed by whole body
**   inhalation to vapors of the test substance at a nominal
**   concentration of 19.4 mg/L (measured concentration of 5.2
**   mg/L). Animals were housed five per wire cage during the
**   exposure. Exp
F007 Ten male and ten female rats were exposed by whole body
**   inhalation to vapors of the test substance at a nominal
**   concentration of 19.4 mg/L (measured concentration of 5.2
**   mg/L). Animals were housed five per wire cage during the
**   exposure. Exposure concentration was determined by gas
**   chromatography. Animals were observed for 14 days after the
**   exposure sacrificed and necropsied.
F020 2112
EOR
F002 9
F010 5.1.2
F004 2
F005 RE
F006 BASF AG, Abteilung Toxikologie, unveroeffentlichte
**   Untersuchung (78/495), 22.05.1979
F007 BASF AG, Abteilung Toxikologie, unveroeffentlichte
**   Untersuchung (78/495), 22.05.1979
F020 2113
EOR
F002 9
F010 5.1.2
F004 2
F005 RM
F006 This study is considered supporting information.
F007 This study is considered supporting information.
F020 2114
EOR
F002 9
F010 5.1.2
F004 2
F005 RS
F006 No animal died during the study. Clinical signs were limited
**   to watering eyes and ruffled fur and were cleared after day
**   2 of the study. Some males showed hair loss on the muzzle.
**
**
**   Body weights (mean)

**   Males wt (g)   Females wt (g)
**   Day   Test
F007 No animal died during the study. Clinical signs were limited
**   to watering eyes and ruffled fur and were cleared after day
**   2 of the study. Some males showed hair loss on the muzzle.
**
**
**   Body weights (mean)
**   Males wt (g)   Females wt (g)
**   Day   Test Control   Test Control
**   Start 187   188   189   187
**   Day 7 224   218   203   197
**   Day 14 260   267   213   206
F020 2115
EOR
F002 9
F010 5.1.2
F004 2
F005 TS
F006 Methylformate. Prod. Nr 04837Purity 98%
F007 Methylformate. Prod. Nr 04837Purity 98%
F020 2116
EOR
F002 9
F010 5.1.2
F004 3
F005 CL
F006 The acute LC50 is greater than 5000 ppm for 1 hour and 2000
**   ppm for 8 hours.
F007 The acute LC50 is greater than 5000 ppm for 1 hour and 2000
**   ppm for 8 hours.
F020 2117
EOR
F002 9
F010 5.1.2
F004 3
F005 ME
F006 Results of the exposure of unspecified (presumably rats)
**   experimental animals to the vapors of methyl formate are
**   presented in this brief report of experimental findings. No
**   experimental details were presented.
F007 Results of the exposure of unspecified (presumably rats)
**   experimental animals to the vapors of methyl formate are
**   presented in this brief report of experimental findings. No
**   experimental details were presented.
F020 2118
EOR
F002 9
F010 5.1.2
F004 3
F005 RM
F006 This study is considered supporting
F007 This study is considered supporting
F020 2119
EOR
F002 9
F010 5.1.2

F004 3
F005 RS
F006 The following results are provided:
**
** Kills most animals in a short time 50,000 ppm
**
** Dangerous to life in 30 to 60 minutes 15,000 - 25,000 ppm
**
** Maximum concentration tolerated for
** 60 min without serious disturbances 5,000 ppm
**
** Maximum concen
F007 The following results are provided:
**
** Kills most animals in a short time 50,000 ppm
**
** Dangerous to life in 30 to 60 minutes 15,000 - 25,000 ppm
**
** Maximum concentration tolerated for
** 60 min without serious disturbances 5,000 ppm
**
** Maximum concentration for prolonged
** (8 hours) exposure without serous
** disturbances 1,500-2000 ppm
**
**
** The conclusions also stares that narcosis and irritation
** were identified as effects of acute vapor esposure
F020 2120
EOR
F002 9
F010 5.1.2
F004 3
F005 TS
F006 Methyl formate, purity unspecified
F007 Methyl formate, purity unspecified
F020 2121
EOR
F002 9
F010 5.1.3
F004 1
F005 ME
F006 Rats were treated and observed for 14 days, no other
** information
F007 Rats were treated and observed for 14 days, no other
** information
F020 2122
EOR
F002 9
F010 5.1.3
F004 1
F005 RE
F006 BASF AG, Abteilung Toxikologie, unveroeffentlichte
** Untersuchung (78/495), 22.05.1979
F007 BASF AG, Abteilung Toxikologie, unveroeffentlichte
** Untersuchung (78/495), 22.05.1979
F020 2123

EOR
F002 9
F010 5.1.3
F004 1
F005 RM
F006 This result is supported by a 1990 screening-level dermal
** toxicity study of methyl formate sponsored by Hoechst
** Celanese in which 0/4 treated rabbits died at a dermal dose
** of 5,000 mg/kg (BioDynamics Inc, Acute Dermal Toxicity,
** Rabbits C-
F007 This result is supported by a 1990 screening-level dermal
** toxicity study of methyl formate sponsored by Hoechst
** Celanese in which 0/4 treated rabbits died at a dermal dose
** of 5,000 mg/kg (BioDynamics Inc, Acute Dermal Toxicity,
** Rabbits C-1160, sponsored by Hoechst Celanese, 2/28/1990)
F020 2124
EOR
F002 9
F010 5.1.3
F004 1
F005 RS
F006 The LD50 was found to be > 4000 mg/kg.
**
** The following clinical signs were observed:
** Slight apathy
** Staggering
** Spastic gait
** irregular breathing
F007 The LD50 was found to be > 4000 mg/kg.
**
** The following clinical signs were observed:
** Slight apathy
** Staggering
** Spastic gait
** irregular breathing
F020 2125
EOR
F002 9
F010 5.1.3
F004 1
F005 TS
F006 Methyl Formate, purity 98%
F007 Methyl Formate, purity 98%
F020 2126
EOR
F002 9
F010 5.10
F004 1
F005 RM
F006 Methylformate and isopropanol exposures in a foundry, neurobehavioural
* effects
F007 Methylformate and isopropanol exposures in a foundry, neurobehavioural
* effects
F008 IUC4
F009 16-09-2002
F020 2036
EOR

F002 9
F010 5.10
F004 2
F005 CL
F006 Combined exposure to methylformate and isopropanol in a
** foundry did not cause any neurobehavioral effects.
F007 Combined exposure to methylformate and isopropanol in a
** foundry did not cause any neurobehavioral effects.
F020 2127
EOR
F002 9
F010 5.10
F004 2
F005 ME
F006 Ten workers in a Swiss foundry were monitored at ten
** different times during work. Neurobehavioral tests were
** performed to determine if the exposures correlated with
** changes in neurobehavioral parameters. Tests included
** postural balance (bi
F007 Ten workers in a Swiss foundry were monitored at ten
** different times during work. Neurobehavioral tests were
** performed to determine if the exposures correlated with
** changes in neurobehavioral parameters. Tests included
** postural balance (bipedal, monopedal, bipedal blind) simple
** reaction time and digit span and a combined memory and
** reaction-time test. A rating of well being was also recorded
** as was alcohol, nicotine, caffeine and drug consumption.
** .
F020 2128
EOR
F002 9
F010 5.10
F004 2
F005 RE
F006 Sethre T, Laubli T, Hangartner M, Berode M, Krueger H.
** Isopropanol and methylformate exposure in a foundry:
** exposure data and neurobehavioural measurements. Int Arch
** Occup Environ Health. 2000 Nov;73(8):528-36.
F007 Sethre T, Laubli T, Hangartner M, Berode M, Krueger H.
** Isopropanol and methylformate exposure in a foundry:
** exposure data and neurobehavioural measurements. Int Arch
** Occup Environ Health. 2000 Nov;73(8):528-36.
F020 2129
EOR
F002 9
F010 5.10
F004 2
F005 RM
F006 In a previous study, these same authors reproved that there
** was a neurobehavioral effect of isopropanol and
** methylformate esposure to foundry workers. This was
** designed as a follow up study and the initial observations
** could not be repeate
F007 In a previous study, these same authors reproved that there
** was a neurobehavioral effect of isopropanol and
** methylformate esposure to foundry workers. This was
** designed as a follow up study and the initial observations

**   could not be repeated.
F020 2130
EOR
F002 9
F010 5.10
F004 2
F005 RS
F006 Mean methyl formate concentration during work was 36 ppm
**   while mean isopropanol concentration was 44 ppm. Three
**   workers exceeded the methylformate MAC value of 100 ppm over
**   8 hours. The MAC value of 400 ppm for isopropanol was not
**   exceeded
F007 Mean methyl formate concentration during work was 36 ppm
**   while mean isopropanol concentration was 44 ppm. Three
**   workers exceeded the methylformate MAC value of 100 ppm over
**   8 hours. The MAC value of 400 ppm for isopropanol was not
**   exceeded. There was no correlation between the results of
**   the neurobehavioral testing and the methylformate
**   concentration.
**
**   Personal monitoring and urinary methanol concentrations were
**   found to correlate. No neurobehavioral effects were
**   correlated with exposure.
F020 2131
EOR
F002 9
F010 5.4
F004 1
F005 CL
F006
**   Sodium formate at 1% in the drinking water did not produce
**   clinically adverse effects in rats after administration for
**   approximately 18 months. The NOEL cannot be determined since
**   pathological investigations had not been conducted
F007
**   Sodium formate at 1% in the drinking water did not produce
**   clinically adverse effects in rats after administration for
**   approximately 18 months. The NOEL cannot be determined since
**   pathological investigations had not been conducted
F020 2132
EOR
F002 9
F010 5.4
F004 1
F005 ME
F006 Six animals per group
F007 Six animals per group
F020 2133
EOR
F002 9
F010 5.4
F004 1
F005 RE
F006 Malorny, G.: Z. Ernaehrungswiss. 9, 332-339 (1969)
F007 Malorny, G.: Z. Ernaehrungswiss. 9, 332-339 (1969)
F020 2134
EOR

F002 9
F010 5.4
F004 1
F005 RM
F006 The results are only available as a brief keynote summary.
F007 The results are only available as a brief keynote summary.
F020 2135
EOR
F002 9
F010 5.4
F004 1
F005 RS
F006 No toxicity detected
F007 No toxicity detected
F020 2136
EOR
F002 9
F010 5.4
F004 1
F005 TS
F006 Sodium formate in the drinking water at 1%
F007 Sodium formate in the drinking water at 1%
F020 2137
EOR
F002 9
F010 5.4
F004 2
F005 CL
F006
** This study shows that the formate portion of methyl formate
** up to the equivalent of 200 mg/kg as calcium formate has no
** adverse effect on rats dosed in drinking water
F007
** This study shows that the formate portion of methyl formate
** up to the equivalent of 200 mg/kg as calcium formate has no
** adverse effect on rats dosed in drinking water
F020 2138
EOR
F002 9
F010 5.4
F004 2
F005 ME
F006
** The study design encompassed both a five-generation and
** chronic study in Wistar rats with calcium formate at 0.2% in
** drinking water. Eight males and 24 females were in the
** original test group with four controls of each sex. Both
** microscop
F007
** The study design encompassed both a five-generation and
** chronic study in Wistar rats with calcium formate at 0.2% in
** drinking water. Eight males and 24 females were in the
** original test group with four controls of each sex. Both
** microscopic and pathologic investigations were done upon
** natural death of the animals.
**
** An additional series of experiments using 0.4% calcium

** formate in the drinking water was also in progress and was
** in the second year and second generation at the time of this
** publication, histopathology results were not available for
** this dose level
F020 2139
EOR
F002 9
F010 5.4
F004 2
F005 RM
F006
** Limitations to this study include the lack of data
** presentation for the 0.4% dose group, the limited
** description of the pathology and histopathology organ list
** and the modest size of the concurrent control group. In
** addition, this study d
F007
** Limitations to this study include the lack of data
** presentation for the 0.4% dose group, the limited
** description of the pathology and histopathology organ list
** and the modest size of the concurrent control group. In
** addition, this study does not take into account the effect
** of the methanol produced by hydrolysis of methyl formate
F020 2140
EOR
F002 9
F010 5.4
F004 2
F005 RS
F006
** Bodyweights and bodyweight gains of treated and control
** animals were similar. Microscopic and histological
** investigation of lung, spleen, stomach, liver and kidneys
** showed no suspect findings. Occasional small phagocytic
** action in reticulo
F007
** Bodyweights and bodyweight gains of treated and control
** animals were similar. Microscopic and histological
** investigation of lung, spleen, stomach, liver and kidneys
** showed no suspect findings. Occasional small phagocytic
** action in reticuloendothelium and reticulo-histocyto
** elements of lung, spleen and stomach lymph nodes were
** reported. Two benign spontaneous tumors were seen in old
** animals and were considered not related to test substance
** administration.
**
** The study at 0.4% calcium formate had been going on for
** about two years and it was reported that no disturbances
** (presumably mortality, body weight, fertility, or
** developmental toxicity) had been observed up to this point.
** Pathology and histopathology were in progress pending
** natural death of the test animals
F020 2141
EOR
F002 9
F010 5.4
F004 2

F005 TS
F006
** Calcium Formate, CAS Number 544-17-
F007
** Calcium Formate, CAS Number 544-17-
F020 2142
EOR
F002 9
F010 5.5
F004 1
F005 CL
F006 This material was not mutagenic in the Ames test under these
** experimental conditions.
F007 This material was not mutagenic in the Ames test under these
** experimental conditions.
F020 2143
EOR
F002 9
F010 5.5
F004 1
F005 ME
F006 The S-9 was prepared from Aroclor-induced rats.
**
** Posiitive controls were:
** -With S-9
** - 2-Aminoanthracene for all strains
** -Without S-9
** - MNNG for TA100 and TA1535
** - 4-Nitro-o-phenylendiame for TA98
** - 9-Aminoacridine chloride for
F007 The S-9 was prepared from Aroclor-induced rats.
**
** Posiitive controls were:
** -With S-9
** - 2-Aminoanthracene for all strains
** -Without S-9
** - MNNG for TA100 and TA1535
** - 4-Nitro-o-phenylendiame for TA98
** - 9-Aminoacridine chloride for TA1537
**
** Triple plate test
**
** All strains run with the plate-incorporation method and the
** preincubation method at 20 to 5000 micrograms/plate. Strain
** 1535 also run with plate incorporation technigue at five
** concentrations from 100 to 1000 micrograms/plate.
F020 2144
EOR
F002 9
F010 5.5
F004 1
F005 RE
F006 BASF AG, Abteilung Toxikologie, unveroeffentlichte
** Untersuchung (89/632), 11.01.1990
F007 BASF AG, Abteilung Toxikologie, unveroeffentlichte
** Untersuchung (89/632), 11.01.1990
F020 2145

```
EOR
F002 9
F010 5.5
F004 1
F005 RS
F006 There was no increase in the number of revertants for any
**   strain at any concentration level of test substance. No
**   bacterial toxicity was reported at any concentration. The
**   positive and negative controls responded appropriately.
F007 There was no increase in the number of revertants for any
**   strain at any concentration level of test substance. No
**   bacterial toxicity was reported at any concentration. The
**   positive and negative controls responded appropriately.
F020 2146
EOR
F002 9
F010 5.5
F004 1
F005 SO
F006 BASF AG Ludwigshafen
F007 BASF AG Ludwigshafen
F020 2147
EOR
F002 9
F010 5.5
F004 1
F005 TS
F006 Pure methyl formate, purity 98.4%
F007 Pure methyl formate, purity 98.4%
F020 2148
EOR
F002 9
F010 5.5
F004 2
F005 CL
F006 This material was not mutagenic in the Ames test under these
**   experimental conditions.
F007 This material was not mutagenic in the Ames test under these
**   experimental conditions.
F020 2149
EOR
F002 9
F010 5.5
F004 2
F005 ME
F006 The S-9 was prepared from Aroclor-induced rats.
**
**   Positive controls were:
**   -With S-9
**      - 2-Aminoanthracene for all strains
**   -Without S-9
**      - Sodium azide for TA100 and TA1535
**      - 2-Nitrofluorene for TA98 and TA1538
**      - ICR-191 for TA1537
F007 The S-9 was prepared from Aroclor-induced rats.
**
**   Positive controls were:
```

```
**   -With S-9
**      - 2-Aminoanthracene for all strains
**   -Without S-9
**      - Sodium azide for TA100 and TA1535
**      - 2-Nitrofluorene for TA98 and TA1538
**      - ICR-191 for TA1537
**
**   Triple plate test
**
**   One repeat
**
**   All strains run with the preincubation method at 667 to
**   10000 micrograms/plate with a 20 minute preincubation using
**   a sealed tube to prevent loss of test material.
F020 2150
EOR
F002 9
F010 5.5
F004 2
F005 RE
F006 Microbiological Associates Inc, Salmonella/Mammalian
**   Preincubation Mutagenicity Assay with a Closed Phase
**   Induction System. Report T8837.502002. 09/27/1989. Sponsored
**   by Hoechst Celanese
F007 Microbiological Associates Inc, Salmonella/Mammalian
**   Preincubation Mutagenicity Assay with a Closed Phase
**   Induction System. Report T8837.502002. 09/27/1989. Sponsored
**   by Hoechst Celanese
F020 2151
EOR
F002 9
F010 5.5
F004 2
F005 RS
F006 There was no increase in the number of revertants for any
**   strain at any concentration level of test substance. No
**   bacterial toxicity was reported at any concentration. The
**   positive and negative controls responded appropriately.
F007 There was no increase in the number of revertants for any
**   strain at any concentration level of test substance. No
**   bacterial toxicity was reported at any concentration. The
**   positive and negative controls responded appropriately.
F020 2152
EOR
F002 9
F010 5.5
F004 2
F005 SO
F006 Hoechst Celanese
F007 Hoechst Celanese
F020 2153
EOR
F002 9
F010 5.5
F004 2
F005 TS
F006 Methyl formate (C-1160)
```

```
F007 Methyl formate (C-1160)
F020 2154
EOB
C
C    ********* N E W   D A T A   S E T *********
C
D    11
C
B052 DS_COMPONENT_JOIN_TAB
F001 11
F002 0
F003 1.0.1
F004 1
F005 1
F006 25-05-2001
F007 25-05-2001
EOR
F001 11
F002 0
F003 1.0.1
F004 2
F005 2
F006 19-12-2001
F007 25-05-2001
EOR
F001 11
F002 0
F003 1.0.1
F004 3
F005 3
F006 19-12-2001
F007 25-05-2001
EOR
F001 11
F002 0
F003 1.0.1
F004 4
F005 4
F006 19-12-2001
F007 25-05-2001
EOR
F001 11
F002 0
F003 1.0.1
F004 5
F005 5
F006 19-12-2001
F007 19-12-2001
EOR
F001 11
F002 0
F003 1.0.1
F004 6
F005 6
F006 19-12-2001
F007 19-12-2001
EOR
```

F001 11
F002 0
F003 1.1.1
F004 1
F005 1
F006 25-05-2001
F007 25-05-2001
EOR
F001 11
F002 0
F003 1.1.1
F004 2
F005 2
F006 19-12-2001
F007 25-05-2001
EOR
F001 11
F002 0
F003 1.2
F004 1
F005 1
F006 25-05-2001
F007 25-05-2001
EOR
F001 11
F002 0
F003 1.2
F004 2
F005 2
F006 25-05-2001
F007 25-05-2001
EOR
F001 11
F002 0
F003 1.2
F004 3
F005 3
F006 25-05-2001
F007 25-05-2001
EOR
F001 11
F002 0
F003 1.2
F004 4
F005 4
F006 25-05-2001
F007 25-05-2001
EOR
F001 11
F002 0
F003 2.1
F004 1
F005 1
F006 25-05-2001
F007 25-05-2001
EOR
F001 11

F002 0
F003 2.2
F004 1
F005 1
F006 02-03-2003
F007 02-03-2003
EOR
F001 11
F002 0
F003 2.4
F004 1
F005 1
F006 13-11-2001
F007 25-05-2001
EOR
F001 11
F002 0
F003 2.5
F004 1
F005 1
F006 02-03-2003
F007 02-03-2003
EOR
F001 11
F002 0
F003 2.6.1
F004 1
F005 1
F006 25-05-2001
F007 25-05-2001
EOR
F001 11
F002 0
F003 3.1.1
F004 1
F005 1
F006 14-11-2001
F007 25-05-2001
EOR
F001 11
F002 0
F003 3.1.2
F004 1
F005 1
F006 20-02-2003
F007 25-05-2001
EOR
F001 11
F002 0
F003 3.3.2
F004 1
F005 1
F006 01-03-2003
F007 27-09-2001
EOR
F001 11
F002 0

F003 3.5
F004 1
F005 1
F006 15-11-2001
F007 25-05-2001
EOR
F001 11
F002 0
F003 3.5
F004 2
F005 2
F006 19-12-2001
F007 25-05-2001
EOR
F001 11
F002 0
F003 3.5
F004 3
F005 3
F006 19-12-2001
F007 25-05-2001
EOR
F001 11
F002 0
F003 4.1
F004 1
F005 1
F006 15-11-2001
F007 25-05-2001
EOR
F001 11
F002 0
F003 4.1
F004 2
F005 2
F006 15-11-2001
F007 25-05-2001
EOR
F001 11
F002 0
F003 4.1
F004 3
F005 3
F006 28-01-2003
F007 25-05-2001
EOR
F001 11
F002 0
F003 4.1
F004 4
F005 4
F006 01-03-2003
F007 25-05-2001
EOR
F001 11
F002 0
F003 4.2

F004 1
F005 1
F006 28-02-2003
F007 25-05-2001
EOR
F001 11
F002 0
F003 4.3
F004 1
F005 1
F006 28-02-2003
F007 26-05-2001
EOR
F001 11
F002 0
F003 4.7
F004 1
F005 1
F006 15-11-2001
F007 12-09-2001
EOR
F001 11
F002 0
F003 4.7
F004 2
F005 2
F006 13-09-2001
F007 12-09-2001
EOR
F001 11
F002 0
F003 4.7
F004 3
F005 3
F006 13-09-2001
F007 13-09-2001
EOR
F001 11
F002 0
F003 5.1.1
F004 1
F005 1
F006 15-11-2001
F007 27-05-2001
EOR
F001 11
F002 0
F003 5.1.1
F004 2
F005 2
F006 15-11-2001
F007 27-05-2001
EOR
F001 11
F002 0
F003 5.1.1
F004 3

F005 3
F006 19-12-2001
F007 27-05-2001
EOR
F001 11
F002 0
F003 5.1.2
F004 1
F005 1
F006 01-03-2003
F007 27-05-2001
EOR
F001 11
F002 0
F003 5.10
F004 1
F005 1
F006 15-11-2001
F007 21-09-2001
EOR
F001 11
F002 0
F003 5.4
F004 1
F005 1
F006 18-11-2001
F007 18-11-2001
EOR
F001 11
F002 0
F003 5.5
F004 1
F005 1
F006 21-09-2001
F007 12-07-2001
EOR
F001 11
F002 0
F003 5.5
F004 2
F005 2
F006 15-11-2001
F007 12-07-2001
EOR
F001 11
F002 0
F003 5.5
F004 3
F005 3
F006 28-01-2003
F007 21-09-2001
EOR
F001 11
F002 0
F003 5.6
F004 1
F005 1

F006 15-11-2001
F007 09-10-2001
EOR
F001 11
F002 0
F003 5.8.2
F004 1
F005 1
F006 18-11-2001
F007 21-09-2001
EOR
F001 11
F002 0
F003 5.8.2
F004 2
F005 2
F006 18-11-2001
F007 18-11-2001
EOB
C
B051 DS_COMPONENT_TAB
F001 11
F002 0
F003 141-53-7
F012 N
F010 25-05-2001
F004 12032821
F005 25-05-2001
F006 12032821
F007 25-05-2001
F009 A35-01
EOB
C
B115 GI_COMPANY_TAB
F001 11
F002 1
F003 25-05-2001
F004 IUC31
F021 1
F007 A34-02
F008 American Chemistry Council, Formates Panel
F009 1300 Wilson Boulevard
F010 Arlington, VA
F011 22209
F013 A31-024
EOR
F001 11
F002 2
F003 19-12-2001
F004 IUC31
F007 A34-01
F008 Celanese Ltd
EOR
F001 11
F002 3
F003 19-12-2001
F004 IUC31

F007 A34-01
F008 BASF Corporation
EOR
F001 11
F002 4
F003 19-12-2001
F004 IUC31
F007 A34-01
F008 Bayer Corporation
EOR
F001 11
F002 5
F003 19-12-2001
F004 IUC31
F007 A34-01
F008 GEO Specialty Chemicals
EOR
F001 11
F002 6
F003 19-12-2001
F004 IUC31
F007 A34-01
F008 Hercules Inc
EOB
C
B101 GI_GENERAL_INFORM_TAB
F001 11
F002 1
F003 25-05-2001
F004 IUC31
EOR
F001 11
F002 2
F003 19-12-2001
F004 IUC31
F010 A04-05
F011 A19-03
EOB
C
B102 GI_SYNONYM_TAB
F001 11
F002 1
F003 25-05-2001
F004 IUC31
F007 Formic acid, sodium salt
EOR
F001 11
F002 2
F003 25-05-2001
F004 IUC31
F007 Natriumformiat
EOR
F001 11
F002 3
F003 25-05-2001
F004 IUC31
F007 Ameisensaeure, Natriumsalz

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EOR
F001 11
F002 4
F003 25-05-2001
F004 IUC31
F007 Sodium methanoate
EOB
C
B201 PC_MELTING_TAB
F001 11
F002 1
F003 25-05-2001
F004 IUC31
F015 A36-003
F007 A02-03
F008 253
F014 A03-01
EOB
C
B202 PC_BOILING_TAB
F001 11
F002 1
F003 02-03-2003
F004 IUC4
F016 A36-003
F007 A02-04
F008 300
F012 A30-03
EOB
C
B204 PC_VAPOUR_TAB
F001 11
F002 1
F003 13-11-2001
F004 IUC31
F015 A36-005
F007 A02-03
F008 0
EOB
C
B205 PC_PARTITION_TAB
F001 11
F002 1
F003 02-03-2003
F004 IUC4
F007 A02-06
F008 -4.27
F011 P07-04
F020 C15-001
EOB
C
B206 PC_WATER_SOL_TAB
F001 11
F002 1
F003 25-05-2001
F004 IUC31
F023 A36-003
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F007 A02-03
F008 P08-01
F009 550
F011 20
F012 A02-06
F013 9
F014 10
F015 50
F016 P08-01
F017 20
EOB
C
B301 EN_PHOTODEGRADATION_TAB
F001 11
F002 1
F003 14-11-2001
F004 IUC31
F045 A36-005
F008 F01-02
EOB
C
B302 EN_STABILITY_IN_WATER_TAB
F001 11
F002 1
F003 20-02-2003
F004 IUC4
F040 A36-005
F008 F08-01
EOB
C
B306 EN_DISTRIBUTION_TAB
F001 11
F002 1
F003 01-03-2003
F004 IUC4
F010 A36-003
F007 F24-02
F008 F23-03
F009 2001
EOB
C
B308 EN_BIODEGRADATION_TAB
F001 11
F002 1
F003 15-11-2001
F004 IUC31
F047 A36-003
F048 1
F008 F25-01
F010 1981
F011 F27-0139
F012 20
F013 F28-02
F014 F29-02
F015 A02-03
F017 92
F018 21

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F019 F05-01
F020 F30-03
F046 A03-01
EOR
F001 11
F002 2
F003 19-12-2001
F004 IUC31
F047 A36-005
F048 2
F008 F25-01
F010 1985
F011 F27-0149
F012 300
F013 F28-02
F014 F29-02
F015 A02-03
F017 100
F018 9
F019 F05-01
F020 F30-01
F052 9
F053 F05-01
EOR
F001 11
F002 3
F003 19-12-2001
F004 IUC31
F047 A36-005
F048 3
F008 F25-01
F011 F27-0149
F012 10
F013 F28-02
F014 F29-02
F015 A02-03
F017 97.5
F020 F30-01
EOB
C
B401 EC_FISHTOX_TAB
F001 11
F002 1
F003 15-11-2001
F004 IUC31
F033 A36-005
F034 3
F008 E01-05
F009 E02-0075
F012 48
F013 E04-02
F014 E05-02
F021 A02-04
F022 1000
F032 A03-01
F045 E35-02
EOR
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F001 11
F002 2
F003 15-11-2001
F004 IUC31
F033 A36-005
F034 4
F008 E01-05
F009 E02-0070
F011 1965
F012 24
F013 E04-02
F014 E05-02
F021 A02-03
F022 5000
F045 E35-02
EOR
F001 11
F002 3
F003 28-01-2003
F004 IUC4
F033 A36-002
F034 1
F008 E01-02
F009 E02-0119
F010 E03-07
F011 1990
F012 96
F013 E04-02
F014 E05-02
F015 A02-03
F016 954
F018 A02-03
F019 954
F021 A02-04
F022 1000
F031 A03-03
F032 A03-03
F043 E35-02
F044 E35-02
F045 E35-01
EOR
F001 11
F002 4
F003 01-03-2003
F004 IUC4
F033 A36-002
F034 2
F008 E01-02
F009 E02-0139
F010 E03-07
F011 1990
F012 96
F013 E04-02
F014 E05-02
F015 A02-04
F016 887
F018 A02-04

F019 887
F021 A02-04
F022 1000
F031 A03-03
F032 A03-03
F043 E35-02
F044 E35-02
F045 E35-01
EOB
C
B402 EC_DAPHNIATOX_TAB
F001 11
F002 1
F003 28-02-2003
F004 IUC4
F032 A36-002
F008 E06-0010
F011 48
F012 E04-02
F013 E05-02
F014 A02-03
F015 120
F017 A02-03
F018 247
F020 A02-04
F021 1070
F030 A03-03
F031 A03-03
F042 E01-02
F043 E35-02
F044 E35-02
F045 E35-02
EOB
C
B403 EC_ALGAETOX_TAB
F001 11
F002 1
F003 28-02-2003
F004 IUC4
F036 A36-002
F008 E08-0056
F009 E09-04
F011 E10-02
F012 96
F013 E04-02
F014 E05-02
F015 A02-03
F016 125
F024 A02-03
F025 99
F027 A02-03
F028 790
F034 A03-03
F035 A03-03
F046 E35-02
F049 E35-01
F050 E35-01

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EOB
C
B410 EC_BIOEFFECT_TAB
F001 11
F002 1
F003 15-11-2001
F004 IUC31
F008 A36-002
F010 1
EOR
F001 11
F002 2
F003 13-09-2001
F004 IUC31
EOR
F001 11
F002 3
F003 13-09-2001
F004 IUC31
EOB
C
B501 TO_ACUTE_ORAL_TAB
F001 11
F002 1
F003 15-11-2001
F004 IUC31
F017 A36-005
F007 A01-01
F008 T01-03
F009 T02-24
F010 T03-02
F011 1989
F012 A02-04
F013 3000
F015 T04-01
F016 A03-01
EOR
F001 11
F002 2
F003 15-11-2001
F004 IUC31
F017 A36-003
F008 T01-03
F009 T02-18
F011 1982
F012 A02-03
F013 4700
F015 T04-01
F016 A03-02
F022 T23-08
EOR
F001 11
F002 3
F003 19-12-2001
F004 IUC31
F017 A36-003
F008 T01-03
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F009 T02-18
F011 1969
F012 A02-03
F013 11200
F015 T04-01
F016 A03-01
EOB
C
B502 TO_ACUTE_INHAL_TAB
F001 11
F002 1
F003 01-03-2003
F004 IUC4
F008 T05-01
F009 T02-24
F010 T06-03
F011 1990
F012 A02-04
F013 .67
F015 T07-01
F016 4
F017 T08-01
F018 A03-03
F021 T24-03
F024 T23-42
EOB
C
B508 TO_REPEATED_DOSE_TAB
F001 11
F002 1
F003 18-11-2001
F004 IUC31
F030 A36-005
F008 T02-24
F009 T23-46
F010 T24-03
F011 T25-02
F014 Lifetime
F015 Continuous
F017 1.0%
F029 A03-01
EOB
C
B509 TO_GENETIC_IN_VITRO_TAB
F001 11
F002 1
F003 21-09-2001
F004 IUC31
F016 A36-003
F017 1
F007 A01-01
F008 T30-14
F009 T31-18: according to Ames, B.N. et al., Mutat. Res. 31, 347-364
F010 1975
F011 Salmonella typhimurium TA 98, TA 100, TA 1535, TA 1537, TA1538
F012 T32-03
F013 T33-02

F014 A03-01
F015 up to 5000 ug test substance/plate
EOR
F001 11
F002 2
F003 15-11-2001
F004 IUC31
F016 A36-004
F017 3
F008 T30-13
F011 mouse lymphoma cell line L5178Y TK+/–
F012 T32-03
F013 T33-03
F015 Dose range: 4857-8714 mg/l with metabolic activation; 3571-10000 mg/l
*   without metabolic activation.
EOR
F001 11
F002 3
F003 28-01-2003
F004 IUC4
F016 A36-002
F017 2
F008 T30-20
F011 CHO-K1 cells
F012 T32-03
F013 T33-02
F015 270, 360, 450, 540, 630 ug/ml (6-14 mM)
EOB
C
B510 TO_GENETIC_IN_VIVO_TAB
F001 11
F002 1
F003 15-11-2001
F004 IUC31
F018 A36-003
F008 T34-03
F009 T02-03
F010 T23-48: Oregon-K
F012 1969
F013 T24-02
F014 T25-09
F015 entire larval stage
F016 0.1% as formic acid
F017 A03-01
F020 T33-02
EOB
C
B513 TO_DEVELOPMENTAL_TAB
F001 11
F002 1
F003 18-11-2001
F004 IUC31
F030 A36-003
F031 1
F008 T02-24
F009 T23-42
F011 T25-11: In vitro incubation using whole-embryo culture

F012 T44-03: In vitro, whole embryo culture
F013 1993
F014 48 hrs
F015 48 hr
F017 200, 400, 800, 1200, 1600 ug/ml
F029 A03-01
EOR
F001 11
F002 2
F003 18-11-2001
F004 IUC31
F030 A36-003
F031 2
F008 T02-12
F011 T25-11
F017 5 mg, 10 mg or 20 mg/egg
F018 T27-03: negative and positive (0.025 mg hydrocortisone /egg)
EOB
C
B515 TO_HUMAN_EXPERIENCE_TAB
F001 11
F002 1
F003 15-11-2001
F004 IUC31
F008 A36-003
F010 2
EOB
C
B601 TEXT_TAB
F002 11
F010 1.1.1
F004 2
F005 TS
F006 Varies
F007 Varies
F008 IUC31
F020 2344
EOR
F002 11
F010 2.1
F004 1
F005 RE
F006 Sicherheitsdatenblatt Huels AG vom 04.10.93
F007 Sicherheitsdatenblatt Huels AG vom 04.10.93
F008 IUC31
F020 2345
EOR
F002 11
F010 2.2
F004 1
F005 RE
F006 O'Neil, M ed. The Merck Index, Thirteenth edition, 2001 p1541
F007 O'Neil, M ed. The Merck Index, Thirteenth edition, 2001 p1541
F020 10231
EOR
F002 11
F010 2.2

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F004 1
F005 RL
F006
**   Handbook value
F007
**   Handbook value
F020 10232
EOR
F002 11
F010 2.2
F004 1
F005 RS
F006 Material decomposes into sodium oxylate and hydrogen and then inot sodium
*    carbonate
F007 Material decomposes into sodium oxylate and hydrogen and then inot sodium
*    carbonate
F020 10230
EOR
F002 11
F010 2.2
F004 1
F005 TS
F006
**   Sodium Formate, CAS Number 141-53-
F007
**   Sodium Formate, CAS Number 141-53-
F020 10229
EOR
F002 11
F010 2.4
F004 1
F005 CL
F006 Material considered non-volatile as a dry solid.
F007 Material considered non-volatile as a dry solid.
F008 IUC31
F020 2346
EOR
F002 11
F010 2.4
F004 1
F005 RE
F006 Sicherheitsdatenblatt Huels AG vom 04.10.93
F007 Sicherheitsdatenblatt Huels AG vom 04.10.93
F008 IUC31
F020 2347
EOR
F002 11
F010 2.4
F004 1
F005 RM
F006 This material is a solid salt and as such is considered to
**   have negligible vapor pressure.  It should be kept in mind,
**   however, that it is in equilibrium with formic acid in
**   solution and volatilization from solution is therefore pH
**   dependen
F007 This material is a solid salt and as such is considered to
**   have negligible vapor pressure.  It should be kept in mind,
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**   however, that it is in equilibrium with formic acid in
**   solution and volatilization from solution is therefore pH
**   dependent.
F008 IUC31
F020 2348
EOR
F002 11
F010 2.5
F004 1
F005 ME
F006 Estimated using KOWIN v 1.66.
F007 Estimated using KOWIN v 1.66.
F020 10234
EOR
F002 11
F010 2.5
F004 1
F005 RE
F006 Calculated using KOWIN (v 1.66) program contained in EPIWIN
**   3.05  Syracuse Research Corporation 2001.
F007 Calculated using KOWIN (v 1.66) program contained in EPIWIN
**   3.05  Syracuse Research Corporation 2001.
F020 10235
EOR
F002 11
F010 2.5
F004 1
F005 TS
F006
**   Sodium Formate, CAS Number 141-53-7
F007
**   Sodium Formate, CAS Number 141-53-7
F020 10233
EOR
F002 11
F010 2.6.1
F004 1
F005 RE
F006 Sicherheitsdatenblatt Huels AG vom 04.10.93
F007 Sicherheitsdatenblatt Huels AG vom 04.10.93
F008 IUC31
F020 2349
EOR
F002 11
F010 2.6.1
F004 1
F005 RE
F006 Supported by Merck Index listing of "soluble in about 1.3
**   parts water and Handbook of CHemistry and Physics Listing of
**   v. sol.
F007 Supported by Merck Index listing of "soluble in about 1.3
**   parts water and Handbook of CHemistry and Physics Listing of
**   v. sol.
F008 IUC31
F020 2350
EOR
F002 11
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F010 2.6.1
F004 1
F005 SO
F006 Huels AG Marl
F007 Huels AG Marl
F008 IUC31
F020 2351
EOR
F002 11
F010 3.1.1
F004 1
F005 RE
F006 Lyman et al. Handbook of Chemical Property Estimation
** Methods, American Chemical Society, Washington DC 1990.
F007 Lyman et al. Handbook of Chemical Property Estimation
** Methods, American Chemical Society, Washington DC 1990.
F008 IUC31
F020 2352
EOR
F002 11
F010 3.1.1
F004 1
F005 RM
F006 Since this material is not volatile, the only potential
** photolytic reaction that needs to be considered is direct
** photolysis at the earths surface. Direct photolysis is not
** possible because this material does not have a chromophore
** absorbi
F007 Since this material is not volatile, the only potential
** photolytic reaction that needs to be considered is direct
** photolysis at the earths surface. Direct photolysis is not
** possible because this material does not have a chromophore
** absorbing at a wavelength of 290 nm or above, and the
** presence of such a chromophore is a necessary condition for
** photolysis.
F008 IUC31
F020 2353
EOR
F002 11
F010 3.1.2
F004 1
F005 RE
F006 Lyman et al. Handbook of Chemical Property Estimation
** Methods, American Chemical Society, Washington DC 1990
F007 Lyman et al. Handbook of Chemical Property Estimation
** Methods, American Chemical Society, Washington DC 1990
F008 IUC31
F020 2354
EOR
F002 11
F010 3.1.2
F004 1
F005 RM
F006 Disassociates in water to sodium ion and formate ion. Both
** of these are considered stable in water. A carboxylic acid
** is generally the final product of hydrolysis reactions
**

```
**   No testing is required because the material is a salt that is kno
F007 Disassociates in water to sodium ion and formate ion.  Both
**   of these are considered stable in water. A carboxylic acid
**   is generally the final product of hydrolysis reactions
**
**   No testing is required because the material is a salt that is known to
*    dissociate (hydrolyze) in water upon dissolution. Testing is considered
*    impossible based on chemical principles as the anticipated concentration
*    of undissociated material is near zero.
F008 IUC31
F020 2355
EOR
F002 11
F010 3.3.2
F004 1
F005 RE
F006 Calculated using the Level III Fugacity model contained in EPIWIN
**   3.05  Syracuse Research Corporation 2001.
F007 Calculated using the Level III Fugacity model contained in EPIWIN
**   3.05  Syracuse Research Corporation 2001.
F008 IUC31
F020 2356
EOR
F002 11
F010 3.3.2
F004 1
F005 RM
F006 Assumptions used in model:
**
**     Molecular Wt: 68.01
**     Henry's LC  : 7.53e-007 atm-m3/mole (Henrywin program)
**     Vapor Press : 7.53e-008 mm Hg  (Mpbpwin program)
**     Liquid VP   : 9.87e-007 mm Hg  (super-cooled)
**     Melting Pt  : 138 deg C (Mpbpwin
F007 Assumptions used in model:
**
**     Molecular Wt: 68.01
**     Henry's LC  : 7.53e-007 atm-m3/mole (Henrywin program)
**     Vapor Press : 7.53e-008 mm Hg  (Mpbpwin program)
**     Liquid VP   : 9.87e-007 mm Hg  (super-cooled)
**     Melting Pt  : 138 deg C (Mpbpwin program)
**     Log Kow     : -4.27  (Kowwin program)
**     Soil Koc    : 2.2e-005  (calc by model)
**
**
**    Half-Lives (hr), (based upon user-entry)*
**         Air:       504
**         Water:     120
**         Soil:      120
**         Sediment:  1440
**
**
**
**   * This calculation was conducted using a water half-life of
**   120 hours based on actual data.  The soil half-life was
**   estimated at 120 hours on the basis of the water value. Air
**   half-life was set at 504 hours which is the model calculated
```

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**   result for formic acid.  This was done presuming that
**   volatilized material would exist primarily as formic acid.
F008 IUC31
F020 2357
EOR
F002 11
F010 3.3.2
F004 1
F005 RS
F006              Concentration       Half-Life     Emissions
**                (percent)         (hr)             (kg/hr)
**      Air             7.11              1e+005           1000
**      Water           48.7              360        1000
**      Soil            44.1
F007              Concentration       Half-Life     Emissions
**                (percent)         (hr)             (kg/hr)
**      Air             7.11              1e+005           1000
**      Water           48.7              360        1000
**      Soil            44.1              360        1000
**      Sediment        0.0811          1.44e+003       0
**
**
**
**
**            Fugacity     Reaction    Advection  Reaction
**   Advection
**             (atm)          (kg/hr)        (kg/hr)
**   (percent)   (percent)
**
**   Air       7.03e-011      51.4          374           1.71
**          12.5
**
**   Water  1.03e-011   1.07e+003    186          35.7
**   6.19
**
**   Soil      4.67e-010   1.32e+003    0              43.9
**         0
**
**   Sed      8.56e-012   0.149         0.00619    0.00496
**   0.000206
**
**
**      Persistence Time:  150 hr
**      Reaction Time:       185 hr
**      Advection Time:      807 hr
**      Percent Reacted:    81.3
**      Percent Advected:  18.7
**
**      Half-Lives (hr), (based upon user-entry):
**         Air:             504
**         Water:        120
**         Soil:           120
**         Sediment: 1440
**
**      Advection Times (hr):
**         Air:            100
**         Water:       1000
```

```
**         Sediment: 5e+004
**
**      Advection Time:       1.19e+003 hr
**      Percent Reacted:      68.8
**      Percent Advecte
F008 IUC31
F020 2358
EOR
F002 11
F010 3.3.2
F004 1
F005 TS
F006 Sodium Formate CAS Number 141-53-7
F007 Sodium Formate CAS Number 141-53-7
F008 IUC31
F020 2359
EOR
F002 11
F010 3.5
F004 1
F005 ME
F006 OECD Guide–line 301 E "Ready biodegradability: Modified OECD
**   Screening Test"
F007 OECD Guide–line 301 E "Ready biodegradability: Modified OECD
**   Screening Test"
F008 IUC31
F020 2360
EOR
F002 11
F010 3.5
F004 1
F005 RE
F006 Huels investigation (unpublished) as cited in IUDLID 2000
F007 Huels investigation (unpublished) as cited in IUDLID 2000
F008 IUC31
F020 2361
EOR
F002 11
F010 3.5
F004 1
F005 SO
F006 Huels AG Marl
F007 Huels AG Marl
F008 IUC31
F020 2362
EOR
F002 11
F010 3.5
F004 1
F005 TS
F006 Sodium Formate, CAS Number 141-53-7
F007 Sodium Formate, CAS Number 141-53-7
F008 IUC31
F020 2363
EOR
F002 11
F010 3.5
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F004 2
F005 CL
F006 inherently biodegradable
F007 inherently biodegradable
F008 IUC31
F020 2364
EOR
F002 11
F010 3.5
F004 2
F005 ME
F006 OECD Guide–line 302 B "Inherent biodegradability: Modified"
F007 OECD Guide–line 302 B "Inherent biodegradability: Modified"
F008 IUC31
F020 2365
EOR
F002 11
F010 3.5
F004 2
F005 RE
F006 Huels investigation (unpublished) as cited in IUCLID 2000
F007 Huels investigation (unpublished) as cited in IUCLID 2000
F008 IUC31
F020 2366
EOR
F002 11
F010 3.5
F004 2
F005 RM
F006 Inoculum: activated sludge, domestic
F007 Inoculum: activated sludge, domestic
F008 IUC31
F020 2367
EOR
F002 11
F010 3.5
F004 2
F005 SO
F006 Huels AG Marl
F007 Huels AG Marl
F008 IUC31
F020 2368
EOR
F002 11
F010 3.5
F004 2
F005 TS
F006 Sodium Formate, CAS Number 141-53-7
F007 Sodium Formate, CAS Number 141-53-7
F008 IUC31
F020 2369
EOR
F002 11
F010 3.5
F004 3
F005 ME
F006 OECD Guide–line 303 A "Simulation Test – Aerobic Sewage"

F007 OECD Guide–line 303 A "Simulation Test – Aerobic Sewage"
F008 IUC31
F020 2370
EOR
F002 11
F010 3.5
F004 3
F005 RE
F006 Huels investigation (unpublished) as cited in IUDLID 2000
F007 Huels investigation (unpublished) as cited in IUDLID 2000
F008 IUC31
F020 2371
EOR
F002 11
F010 3.5
F004 3
F005 RM
F006 The 97,5 % loss of DOC refers to an average retention time
** of 3 hours.
F007 The 97,5 % loss of DOC refers to an average retention time
** of 3 hours.
F008 IUC31
F020 2372
EOR
F002 11
F010 3.5
F004 3
F005 SO
F006 Huels AG Marl
F007 Huels AG Marl
F008 IUC31
F020 2373
EOR
F002 11
F010 3.5
F004 3
F005 TS
F006 Sodium Formate, CAS Number 141-53-7
F007 Sodium Formate, CAS Number 141-53-7
F008 IUC31
F020 2374
EOR
F002 11
F010 4.1
F004 1
F005 ME
F006 other: Bestimmung der Wirkung von Wasserinhaltsstoffen auf
** Fische, DIN 38412 Teil 15 (Determination of the effect of
** substances contained in water on fish, DIN 38412 part of 15)
F007 other: Bestimmung der Wirkung von Wasserinhaltsstoffen auf
** Fische, DIN 38412 Teil 15 (Determination of the effect of
** substances contained in water on fish, DIN 38412 part of 15)
F008 IUC31
F020 2375
EOR
F002 11
F010 4.1

F004 1
F005 RE
F006 Huels investigation (unpublished), as cited in IUDLID 2000.
F007 Huels investigation (unpublished), as cited in IUDLID 2000.
F008 IUC31
F020 2376
EOR
F002 11
F010 4.1
F004 1
F005 SO
F006 Huels AG Marl
F007 Huels AG Marl
F008 IUC31
F020 2377
EOR
F002 11
F010 4.1
F004 1
F005 TS
F006 Sodium Formate, CAS Number 141-53-7
F007 Sodium Formate, CAS Number 141-53-7
F008 IUC31
F020 2378
EOR
F002 11
F010 4.1
F004 2
F005 ME
F006 other: Standard method for the determination of the fish
** toxicity of pure substances after Freeman
F007 other: Standard method for the determination of the fish
** toxicity of pure substances after Freeman
F008 IUC31
F020 2379
EOR
F002 11
F010 4.1
F004 2
F005 RE
F006 Dowden, B.F., Bennett, H.J. (1965): J. Water Pollut. Control
F007 Dowden, B.F., Bennett, H.J. (1965): J. Water Pollut. Control
F008 IUC31
F020 2380
EOR
F002 11
F010 4.1
F004 2
F005 RE
F006 Freeman, L. (1953): Sewage and Industrial Wastes 25, 845-848
F007 Freeman, L. (1953): Sewage and Industrial Wastes 25, 845-848
F008 IUC31
F020 2381
EOR
F002 11
F010 4.1
F004 2

F005 RL
F006 Rated as 4 since relies on secondary (IUCLID) reference.
F007 Rated as 4 since relies on secondary (IUCLID) reference.
F008 IUC31
F020 2382
EOR
F002 11
F010 4.1
F004 2
F005 SO
F006 Huels AG Marl
F007 Huels AG Marl
F008 IUC31
F020 2383
EOR
F002 11
F010 4.1
F004 2
F005 TS
F006 Sodium Formate, CAS Number 141-53-7
F007 Sodium Formate, CAS Number 141-53-7
F008 IUC31
F020 2384
EOR
F002 11
F010 4.1
F004 3
F005 CL
F006 Under these conditions, the LC50, LC0 and NOEC were all
** greater than 954 mg/L. The LC50 is greater than 1000 mg/L
F007 Under these conditions, the LC50, LC0 and NOEC were all
** greater than 954 mg/L. The LC50 is greater than 1000 mg/L
F008 IUC31
F020 2385
EOR
F002 11
F010 4.1
F004 3
F005 ME
F006 The study was conducted using a flow-through design at 5
** nominal concentrations (63, 125, 250, 500 and 1000 mg/L)
** test material. Actual concentrations were measured
** (duplicate) at the beginning and end of the 96-hour exposure
** period and the
F007 The study was conducted using a flow-through design at 5
** nominal concentrations (63, 125, 250, 500 and 1000 mg/L)
** test material. Actual concentrations were measured
** (duplicate) at the beginning and end of the 96-hour exposure
** period and the means were: 58, 116, 223, 461 and 954 mg/L.
** Dilution water was blended soft water with a hardness of
** 40-48 mg/L, alkalinity of 52-56 mg/L, and a pH of 7.4 to
** 7.5. Twenty fish (mean weight 0.23 g) per concentration were
** exposed using a flow rate of 6.4 volume replacements per day
** for the 30-liter aquaria. Fish were observed daily for
** mortality and compound related sub-lethal effects.
** Temperature, oxygen levels and pH were measured at 0, 48 and
** 96 hours. Water temperature varied from 21 to 22 deg. C. Dissolved

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*    oxygen levels were above 8.4 mg/L in the control, low, mid and high
*    concentration levels at 0, 48 and 96 hours.
F008 IUC31
F020 2386
EOR
F002 11
F010 4.1
F004 3
F005 RE
F006 Analytical Biochemistry Laboratories Inc. Acute Flow-Through
**   Toxicity of Sodium Formate to Fathead Minnow (Pimephales
**   promelas). Report #38313, Sponsored by Hoechst Celanese,
**   March 16, 1990.
F007 Analytical Biochemistry Laboratories Inc. Acute Flow-Through
**   Toxicity of Sodium Formate to Fathead Minnow (Pimephales
**   promelas). Report #38313, Sponsored by Hoechst Celanese,
**   March 16, 1990.
F008 IUC31
F020 2387
EOR
F002 11
F010 4.1
F004 3
F005 RS
F006 No mortality or sub-lethal effects were observed at any
**   concentration. Oxygen, temperature and pH were within the
**   protocol specified limits. The measure concentrations were
**   similar to the target (nominal) concentrations.
F007 No mortality or sub-lethal effects were observed at any
**   concentration. Oxygen, temperature and pH were within the
**   protocol specified limits. The measure concentrations were
**   similar to the target (nominal) concentrations.
F008 IUC31
F020 2388
EOR
F002 11
F010 4.1
F004 3
F005 SO
F006 Celanese Ltd
F007 Celanese Ltd
F008 IUC31
F020 2389
EOR
F002 11
F010 4.1
F004 3
F005 TS
F006 Sodium formate, described as white granules, received from
**   Hoechst Celanese Corporation coded C-01261. Purity not
**   specified.
F007 Sodium formate, described as white granules, received from
**   Hoechst Celanese Corporation coded C-01261. Purity not
**   specified.
F008 IUC31
F012 1
F020 2390
```

EOR
F002 11
F010 4.1
F004 4
F005 CL
F006 Under these conditions, the LC50, LC0 and NOEC were all
** greater than 887 mg/L. The LC50 is greater than 1000 mg/L
F007 Under these conditions, the LC50, LC0 and NOEC were all
** greater than 887 mg/L. The LC50 is greater than 1000 mg/L
F008 IUC31
F012 1
F020 2391
EOR
F002 11
F010 4.1
F004 4
F005 ME
F006 The study was conducted using a flow-through design at 5
** nominal concentrations (63, 125, 250, 500 and 1000 mg/L)
** test material. Actual concentrations were measured
** (duplicate) at the beginning and end of the 96-hour exposure
** period and the
F007 The study was conducted using a flow-through design at 5
** nominal concentrations (63, 125, 250, 500 and 1000 mg/L)
** test material. Actual concentrations were measured
** (duplicate) at the beginning and end of the 96-hour exposure
** period and the means were: 54, 105, 215, 443 and 887 mg/L.
** Dilution water was blended soft water with a hardness of 48
** mg/L, alkalinity of 56-58 mg/L, temperature from 12-13
** degrees and a pH of 7.7 to 7.8. Twenty fish (mean weight
** 0.70 g) per concentration were exposed using a flow rate of
** 6.4 volume replacements per day for the 30-liter aquaria.
** Fish were observed daily for mortality and compound related
** sub-lethal effects. Temperature, oxygen levels and pH were
** measured at 0, 48 and 96 hours.
F008 IUC31
F012 1
F020 2392
EOR
F002 11
F010 4.1
F004 4
F005 RE
F006 Analytical Biochemistry Laboratories Inc Acute Flow-Through
** Toxicity of Sodium Formate to Rainbow Trout (Oncorhynchus
** mykiss. Report #38312, Sponsored by Hoechst Celanese, March
** 16, 1990.
F007 Analytical Biochemistry Laboratories Inc Acute Flow-Through
** Toxicity of Sodium Formate to Rainbow Trout (Oncorhynchus
** mykiss. Report #38312, Sponsored by Hoechst Celanese, March
** 16, 1990.
F008 IUC31
F012 1
F020 2393
EOR
F002 11
F010 4.1

```
F004 4
F005 RS
F006 No mortality or sub-lethal effects were observed at any
**   concentration. Oxygen, temperature and pH were within the
**   protocol specified limits. The measured concentrations were
**   similar to the target (nominal) concentrations.
F007 No mortality or sub-lethal effects were observed at any
**   concentration. Oxygen, temperature and pH were within the
**   protocol specified limits. The measured concentrations were
**   similar to the target (nominal) concentrations.
F008 IUC31
F012 1
F020 2394
EOR
F002 11
F010 4.1
F004 4
F005 SO
F006 Celanese Ltd
F007 Celanese Ltd
F008 IUC31
F012 1
F020 2395
EOR
F002 11
F010 4.1
F004 4
F005 TS
F006 Sodium formate, described as white granules, received from
**   Hoechst Celanese Corporation coded C-01261. Purity not
**   specified.
F007 Sodium formate, described as white granules, received from
**   Hoechst Celanese Corporation coded C-01261. Purity not
**   specified.
F008 IUC31
F012 1
F020 2396
EOR
F002 11
F010 4.2
F004 1
F005 CL
F006 Under these conditions, the EC50 for daphnids was greater
**   than 1070 mg/L, the NOEC was 122 mg/L.
F007 Under these conditions, the EC50 for daphnids was greater
**   than 1070 mg/L, the NOEC was 122 mg/L.
F008 IUC31
F012 1
F020 2397
EOR
F002 11
F010 4.2
F004 1
F005 ME
F006 The study was conducted using a flow-through design at 5
**   nominal concentrations (60, 120, 250, 500 and 1000 mg/L)
**   test material. Actual concentrations were measured
```

```
**   (duplicate) at the beginning and end of the 96-hour exposure
**   period and the
F007 The study was conducted using a flow-through design at 5
**   nominal concentrations (60, 120, 250, 500 and 1000 mg/L)
**   test material. Actual concentrations were measured
**   (duplicate) at the beginning and end of the 96-hour exposure
**   period and the means were: 74, 122, 247, 447 and 1070mg/L.
**   Dilution water was blended well water/RO water with a
**   hardness of 178 mg/L, alkalinity of 210 mg/L, and a pH of
**   7.8. Twenty first-instar daphnids per concentration were
**   exposed (four replicate chambers of five daphnids at each
**   concentration plus control) using a flow rate of 6.1 volume
**   replacements per day for the 1-liter test chambers
**   containing five daphnids each. Daphnids were observed daily
**   for mortality and compound related sub-lethal effects.
**   Temperature, oxygen levels, pH and test material
**   concentrations were measured at 0 and 48 hours. Temperature (19 deg C)
*    and dissolved oxygen (8.6 to 8.8 mg/L) were determined at the start and
*    completion of the test.
F008 IUC31
F012 1
F020 2398
EOR
F002 11
F010 4.2
F004 1
F005 RE
F006 Analytical Biochemistry Laboratories Inc, Columbia MO.
**   Report #38314 Acute Flow-Through Toxicity of Sodium Formate
**   (C-1261) to Daphnia magna. Hoechst-Celanese sponsor, March
**   13, 1990
F007 Analytical Biochemistry Laboratories Inc, Columbia MO.
**   Report #38314 Acute Flow-Through Toxicity of Sodium Formate
**   (C-1261) to Daphnia magna. Hoechst-Celanese sponsor, March
**   13, 1990
F008 IUC31
F012 1
F020 2399
EOR
F002 11
F010 4.2
F004 1
F005 RS
F006 The mortality and extent of sublethal effects are shown in
**   the table.
**
**                      MORTALITY
**   Nom.   Meas   24 hr   48 hr    Other
**   Conc   Conc                       Effects
**   0      0     1     1     none
**   60     74    1     1     none
**   120    122   0     0     none
**   250    247   0     0     very
F007 The mortality and extent of sublethal effects are shown in
**   the table.
**
**                      MORTALITY
```

```
**   Nom.   Meas   24 hr   48 hr    Other
**   Conc   Conc                       Effects
**   0      0     1     1     none
**   60     74    1     1     none
**   120    122   0     0     none
**   250    247   0     0     very few
**   599    447   1     1     few
**   1000   1070  1     1     many
F008 IUC31
F012 1
F020 2400
EOR
F002 11
F010 4.2
F004 1
F005 TS
F006 Sodium formate, described as white granules, received from
**   Hoechst Celanese Corporation coded C-01261. Purity not
**   specified.
F007 Sodium formate, described as white granules, received from
**   Hoechst Celanese Corporation coded C-01261. Purity not
**   specified.
F008 IUC31
F012 1
F020 2401
EOR
F002 11
F010 4.3
F004 1
F005 CL
F006 Under these conditions, the 96-hour EC50 for algal growth
**   was 790 mg/L and the NOEC was estimated to be 125 mg/L. The
**   EC10 was calculated to be 99 mg/L from thje regression
**   equation.
F007 Under these conditions, the 96-hour EC50 for algal growth
**   was 790 mg/L and the NOEC was estimated to be 125 mg/L. The
**   EC10 was calculated to be 99 mg/L from thje regression
**   equation.
F008 IUC31
F012 1
F020 2402
EOR
F002 11
F010 4.3
F004 1
F005 ME
F006 Two preliminary toxicity tests were conducted to set
**   concentration levels for the definitive test. In the first
**   96-hour preliminary test, test concentrations of 1, 10 or
**   100 mg/L produced growth inhibitions of 0, 18 or 50%,
**   respectively. Th
F007 Two preliminary toxicity tests were conducted to set
**   concentration levels for the definitive test. In the first
**   96-hour preliminary test, test concentrations of 1, 10 or
**   100 mg/L produced growth inhibitions of 0, 18 or 50%,
**   respectively. The second preliminary test was started as a
**   definitive test with triplicate cultures at concentrations
```

```
**   of 20, 40, 80, 160 or 320 mg/L. Algal cells counts in this
**   study wer 110, 110, 110, 110 or 86 % of the control
**   population. Thus it was determined that there was an
**   insufficient inhibitory response to define the IC50 and a
**   final definitive test was set up. Algal media (prepared from reverse
*    osmosis water) was inoculated
**   with 1 million cells of test organism into triplicate 250 ml
**   flasks, closed with a foam plug, containing 100 ml algal
**   growth media. Dilutions of test material in growth media
**   were prepared from a 1000 mg/L stock of test material in
**   growth media. Flasks were incubated and agitated (100 rpm)
**   in random positions for 96 hours under 4300 Lux lighting at
**   24 degrees C. Cell counts were conducted daily for each test
**   replicate using a hemacytometer and compound microscope.
**   Concentration of test material in the media was determined
**   at the beginning and end of the incubation period and mean
**   concentrations reported. Cell counts for each replicate and
**   controls were subjected to analysis of variance (ANOVA)
**   followed by Dunnett's test accepting p< 0.05 as significant.
**   IC50 values were calculated from a regression plot. Two
**   regression plots were constructed using either the mean cell
**   count or the log of the cell count. The regression equation
**   giving the best fit was used to determine the IC50.
**   .
F008 IUC31
F012 1
F020 2403
EOR
F002 11
F010 4.3
F004 1
F005 RE
F006 Analytical Biochemistry Laboratories Inc., Acute Toxicity of
**   Sodium Formate to Selenastrum capricornutum Printz.  Report
**   #38315, Sponsored by Hoechst Celanese, March 16, 1990.
F007 Analytical Biochemistry Laboratories Inc., Acute Toxicity of
**   Sodium Formate to Selenastrum capricornutum Printz.  Report
**   #38315, Sponsored by Hoechst Celanese, March 16, 1990.
F008 IUC31
F012 1
F020 2404
EOR
F002 11
F010 4.3
F004 1
F005 RM
F006 Supported by a 1984 Huels study reported in IUCLID 2000, in
**   which the EC50 for Scenedesmus subspicatus was reported to
**   be greater than or equal to 1000 mg/L.
**   .
F007 Supported by a 1984 Huels study reported in IUCLID 2000, in
**   which the EC50 for Scenedesmus subspicatus was reported to
**   be greater than or equal to 1000 mg/L.
**   .
F008 IUC31
F012 1
F020 2405
```

EOR
F002 11
F010 4.3
F004 1
F005 RS
F006 Measured concentrations were very close to nominal
** concentrations, the concentration at termination was similar
** to the starting concentration and no loss of test material
** was apparent. Concentrations above 250 mg/L were inhibitory
** and the d
F007 Measured concentrations were very close to nominal
** concentrations, the concentration at termination was similar
** to the starting concentration and no loss of test material
** was apparent. Concentrations above 250 mg/L were inhibitory
** and the data are shown in the table.
**
** pH varied from 6.9 to 7.4 at initiation and 7.8 to 8.1 at 96-hours. It
* was not concentration dependent.
**
**
** Mean cells counts were as follows:
**

Nomin Conc	Meas Conc	TIME (hours) 24	48	72	96
0(mg/L)	<5	2.9	12	45	140
63	58.3	2.0	8.2*	40	140
125	121	1.1*	8.3*	30*	110
250	243	1.3*	6.8*	28*	93*
500	498	0.78*	4.6*	27*	88*
1000	1001	0.93*	3.5*	8*	61*

**
** Counts are in units of 10,000 cells/ml
** * Denotes significant inhibition at p<0.0
**
** A quadratic equation was developed using percent difference
** in cell count from control versus ln concentration. From
** this equation, the EC50 was calculated to be 790 mg/L and
** the EC10 as 99 mg/L (based on nominal concentrations). The
** NOEC is considered to be 125 mg/L.
F008 IUC31
F012 1
F020 2406
EOR
F002 11
F010 4.3
F004 1
F005 TS
F006 Sodium formate, described as white granules, received from
** Hoechst Celanese Corporation coded C-01261. Purity not
** specified.
F007 Sodium formate, described as white granules, received from
** Hoechst Celanese Corporation coded C-01261. Purity not
** specified.
F008 IUC31
F012 1
F020 2407
EOR

F002 11
F010 4.7
F004 1
F005 CL
F006 The effects of sodium formate on surface vegetation growth
** were also determined in a greenhouse study in which sodium
** formate solution was applied bi-weekly to representative
** plants at rates from 0.1 to 48 grams per square meter of
** soil. Bi
F007 The effects of sodium formate on surface vegetation growth
** were also determined in a greenhouse study in which sodium
** formate solution was applied bi-weekly to representative
** plants at rates from 0.1 to 48 grams per square meter of
** soil. Biweekly concentrations at and above 33 g/m2 reduced
** plant biomass growth. These inhibitory concentrations are,
** however, very high concentrations that would not be
** encountered in this application of sodium formate.
**
**
**
** The conclusions drawn are: The use of sodium formate as a
** de-icing agent applied during the winter of 1991-1992 at the
** Halifax international airport, appears to have had no effect
** on.
** 1. The in situ concentration of total heterotrophic bacteria
** whether these were either aerobic or anerobic and either
** psychrophilic of mesophilic bacteria.
** 2. The in situ concentrations of fungi, whether these fungi
** were either psychrophilic or mesophilic moulds.
** 3. The soil respiration characteristics of the rate of
** carbon dioxide evolved, the proportion of organic carbon
** metabolized, or the temperature coefficient Q10.
** 4. Application of NaFo to vegetated soil from the NaFo test
** area when applied biweekly at concentrations of less than
** 2000 mg NaFo/L did not appear to inhibit vegetative plant
** growth. Application of NaFo at greater concentrations,
** specifically 3500 and 5000 mg NaFo/L did inhibit vegetative
** plant growth appreciably (approximately 65 percent and 70
** percent respectively).
** 5. When NaFo was applied in single applications, the
** inhibition of surface vegetative growth was directly
** proportional to the mass of NaFo applied. Application of 500
** mg NaFo/kg, which is equivalent to 84.5 g/m2 , caused 50
** percent inhibition. Concentrations of between 1000 and 3500
** mg/kg (169 and 591.5 g/M2 respectively) caused approximately
** 75 percent inhibition and 5000 mg/kg (845 g/m2) caused
** approximately 95 percent inhibition.
** 6. Results of the microbiological evaluation tests suggest
** that, except.at unusually high concentrations of NaFo that
** are unlikely to be encountered during normal use as a
** de?icing agent, NaFo causes no deleterious disruptions in
** the in situ microbiological populations.
**
**
** Results of the vegetative surface growth tests suggest that
** when NaFo is applied in moderate concentrations over a
** prolonged period of time at concentrations of less than 2000

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**   mg NaFo/1, no deleterious disruptions in the plant life may
**   be expected. However, spills of solid NaFo on vegetated
**   surfaces should be avoided, as doses of as little as 1.69 g
**   NaFo/M2 may cause deleterious disruptions in the surface
**   plant growth.
F008 IUC31
F012 1
F020 2408
EOR
F002 11
F010 4.7
F004 1
F005 ME
F006 Transport Canada conducted and environmental assessment to
**   compare the use of sodium formate (NaFo) with urea as a
**   runway anti-icer/deicer at the Halifax International
**   Airport. Over the winter of 1991-92, 16 tons of NaFo were
**   used on a taxi
F007 Transport Canada conducted and environmental assessment to
**   compare the use of sodium formate (NaFo) with urea as a
**   runway anti-icer/deicer at the Halifax International
**   Airport. Over the winter of 1991-92, 16 tons of NaFo were
**   used on a taxiway with a unique drainage system so that
**   potential environmental effects of NaFo could be identified.
**   Urea was used on two runways and its effects wre compared
**   with those from NAFo.  Streams and groundwater were
**   monitored for several parameters with the following issues
**   of primary importance:
**    * The effect on ground and surface water, especially oxygen
**       depletion
**    * The effect on the microbial community
**    * The effect on aquatic biota
**    * The mobilization of metals
**    * The effect on vegetation
**
**   The effects of sodium formate on surface vegetation growth
**   were also determined in a greenhouse study in which sodium
**   formate solution was applied bi-weekly to representative
**   plants at rates from 0.1 to 48 grams per square meter of
**   soil. Biweekly concentrations at and above 33 g/m2 reduced
**   plant biomass growth.  These inhibitory concentrations are,
**   however, very high concentrations that would not be
**   encountered in this application of sodium formate.
F008 IUC31
F012 1
F020 2409
EOR
F002 11
F010 4.7
F004 1
F005 RE
F006 Transport Canada, Environmental Impact from the use of
**   Sodium Formate at Halifax International Airport. Volume I:
**   Final Report. Prepared by Nolan Davis & Associates November
**   1992
F007 Transport Canada, Environmental Impact from the use of
**   Sodium Formate at Halifax International Airport. Volume I:
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**   Final Report. Prepared by Nolan Davis & Associates November
**   1992
F008 IUC31
F012 1
F020 2410
EOR
F002 11
F010 4.7
F004 1
F005 RM
F006 Year 1992
F007 Year 1992
F008 IUC31
F012 1
F020 2411
EOR
F002 11
F010 4.7
F004 3
F005 CL
F006 The conclusions drawn are:  The use of sodium formate as a
**   de-icing agent applied during the winter of 1991-1992 at the
**   Halifax international airport, appears to have had no effect
**   on.
**   1.     The in situ concentration of total heterotrophic ba
F007 The conclusions drawn are:  The use of sodium formate as a
**   de-icing agent applied during the winter of 1991-1992 at the
**   Halifax international airport, appears to have had no effect
**   on.
**   1.     The in situ concentration of total heterotrophic bacteria
**   whether these were either aerobic or anerobic and either
**   psychrophilic of mesophilic bacteria.
**   2.     The in situ concentrations of fungi, whether these fungi
**   were either psychrophilic or mesophilic moulds.
**   3.     The soil respiration characteristics of the rate of
**   carbon dioxide evolved, the proportion of organic carbon
**   metabolized, or the temperature coefficient Q10.
**   4.     Application of  NaFo to vegetated soil from the NaFo test
**   area when applied bi?weekly at concentrations of less than
**   2000 mg NaFo/L did not appear to inhibit vegetative plant
**   growth. Application of NaFo at greater concentrations,
**   specifically 3500 and 5000 mg NaFo/L did inhibit vegetative
**   plant growth appreciably (approximately 65 percent and 70
**   percent respectively).
**   5.     When NaFo was applied in single applications, the
**   inhibition of surface vegetative growth was directly
**   proportional to the mass of NaFo applied. Application of 500
**   mg NaFo/kg, which is equivalent to 84.5 g/m2 , caused 50
**   percent inhibition. Concentrations of between  1000 and 3500
**   mg/kg (169 and 591.5 g/M2 respectively) caused approximately
**   75 percent inhibition and 5000 mg/kg (845 g/m2) caused
**   approximately 95 percent inhibition.
**   6.     Results of the microbiological evaluation tests suggest
**   that, except.at unusually high concentrations of NaFo that
**   are unlikely to be encountered during normal use as a
**   de?icing agent, NaFo causes no deleterious disruptions in
**   the in situ microbiological populations.
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F008 IUC31
F012 1
F020 2412
EOR
F002 11
F010 4.7
F004 3
F005 ME
F006 XX
F007 XX
F008 IUC31
F012 1
F020 2413
EOR
F002 11
F010 5.1.1
F004 1
F005 RE
F006 Hules Report #1579, 1989, unpublished data (as cited in
**   IUCLID 2000)
F007 Hules Report #1579, 1989, unpublished data (as cited in
**   IUCLID 2000)
F008 IUC31
F012 1
F020 2414
EOR
F002 11
F010 5.1.1
F004 1
F005 RL
F006 Assigned as 4 since it relies on a secondary source (IUCLID
**   2000)
F007 Assigned as 4 since it relies on a secondary source (IUCLID
**   2000)
F008 IUC31
F012 1
F020 2415
EOR
F002 11
F010 5.1.1
F004 1
F005 RM
F006 Information obtained from the IUCLID 2000 document. This is
**   listed as an unpublished study by Hules dated 1989.  The
**   full
**   report was not available for review.
F007 Information obtained from the IUCLID 2000 document. This is
**   listed as an unpublished study by Hules dated 1989.  The
**   full
**   report was not available for review.
F008 IUC31
F012 1
F020 2416
EOR
F002 11
F010 5.1.1
F004 1
```

F005 SO
F006 Huels AG Marl
F007 Huels AG Marl
F008 IUC31
F012 1
F020 2417
EOR
F002 11
F010 5.1.1
F004 1
F005 TS
F006 Sodium Formate, CAS Number 141-53-7
F007 Sodium Formate, CAS Number 141-53-7
F008 IUC31
F012 1
F020 2418
EOR
F002 11
F010 5.1.1
F004 2
F005 RE
F006 Smith, E.N., Taylor, R.T. (1982): Toxicology 25, 271-287 (as
** cited in IUCLID 2000)
F007 Smith, E.N., Taylor, R.T. (1982): Toxicology 25, 271-287 (as
** cited in IUCLID 2000)
F008 IUC31
F012 1
F020 2419
EOR
F002 11
F010 5.1.1
F004 2
F005 RM
F006 C57BL/6Cs folic acid deficient (FAD) mice were used in this
** study. 12 weeks prior to LD50 determination, 6 mice were fed
** a diet supplemented with 3 mg of folic acid/kg diet. 6 mice
** received a diet without folic acid supplements. FAD–mice fe
F007 C57BL/6Cs folic acid deficient (FAD) mice were used in this
** study. 12 weeks prior to LD50 determination, 6 mice were fed
** a diet supplemented with 3 mg of folic acid/kg diet. 6 mice
** received a diet without folic acid supplements. FAD–mice fed
** with a supplemented diet showed a slightly higher LD50 (4700
** mg/kg) than mice fed a diet without folic acid supplements
** (LD50 3700 mg/kg).
F008 IUC31
F012 1
F020 2420
EOR
F002 11
F010 5.1.1
F004 2
F005 SO
F006 Huels AG Marl
F007 Huels AG Marl
F008 IUC31
F012 1
F020 2421

EOR
F002 11
F010 5.1.1
F004 2
F005 TS
F006 Sodium Formate, CAS Number 141-53-7
F007 Sodium Formate, CAS Number 141-53-7
F008 IUC31
F012 1
F020 2422
EOR
F002 11
F010 5.1.1
F004 3
F005 ME
F006
** Details not provided except that it was part of a series of
** studies of formic acid and four formate salts and that 54
** animals were used to determint the LD50
F007
** Details not provided except that it was part of a series of
** studies of formic acid and four formate salts and that 54
** animals were used to determint the LD50
F008 IUC31
F012 1
F020 2423
EOR
F002 11
F010 5.1.1
F004 3
F005 RE
F006 Malorny, G. (1969): Z. Ernaehrungswissenschaft 9, 332-339
F007 Malorny, G. (1969): Z. Ernaehrungswissenschaft 9, 332-339
F008 IUC31
F012 1
F020 2424
EOR
F002 11
F010 5.1.1
F004 3
F005 RL
F006
** Assigned as 2 since it was published with the acute toxicity
** of several other formates and it fits the expected pattern
F007
** Assigned as 2 since it was published with the acute toxicity
** of several other formates and it fits the expected pattern
F008 IUC31
F012 1
F020 2425
EOR
F002 11
F010 5.1.1
F004 3
F005 RS
F006
** The LD50 range for sodium formate was given as 9,600 to

```
**   12,80
F007
**   The LD50 range for sodium formate was given as 9,600 to
**   12,80
F008 IUC31
F012 1
F020 2426
EOR
F002 11
F010 5.1.1
F004 3
F005 SO
F006 Huels G AG, Literature
F007 Huels G AG, Literature
F008 IUC31
F012 1
F020 2427
EOR
F002 11
F010 5.1.1
F004 3
F005 TS
F006
**   Sodium Formate, CAS Number 141-53-
F007
**   Sodium Formate, CAS Number 141-53-
F008 IUC31
F012 1
F020 2428
EOR
F002 11
F010 5.1.2
F004 1
F005 CL
F006 Exposure of rats to the highest practical aerosol
**   concentration of test material, with a large portion in the
**   respirable range, was not associated with adverse effect
**   other than eye and nasal irritation.  The acute inhalation
**   LC50 is greate
F007 Exposure of rats to the highest practical aerosol
**   concentration of test material, with a large portion in the
**   respirable range, was not associated with adverse effect
**   other than eye and nasal irritation.  The acute inhalation
**   LC50 is greater than 0.67 mg/L for a four-hour inhalation
**   exposure.
F008 IUC31
F012 1
F020 2429
EOR
F002 11
F010 5.1.2
F004 1
F005 ME
F006 The solid test material was milled to a fine powder and
**   placed in a glass fluidizing bed. The material was
**   aerosolized using a flow of 30 liters per minute and the
**   dust from the bed was swept at a rate of 5 L/min into a 100
```

**   liter plexiglass
F007 The solid test material was milled to a fine powder and
**   placed in a glass fluidizing bed. The material was
**   aerosolized using a flow of 30 liters per minute and the
**   dust from the bed was swept at a rate of 5 L/min into a 100
**   liter plexiglass exposure chamber. The flow rate was 35
**   L/min, providing an air change every 2.9 minutes. This was
**   considered the maximum level of dust practically attainable
**   with the equipment. It was determined gravimetrically to
**   contain 0.67 mg/L (nominal concentration based on material
**   loss was 10 mg/L) and have a MMAD of 5.4 microns with an
**   Average Geometric Standard Deviation of 2.4. This aerosol
**   was considered respirable. Five animals (males, 9 weeks of
**   age, weight range 321-344 g; females 10 weeks of age, weight
**   range 223-254 g) of each sex were exposed for 4 hours.
**   Animals remained in the chamber for 30 minutes after the
**   test material was cleared from the breathing air. Animals
**   were doubly housed during the acclimation and post-exposure
**   14-day observation period and singly housed during the
**   exposure. Animals were observed at 0, 15, 30, 45, 60, 120,
**   180 and 240 minutes during the 4-hour exposure, then
**   examined daily for 14 days. Surviving animals were
**   sacrificed after 14 days and submitted to a gross necropsy.
**   The chamber temperature was 25 degrees and the relative
**   humidity ranges for 17% to 6% with the lower values in the
**   latter part of the study (considered a result of the
**   dessicant activity of fine particles of sodium formate)
**   Chamber concentration of test material was measured at nine
**   intervals during the study and ranged from 0.5 to 0.86 mg/L.
F008 IUC31
F012 1
F020 2430
EOR
F002 11
F010 5.1.2
F004 1
F005 RE
F006 BioDynamics Inc. An Acute Inhalationn Toxicity Study of
**   C-1261 in the Rat. Project # 89-8232, Sponsored by Hoechst
**   Celanese Corp., May 31 1990.
F007 BioDynamics Inc. An Acute Inhalationn Toxicity Study of
**   C-1261 in the Rat. Project # 89-8232, Sponsored by Hoechst
**   Celanese Corp., May 31 1990.
F008 IUC31
F012 1
F020 2431
EOR
F002 11
F010 5.1.2
F004 1
F005 RS
F006 There were no deaths during the exposure or the 14-day
**   observation period. Adverse clinical sighs were minimal and
**   consisted of decreased activity and eyes partly or fully
**   closed during the exposure and lacrimation and nasal
**   discharge but g
F007 There were no deaths during the exposure or the 14-day

**   observation period. Adverse clinical sighs were minimal and
**   consisted of decreased activity and eyes partly or fully
**   closed during the exposure and lacrimation and nasal
**   discharge but generally fully recovered within a week. There
**   was a slight and transient reduction in body weight gain (or
**   weight loss) following the exposure but all animals
**   continued to gain weight a few days after the exposure
**   period:
**
**
**
**
**
**   MEAN BODY WEIGHTS (grams) Exposure 0.67 mg/L (4 hours)
**
**   DAY   MALES   FEMALES
**   1   337   235
**   2   333   230
**   5   344   236
**   8   365   244
**   15   414   255
**
**
**   There were no treatment-related findings at gross necropsy.
F008 IUC31
F012 1
F020 2432
EOR
F002 11
F010 5.1.2
F004 1
F005 SO
F006 Celanese Ltd
F007 Celanese Ltd
F008 IUC31
F012 1
F020 2433
EOR
F002 11
F010 5.1.2
F004 1
F005 TS
F006 C-1261 (Sodium Formate), purity 99% active ingredient. The
**   test material was milled by Sturtevant Inc (Boston) on 8
**   November 1989 and then sent to BioDynamics.
F007 C-1261 (Sodium Formate), purity 99% active ingredient. The
**   test material was milled by Sturtevant Inc (Boston) on 8
**   November 1989 and then sent to BioDynamics.
F008 IUC31
F012 1
F020 2434
EOR
F002 11
F010 5.10
F004 1
F005 CL
F006 Methyl formate exposure at 100 ppm was associated with

**   increased subjective fatigue, no other significant changes
**   were found in battery of tests including mood,
**   neurobehavioral performance, vision, and postural sway.
**   .
F007 Methyl formate exposure at 100 ppm was associated with
**   increased subjective fatigue, no other significant changes
**   were found in battery of tests including mood,
**   neurobehavioral performance, vision, and postural sway.
**   .
F008 IUC31
F012 1
F020 2435
EOR
F002 11
F010 5.10
F004 1
F005 ME
F006
**   Groups of 20 subjects were exposed to 100 ppm methyl formate
**   vapor or air (controls) for eight hours. At three periods
**   during the exposure measurements were taken of mood,
**   neurobehavioral performance, vision, and postural sway. At
**   the begi
F007
**   Groups of 20 subjects were exposed to 100 ppm methyl formate
**   vapor or air (controls) for eight hours. At three periods
**   during the exposure measurements were taken of mood,
**   neurobehavioral performance, vision, and postural sway. At
**   the beginning and end of exposure, spirometry and odor
**   perception thresholds were measured.
F008 IUC31
F012 1
F020 2436
EOR
F002 11
F010 5.10
F004 1
F005 RE
F006 Sethre T, Laubli T, Berode M, Hangartner M, Krueger H.
**   Experimental exposure to methylformate and its
**   neurobehavioral effects. Int Arch Occup Environ Health. 2000
**   Aug;73(6):401-9.
F007 Sethre T, Laubli T, Berode M, Hangartner M, Krueger H.
**   Experimental exposure to methylformate and its
**   neurobehavioral effects. Int Arch Occup Environ Health. 2000
**   Aug;73(6):401-9.
F008 IUC31
F012 1
F020 2437
EOR
F002 11
F010 5.10
F004 1
F005 RM
F006 Experimental exposure to methylformate and its neurobehavioral effects.
F007 Experimental exposure to methylformate and its neurobehavioral effects.
F008 IUC4

F009 16-09-2002
F020 2343
EOR
F002 11
F010 5.10
F004 1
F005 RS
F006 After exposure the subjective feeling of fatigue was
** significantly increased in the methyl formate exposed group.
** The EMG of the forehead during a difficult task showed a
** different development for the exposed group. Overall, there
** was a ten
F007 After exposure the subjective feeling of fatigue was
** significantly increased in the methyl formate exposed group.
** The EMG of the forehead during a difficult task showed a
** different development for the exposed group. Overall, there
** was a tendency for diminished performance on several tasks
** in the exposed group but it was not significant.
** .
F008 IUC31
F012 1
F020 2438
EOR
F002 11
F010 5.4
F004 1
F005 CL
F006
** Sodium formate at 1% in the drinking water did not produce
** clinically adverse effects in rats after administration for
** approximately 18 months. The NOEL cannot be determined since
** pathological investigations had not been conducted
F007
** Sodium formate at 1% in the drinking water did not produce
** clinically adverse effects in rats after administration for
** approximately 18 months. The NOEL cannot be determined since
** pathological investigations had not been conducted
F008 IUC31
F012 1
F020 2439
EOR
F002 11
F010 5.4
F004 1
F005 ME
F006
** The study design encompassed both a five-generation and
** chronic study in Wistar rats with sodium formate at 1.0% in
** drinking water. Eight males and 24 females were in the
** original test group with four controls of each sex. Both
** microscopi
F007
** The study design encompassed both a five-generation and
** chronic study in Wistar rats with sodium formate at 1.0% in
** drinking water. Eight males and 24 females were in the
** original test group with four controls of each sex. Both
** microscopic and pathologic investigations were to be done

**   upon natural death of the animals. At the time of this
**   report the study had completed 1.5 years. Studies with
**   calcium formate had been completed and were reported
F008 IUC31
F012 1
F020 2440
EOR
F002 11
F010 5.4
F004 1
F005 RE
F006 Malorny G. Acute and chronic toxicity of formic acid and its
**   formates. Z. Ernaehrungswiss 9:332-339 (1969)
F007 Malorny G. Acute and chronic toxicity of formic acid and its
**   formates. Z. Ernaehrungswiss 9:332-339 (1969)
F008 IUC31
F012 1
F020 2441
EOR
F002 11
F010 5.4
F004 1
F005 RM
F006
**   Almost no specific details were given of the results of the
**   1% sodium formate multigeneration study. The indication in
**   the summary was that adverse effects were not observed in
**   the ongoing sodium formate drinking-water study. Due to the
**   l
F007
**   Almost no specific details were given of the results of the
**   1% sodium formate multigeneration study. The indication in
**   the summary was that adverse effects were not observed in
**   the ongoing sodium formate drinking-water study. Due to the
**   lack of details it cannot be confirmed that this was
**   actually the case. In addition the pathological evaluation
**   of the animals had not been conducted.
**
**   A group of dogs was also administered 5 grams sodium formate
**   per day in food. Adverse effects were not reported except
**   that some of the dogs refused to eat the dosed food after a
**   few days
F008 IUC31
F012 1
F020 2442
EOR
F002 11
F010 5.4
F004 1
F005 RS
F006
**   Specific results for the sodium formate portion of these rat
**   chronic studies were not given except in the summary where
**   it was mentioned that formate levels up to 1 gram per
**   kilogram per day (the approximate dose level of the sodium
**   format
F007

```
**   Specific results for the sodium formate portion of these rat
**   chronic studies were not given except in the summary where
**   it was mentioned that formate levels up to 1 gram per
**   kilogram per day (the approximate dose level of the sodium
**   formate study) were not harmful to health.  Update results
**   for these studies could not be found in the open literature
F008 IUC31
F012 1
F020 2443
EOR
F002 11
F010 5.4
F004 1
F005 TS
F006
**   Sodium Formate, CAS Number 141-53-
F007
**   Sodium Formate, CAS Number 141-53-
F008 IUC31
F012 1
F020 2444
EOR
F002 11
F010 5.5
F004 1
F005 RE
F006 Huels Report No. 88/210 (unpublished)
F007 Huels Report No. 88/210 (unpublished)
F008 IUC31
F012 1
F020 2445
EOR
F002 11
F010 5.5
F004 2
F005 CL
F006 No firm conclusion about the mutagenic potential can be
**   drawn from this test
F007 No firm conclusion about the mutagenic potential can be
**   drawn from this test
F008 IUC31
F012 1
F020 2446
EOR
F002 11
F010 5.5
F004 2
F005 RE
F006 Cameron, T.P.: Short–Term Test Program sponsored by the
**   devision of cancer etiology, National Cancer Institute:
**   zitiert in CCRIS, Chemical Cancer Research Information
**   System (1991)
F007 Cameron, T.P.: Short–Term Test Program sponsored by the
**   devision of cancer etiology, National Cancer Institute:
**   zitiert in CCRIS, Chemical Cancer Research Information
**   System (1991)
F008 IUC31
```

F012 1
F020 2447
EOR
F002 11
F010 5.5
F004 2
F005 RM
F006 This positive result is considered suspicious as no colony
** sizing data were given. The current OECD 476 (adopted 21
** July 1977) guideline requires colony sizing to confirm the
** positive result. Likewise, the 1994 Mammalian cell gene
** mutation
F007 This positive result is considered suspicious as no colony
** sizing data were given. The current OECD 476 (adopted 21
** July 1977) guideline requires colony sizing to confirm the
** positive result. Likewise, the 1994 Mammalian cell gene
** mutation assays working group report (Mutat Res 1994
** Jun;312(3):235-9) states that "Ability to recover small
** colonies must be convincingly demonstrated when using the
** L5178Y TK mouse lymphoma assay". In addition, the 1997
** report by Coombs et al (The use of L5178Y mouse lymphoma
** cells to assess the mutagenic, clastogenic and aneugenic
** properties of chemicals. Mutagenesis 1995 Sep;10(5):403-8)
** also emphasizes the importance of colony sizing to the
** acceptability of mouse lymphoma results.
F008 IUC31
F012 1
F020 2448
EOR
F002 11
F010 5.5
F004 3
F005 CL
F006
** It was concluded that formic acid it not itself clastogenic
** to these cells but that the acidic conditions were
** responsible for the chromosome aberrations observed. It can
** be further concluded the sodium formate (the product of
** neutralizat
F007
** It was concluded that formic acid it not itself clastogenic
** to these cells but that the acidic conditions were
** responsible for the chromosome aberrations observed. It can
** be further concluded the sodium formate (the product of
** neutralization of formic acid with sodium hydroxide or
** sodium bicarbonate) is not clastogenic
F008 IUC31
F012 1
F020 2449
EOR
F002 11
F010 5.5
F004 3
F005 ME
F006
** The study was conducted basically in accord with the OECD
** 473 guideline "In Vitro Mammalian Chromosome Aberration

```
**   Test".  The only significant variation from this guideline
**   was there were no positive controls reported. As the test
**   material
F007
**   The study was conducted basically in accord with the OECD
**   473 guideline "In Vitro Mammalian Chromosome Aberration
**   Test".  The only significant variation from this guideline
**   was there were no positive controls reported. As the test
**   materials produced positive results at acidic pH levels, the
**   sensitivity of the procedure was demonstrated.
**
**   The procedure was to expose the cells (two or more replicates) in Ham's
*    F12 medium (with 10% fetal calf serum) to various concentrations of test
*    material for 24 hours in the presence or absence of rat-liver S9 prepared
*    from rats pretreated with phenobarbital and 5,6-benzoflavone.  At the end
*    of the exposure period, chromosome preparations were made using an
*    air-drying method.  Two hundred metaphases were evaluated per
**   concentration level. Cytotoxicity was assessed by counting
**   surviving cells at the end of the exposure period.
**
**   Initially cells were exposed to four concentrations of
**   formic acid in the presence or absence of S9 and evaluated
**   for aberrant cells.  These results and the design and
**   results of other studies are provided in "results"
F008 IUC31
F012 1
F020 2450
EOR
F002 11
F010 5.5
F004 3
F005 RE
F006 Morita, T. et al. Evlauation of clastogenicity of formic
**   acid, acetic acid and lactic acid on cultured mammalian
**   cells Mut. Res. 240, 195-202 (1990)
F007 Morita, T. et al. Evlauation of clastogenicity of formic
**   acid, acetic acid and lactic acid on cultured mammalian
**   cells Mut. Res. 240, 195-202 (1990)
F008 IUC31
F012 1
F020 2451
EOR
F002 11
F010 5.5
F004 3
F005 RM
F006
**   This study appears to be a well conducted investigation of
**   the effect of pH on clastogenicity in general and
**   specifically a study of the clastogenicity of formic acid,
**   acetic acid, lactic acid and the sodium salt of these three
**   acids.  The
F007
**   This study appears to be a well conducted investigation of
**   the effect of pH on clastogenicity in general and
**   specifically a study of the clastogenicity of formic acid,
**   acetic acid, lactic acid and the sodium salt of these three
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**   acids.  The procedure closely followed OEDC guideline 473
**   and the results were published in a peer-reviewed journal.
**   The reliability is further enhanced by the similar results
**   on all three acids and the methodical approach to the
**   problem and conduct of the studies
F008 IUC31
F012 1
F020 2452
EOR
F002 11
F010 5.5
F004 3
F005 RS
F006
**   The following dose related increase in aberrant cells was
**   reported:
**
**   Conc (mM)           % Aberrant cells
**                            (-S9)       (+S9)
**         6                  -           1.0
**         8                 2.0    2.0
**        10
F007
**   The following dose related increase in aberrant cells was
**   reported:
**
**   Conc (mM)           % Aberrant cells
**                            (-S9)       (+S9)
**         6                  -           1.0
**         8                 2.0    2.0
**        10                 4.0          20.5
**        12                 15.9   toxic
**        14                 toxic    -
**
**
**
**
**   In a second set of experiments the initial pH of the medium
**   was adjusted to pH 5.8 or 6.0 with 14 or 12 mM formic acid
**   it the absence or presence of S9 mix, respectively.  These
**   media were then neutralized with 1 M NaOH to pH 6.4 and a
**   second group to pH 7.2.  Results were as follows  (cell data
**   were read from a graph and are approximate)
**
**   Activation       %Aberrant cells
**          pH6.0 pH6.4 pH7.2
**   -S9           12           4      0
**   +S9           33     2      3
**
**
**
**   In a third set of studies, the concentration of the buffer
**   system was increased by supplementation with 34 mM sodium
**   bicarbonate in the absence of S9. Under these conditions,
**   there was no clastogenic activity of 10 or 20 mM formic
**   acid; however, at 25mM 12% aberrant cells were reported and
**   at 30 mM the formic acid was cytotoxic.  The 25 and 30 mM
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**   concentrations also resulted in acidic pH levels.
**
**   Similar studies were also conduced with acetic acid and
**   lactic acid with the same results.
F008 IUC31
F012 1
F020 2453
EOR
F002 11
F010 5.5
F004 3
F005 TS
F006 Sodium formate produced by the neutralization of formic acid
**   with sodium hydroxide or sodium bicarbonate.
F007 Sodium formate produced by the neutralization of formic acid
**   with sodium hydroxide or sodium bicarbonate.
F008 IUC31
F012 1
F020 2454
EOR
F002 11
F010 5.6
F004 1
F005 CL
F006
**   Sodium formate produced by neutralization of formic acid is
**   not positive in the Drosophila SLRL test under these
**   conditions; formic acid, at the same molar concentration
**   produced positive results.
F007
**   Sodium formate produced by neutralization of formic acid is
**   not positive in the Drosophila SLRL test under these
**   conditions; formic acid, at the same molar concentration
**   produced positive results.
F008 IUC31
F012 1
F020 2455
EOR
F002 11
F010 5.6
F004 1
F005 ME
F006 Oregon-K strain of Drosophila melanogaster were treated
**   using dosed feed with 0.1 % formic acid, or sodium formate
**   produced by neutralization of 0.1% formic acid with
**   glycine-NaOH buffer. The Mueller-5 technique was used to
**   determine sex-li
F007 Oregon-K strain of Drosophila melanogaster were treated
**   using dosed feed with 0.1 % formic acid, or sodium formate
**   produced by neutralization of 0.1% formic acid with
**   glycine-NaOH buffer. The Mueller-5 technique was used to
**   determine sex-linked lethals (M Demerec, Induction of
**   mutations in Drosophila by debenzanthracene, Genetics
**   33:337-48, 1948). About 50 treated males were mated with M-5
**   virgins and every third day the males were transferred to
**   two fresh virgins in order to produce three successive
**   broods.
```

```
**   .
F008 IUC31
F012 1
F020 2456
EOR
F002 11
F010 5.6
F004 1
F005 RE
F006 Stumm-Tegethoff, B.F.A.: Theor. Appl. Genetics 39, 330-334
**   (1969)
F007 Stumm-Tegethoff, B.F.A.: Theor. Appl. Genetics 39, 330-334
**   (1969)
F008 IUC31
F012 1
F020 2457
EOR
F002 11
F010 5.6
F004 1
F005 RM
F006 This study was similar in conduct to the current OECD 477
**   guideline regarding basic methodology; however, it is not
**   clear that higher levels of sodium formate could not have
**   been used to provide a more robust test of sodium formate
**   genotoxi
F007 This study was similar in conduct to the current OECD 477
**   guideline regarding basic methodology; however, it is not
**   clear that higher levels of sodium formate could not have
**   been used to provide a more robust test of sodium formate
**   genotoxicity.
**   .
F008 IUC31
F012 1
F020 2458
EOR
F002 11
F010 5.6
F004 1
F005 RS
F006
**   Oregon-K strain of Drosophila melanogaster were treated
**   using dosed feed with 0.1 % formic acid, or sodium formate
**   produced by neutralization of 0.1% formic acid with
**   glycine-NaOH buffer. The Mueller-5 technique was used to
**   determine sex-l
F007
**   Oregon-K strain of Drosophila melanogaster were treated
**   using dosed feed with 0.1 % formic acid, or sodium formate
**   produced by neutralization of 0.1% formic acid with
**   glycine-NaOH buffer. The Mueller-5 technique was used to
**   determine sex-linked lethals (M Demerec, Induction of
**   mutations in Drosophila by debenzanthracene, Genetics
**   33:337-48, 1948). About 50 treated males were mated with M-5
**   virgins and every third day the males were transferred to
**   two fresh virgins in order to produce three successive
**   broods.
```

```
**   .
**
**   After feeding formic acid or sodium formate over the entire
**   larval stage, treated males mated with females gave the
**   following results:
**
**   Formic acid
**
**     Brood      # Chromosomes  Tested     % Sex-linked lethals
**        1                   786               1.15
**        2                   522               1.34
**        3                   571               1.11
**
**   Sodium Formate  (only one brood tested)
**
**     Brood      # Chromosomes  Tested     % Sex-linked lethals
**       2                     544               0.38
**
**   Controls
**
**     Brood      # Chromosomes  Tested     % Sex-linked lethals
**      all                   2584              0.15
**
**
**   The sodium formate sex-linked lethal was not different from
**   the control while the formic acid results were stated as
**   bring significantly different from control as determined by
**   the rank-correlation method
F008 IUC31
F012 1
F020 2459
EOR
F002 11
F010 5.6
F004 1
F005 TS
F006
**   Sodium formate produced by neutralization of 0.1% formic
**   acid with glycine-NaOH buffer
F007
**   Sodium formate produced by neutralization of 0.1% formic
**   acid with glycine-NaOH buffer
F008 IUC31
F012 1
F020 2460
EOR
F002 11
F010 5.8.2
F004 1
F005 RE
F006 Andrews JE; Ebron-McCoy M; Kavlock RJ; Rogers JM.  Lowering
**   pH increases embryonic sensitivity to formate in whole
**   embryo culture. Toxicology In Vitro 7:757-62 (1993)
F007 Andrews JE; Ebron-McCoy M; Kavlock RJ; Rogers JM.  Lowering
**   pH increases embryonic sensitivity to formate in whole
**   embryo culture. Toxicology In Vitro 7:757-62 (1993)
F008 IUC31
```

F012 1
F020 2461
EOR
F002 11
F010 5.8.2
F004 1
F005 RM
F006
** Other in vitro studies of sodium formate and formic acid on
** developing embryos have been published and are includid in
** the formic acid IUCLID document. This study was selected as
** representative. High concentrations of sodium formate have
** e
F007
** Other in vitro studies of sodium formate and formic acid on
** developing embryos have been published and are includid in
** the formic acid IUCLID document. This study was selected as
** representative. High concentrations of sodium formate have
** effects on the embryo in vitro. The significance of this to
** in vivo developmental toxicity after exposure to formate is
** not known
F008 IUC31
F012 1
F020 2462
EOR
F002 11
F010 5.8.2
F004 1
F005 RS
F006
** The effect of the pH (8.13, 7.75, 7.00, 6.50 and 6.00) on
** the in vitro teratogenicity of sodium formate (0.2, 0.4,
** 0.8, 1.2 and 1.6 mg/ml) was investigated in rat embryo
** cultures (Sprague-Dawley rats, day 9.5 of gestation).
** Numerous embryo
F007
** The effect of the pH (8.13, 7.75, 7.00, 6.50 and 6.00) on
** the in vitro teratogenicity of sodium formate (0.2, 0.4,
** 0.8, 1.2 and 1.6 mg/ml) was investigated in rat embryo
** cultures (Sprague-Dawley rats, day 9.5 of gestation).
** Numerous embryonic developmental parameters showed that even
** the decreasing pH had an influence on embryonic development
** in this test system. In the highest concentration, the
** parameters crown-rump length (CRL), head length (HL), somite
** number (SN), developmental score (DS) and protein
** concentration were significantly reduced in the incubation
** medium regardless of the pH. At a test substance
** concentration of 0.8 and 1.2 mg/ml, these parameters were
** significantly reduced at a low pH. At a test substance
** concentration of 0.4 and 0.2 mg/ml, CRL, HL and the protein
** concentration were still significantly reduced at a pH of
** 6.5 in the medium. To sum up, a dependence of the embryonic
** developmental parameters and of embryolethality both on the
** formate concentration and on the pH in the incubation medium
** was demonstrated in this test system
F008 IUC31
F012 1

F020 2463
EOR
F002 11
F010 5.8.2
F004 1
F005 TS
F006
** Sodium Formate, CAS Number 141-53-
F007
** Sodium Formate, CAS Number 141-53-
F008 IUC31
F012 1
F020 2464
EOR
F002 11
F010 5.8.2
F004 2
F005 CL
F006
** Sodium formate was not teratogenic under these condition
F007
** Sodium formate was not teratogenic under these condition
F008 IUC31
F012 1
F020 2465
EOR
F002 11
F010 5.8.2
F004 2
F005 ME
F006
** Sodium formate at 5, 10 or 20 mg/Egg was injected into
** fertilized eggs
F007
** Sodium formate at 5, 10 or 20 mg/Egg was injected into
** fertilized eggs
F008 IUC31
F012 1
F020 2466
EOR
F002 11
F010 5.8.2
F004 2
F005 RE
F006 Malorny G. Acute and chronic toxicity of formic acid and its
** formates. Z. Ernaehrungswiss 9:332-339 (1969)
F007 Malorny G. Acute and chronic toxicity of formic acid and its
** formates. Z. Ernaehrungswiss 9:332-339 (1969)
F008 IUC31
F012 1
F020 2467
EOR
F002 11
F010 5.8.2
F004 2
F005 RS
F006

```
**   Sodium formate did not cause deviations in chicken embryos
**   under these conditions
F007
**   Sodium formate did not cause deviations in chicken embryos
**   under these conditions
F008 IUC31
F012 1
F020 2468
EOB
C
C    ********* N E W   D A T A   S E T *********
C
D    22
C
B052 DS_COMPONENT_JOIN_TAB
F001 22
F002 1
F003 1.0.1
F004 1
F005 1
F006 25-10-2002
F007 12-11-2001
EOR
F001 22
F002 1
F003 1.0.1
F004 2
F005 2
F006 25-10-2002
F007 12-11-2001
EOR
F001 22
F002 1
F003 1.0.1
F004 3
F005 3
F006 25-10-2002
F007 20-12-2001
EOR
F001 22
F002 1
F003 1.0.1
F004 4
F005 4
F006 25-10-2002
F007 19-12-2001
EOR
F001 22
F002 1
F003 1.0.1
F004 5
F005 5
F006 25-10-2002
F007 19-12-2001
EOR
F001 22
F002 1
```

F003 1.0.1
F004 6
F005 6
F006 25-10-2002
F007 19-12-2001
EOR
F001 22
F002 1
F003 1.1.1
F004 1
F005 1
F006 25-10-2002
F007 20-12-2001
EOR
F001 22
F002 1
F003 1.2
F004 1
F005 1
F006 25-10-2002
F007 12-11-2001
EOR
F001 22
F002 1
F003 1.2
F004 2
F005 2
F006 25-10-2002
F007 12-11-2001
EOR
F001 22
F002 1
F003 2.1
F004 1
F005 1
F006 25-10-2002
F007 12-11-2001
EOR
F001 22
F002 1
F003 2.1
F004 2
F005 2
F006 25-10-2002
F007 12-11-2001
EOR
F001 22
F002 1
F003 2.14
F004 1
F005 1
F006 25-10-2002
F007 12-11-2001
EOR
F001 22
F002 1
F003 2.2

F004 1
F005 1
F006 02-03-2003
F007 20-12-2001
EOR
F001 22
F002 1
F003 2.3
F004 1
F005 1
F006 25-10-2002
F007 12-11-2001
EOR
F001 22
F002 1
F003 2.3
F004 2
F005 2
F006 25-10-2002
F007 16-11-2001
EOR
F001 22
F002 1
F003 2.4
F004 1
F005 1
F006 25-10-2002
F007 20-12-2001
EOR
F001 22
F002 1
F003 2.5
F004 1
F005 1
F006 25-10-2002
F007 20-12-2001
EOR
F001 22
F002 1
F003 2.6.1
F004 1
F005 1
F006 25-10-2002
F007 16-11-2001
EOR
F001 22
F002 1
F003 2.6.1
F004 2
F005 2
F006 25-10-2002
F007 16-11-2001
EOR
F001 22
F002 1
F003 2.6.1
F004 3

F005 3
F006 25-10-2002
F007 16-11-2001
EOR
F001 22
F002 1
F003 2.7
F004 1
F005 1
F006 25-10-2002
F007 12-11-2001
EOR
F001 22
F002 1
F003 3.1.1
F004 1
F005 1
F006 25-10-2002
F007 14-11-2001
EOR
F001 22
F002 1
F003 3.1.2
F004 1
F005 1
F006 20-02-2003
F007 14-11-2001
EOR
F001 22
F002 1
F003 3.3.2
F004 1
F005 1
F006 25-10-2002
F007 20-12-2001
EOR
F001 22
F002 1
F003 3.5
F004 1
F005 1
F006 25-10-2002
F007 16-11-2001
EOR
F001 22
F002 1
F003 4.1
F004 1
F005 1
F006 25-10-2002
F007 16-11-2001
EOR
F001 22
F002 1
F003 4.1
F004 2
F005 2

F006 28-01-2003
F007 16-11-2001
EOR
F001 22
F002 1
F003 4.1
F004 3
F005 3
F006 25-10-2002
F007 16-11-2001
EOR
F001 22
F002 1
F003 4.2
F004 1
F005 1
F006 28-01-2003
F007 12-11-2001
EOR
F001 22
F002 1
F003 4.3
F004 1
F005 1
F006 28-01-2003
F007 12-11-2001
EOR
F001 22
F002 1
F003 4.4
F004 1
F005 1
F006 25-10-2002
F007 12-11-2001
EOR
F001 22
F002 1
F003 5.1.1
F004 1
F005 1
F006 27-01-2003
F007 12-11-2001
EOR
F001 22
F002 1
F003 5.1.1
F004 2
F005 2
F006 27-01-2003
F007 16-11-2001
EOR
F001 22
F002 1
F003 5.1.1
F004 3
F005 3
F006 27-01-2003

F007 16-11-2001
EOR
F001 22
F002 1
F003 5.1.1
F004 4
F005 4
F006 27-01-2003
F007 16-11-2001
EOR
F001 22
F002 1
F003 5.1.4
F004 1
F005 1
F006 25-10-2002
F007 16-11-2001
EOR
F001 22
F002 1
F003 5.2.1
F004 1
F005 1
F006 25-10-2002
F007 12-11-2001
EOR
F001 22
F002 1
F003 5.2.1
F004 2
F005 2
F006 25-10-2002
F007 12-11-2001
EOR
F001 22
F002 1
F003 5.2.2
F004 1
F005 1
F006 25-10-2002
F007 12-11-2001
EOR
F001 22
F002 1
F003 5.2.2
F004 2
F005 2
F006 25-10-2002
F007 12-11-2001
EOR
F001 22
F002 1
F003 5.2.2
F004 3
F005 3
F006 25-10-2002
F007 12-11-2001

EOR
F001 22
F002 1
F003 5.4
F004 1
F005 1
F006 25-10-2002
F007 18-11-2001
EOR
F001 22
F002 1
F003 5.5
F004 1
F005 1
F006 27-01-2003
F007 12-11-2001
EOR
F001 22
F002 1
F003 5.7
F004 1
F005 1
F006 25-10-2002
F007 18-11-2001
EOR
F001 22
F002 1
F003 5.8.1
F004 1
F005 1
F006 25-10-2002
F007 18-11-2001
EOR
F001 22
F002 1
F003 5.8.2
F004 1
F005 1
F006 02-03-2003
F007 18-11-2001
EOB
C
B053 DS_REC_MARK_TAB
F001 22
F002 1.2
F003 2
F004 A37-009
EOR
F001 22
F002 4.1
F003 2
F004 A37-009
EOR
F001 22
F002 5.1.1
F003 1
F004 A37-009

EOB
C
B051 DS_COMPONENT_TAB
F001 22
F002 0
F003 544-17-2
F012 N
F010 24-10-2002
F004 12035512
F005 24-10-2002
F006 12035512
F007 24-10-2002
F009 A35-01
EOR
F001 22
F002 1
F003 544-17-2
F012 N
F010 20-12-2001
F004 12032815
F005 12-11-2001
F006 12032815
F007 12-11-2001
F009 A35-01
EOB
C
B115 GI_COMPANY_TAB
F001 22
F002 1
F003 06-12-2000
F004 MORUP
F007 A34-02
F008 American Chemistry Council, Formates Panel
F009 1300 Wilson Boulevard
F010 Arlington, VA
F011 22209
F013 A31-024
EOR
F001 22
F002 2
F003 06-12-2000
F004 MOVNV
F007 A34-01
F008 Bayer Corporation
F009 100 Bayer Road
F010 Pittsburgh, PA
F011 15205-9741
F013 A31-024
EOR
F001 22
F002 3
F003 20-12-2001
F004 IUC31
F007 A34-01
F008 Hercules Incorporated
F009 1313 North Market Street
F010 Wilmington, DE

F011 19894-001
EOR
F001 22
F002 4
F003 19-12-2001
F004 IUC31
F007 A34-01
F008 BASF Corporation
EOR
F001 22
F002 5
F003 19-12-2001
F004 IUC31
F007 A34-01
F008 Celanese Ltd
EOR
F001 22
F002 6
F003 19-12-2001
F004 IUC31
F007 A34-01
F008 GEO Specialty Chemicals
EOB
C
B101 GI_GENERAL_INFORM_TAB
F001 22
F002 1
F003 20-12-2001
F004 IUC31
F010 A04-05
F011 A19-03
EOB
C
B102 GI_SYNONYM_TAB
F001 22
F002 1
F003 05-11-2001
F004 MOVNV
F007 Formic acid, calcium salt
EOR
F001 22
F002 2
F003 05-11-2001
F004 MOVNV
F007 Calcium formate
EOB
C
B201 PC_MELTING_TAB
F001 22
F002 1
F003 11-12-2000
F004 MOVNV
F016 2
F007 A02-05
F008 800
F010 A30-03
EOR

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F001 22
F002 2
F003 11-12-2000
F004 MOVNV
F015 A36-003
F016 1
F007 A02-04
F008 300
F012 P01-03:  Handbook value
EOB
C
B202 PC_BOILING_TAB
F001 22
F002 1
F003 02-03-2003
F004 IUC4
F007 A02-04
F008 300
EOB
C
B203 PC_DENSITY_TAB
F001 22
F002 1
F003 11-12-2000
F004 MOVNV
F017 2
F007 P05-01
F009 1150
F011 P18-02
EOR
F001 22
F002 2
F003 16-11-2001
F004 IUC31
F016 A36-003
F017 1
F007 P05-03
F009 2.02
F012 19
F013 P04-03:  Handbook value
EOB
C
B204 PC_VAPOUR_TAB
F001 22
F002 1
F003 20-12-2001
F004 IUC31
EOB
C
B205 PC_PARTITION_TAB
F001 22
F002 1
F003 20-12-2001
F004 IUC31
F014 A36-003
F008 -2.47
F011 P07-04:KOWWIN (v1.65)
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F012 1999
F013 A03-01
EOB
C
B206 PC_WATER_SOL_TAB
F001 22
F002 1
F003 16-11-2001
F004 IUC31
F023 A36-005
F024 1
F008 P08-01
F009 160
F011 20
EOR
F001 22
F002 2
F003 16-11-2001
F004 IUC31
F023 A36-003
F024 2
EOR
F001 22
F002 3
F003 16-11-2001
F004 IUC31
F023 A36-003
F024 3
F007 A02-06
F008 P08-01
F009 255
F011 25
EOB
C
B207 PC_FLASH_TAB
F001 22
F002 1
F003 05-03-1992
F004 VCI
EOB
C
B212 PC_OTHER_TAB
F001 22
F002 1
F003 28-05-1994
F004 WAGNER_S
EOB
C
B301 EN_PHOTODEGRADATION_TAB
F001 22
F002 1
F003 14-11-2001
F004 IUC31
F045 A36-005
F008 F01-02
EOB
C

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B302 EN_STABILITY_IN_WATER_TAB
F001 22
F002 1
F003 20-02-2003
F004 IUC4
F040 A36-005
F008 F08-01
EOB
C
B306 EN_DISTRIBUTION_TAB
F001 22
F002 1
F003 20-12-2001
F004 IUC31
F010 A36-003
F007 F24-02
F008 F23-03
F009 1999
EOB
C
B308 EN_BIODEGRADATION_TAB
F001 22
F002 1
F003 16-11-2001
F004 IUC31
F047 A36-005
F008 F25-01
F009 F26-18
F010 1974
F011 F27-0159
F015 A02-04
F017 75
F018 20
F019 F05-01
F046 A03-01
EOB
C
B401 EC_FISHTOX_TAB
F001 22
F002 1
F003 16-11-2001
F004 IUC31
F033 A36-005
F034 3
F008 E01-05
F009 E02-0075
F010 E03-05: Bestimmung der akuten Wirkung von Stoffen auf Fische.
**   Arbeitskreis "Fischtest" im Hauptausschuss "Detergentien"
**   (15.10.73)
F011 1974
F012 48
F013 E04-02
F014 E05-02
F018 A02-05
F019 1000
F031 A03-01
F032 A03-01
```

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EOR
F001 22
F002 2
F003 28-01-2003
F004 IUC4
F033 A36-002
F034 1
F007 A01-03: calcium formate: technical grade
F008 E01-05
F009 E02-0012
F010 E03-05: Letale Wirkung beim Zebrabaerbling, UBA-Verfahrensvorschlag, Mai
*    1984, Letale Wirkung beim Zebrabaerbling Brachydanio rerio LC0, LC50,
*    LC100, 48-96h
F011 1988
F012 96
F013 E04-02
F014 E05-02
F018 A02-05
F019 1000
F031 A03-01
F032 A03-01
F044 E35-02
EOR
F001 22
F002 3
F003 16-11-2001
F004 IUC31
F033 A36-003
F034 2
F007 A01-03:  molecular structure
F008 E01-03
F010 E03-05:  Calculated (ECOSAR Program) (v0.99e)
F011 1999
F012 96
F013 E04-02
F014 E05-01
F021 A02-03
F022 1540
F032 A03-01
EOB
C
B402 EC_DAPHNIATOX_TAB
F001 22
F002 1
F003 28-01-2003
F004 IUC4
F032 A36-003
F033 1
F007 A01-03:  molecular structure
F008 E06-0034:  Daphnid
F009 E07-04:  Calculated (ECOSAR Program) (v0.99e)
F011 48
F012 E04-02
F013 E05-01
F020 A02-03
F021 1210
F031 A03-01
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F042 E01-03
F045 E35-01
EOB
C
B403 EC_ALGAETOX_TAB
F001 22
F002 1
F003 28-01-2003
F004 IUC4
F036 A36-003
F037 1
F007 A01-03:  molecular structure
F008 E08-0063:  Green
F009 E09-04:  Calculated (ECOSAR Program) (v0.99e)
F010 1999
F011 E10-03
F012 96
F013 E04-02
F014 E05-01
F027 A02-03
F028 584
F035 A03-01
F050 E35-01
EOB
C
B404 EC_BACTOX_TAB
F001 22
F002 1
F003 25-05-1994
F004 PAETZ_A
F008 E29-01
F009 E11-0003
F010 E12-06: Test for Inhibition of Oxygen Consumption by Activated Sludge,
*    ISO 8192
F011 1988
F012 3
F013 E04-02
F014 E05-02
F021 A02-04
F022 10000
F032 A03-01
F033 A03-01
EOB
C
B501 TO_ACUTE_ORAL_TAB
F001 22
F002 1
F003 27-01-2003
F004 IUC4
F017 A36-003
F018 1
F007 A01-01
F008 T01-03
F009 T02-24
F010 T03-03:  Fink and Hund, Arzneim. - Forsch.  15, 1965, p. 624
F012 A02-03
F013 3050
```

F015 T04-01
F016 A03-01
F019 T24-02
F020 60
F021 T52-007
F023 1000, 2000, 3100, 3500, 3800, 4000 mg/kg
EOR
F001 22
F002 2
F003 27-01-2003
F004 IUC4
F017 A36-005
F018 3
F008 T01-03
F009 T02-24
F012 A02-03
F013 2650
F015 T04-01
EOR
F001 22
F002 3
F003 27-01-2003
F004 IUC4
F017 A36-005
F018 4
F008 T01-03
F009 T02-18
F012 A02-03
F013 1920
F015 T04-01
EOR
F001 22
F002 4
F003 27-01-2003
F004 IUC4
F017 A36-003
F018 2
F008 T01-03
F009 T02-24
F011 1979
F012 A02-06
F013 2560
F015 T04-01
F021 T52-001
F022 T23-47
EOB
C
B504 TO_ACUTE_OTHER_TAB
F001 22
F002 1
F003 16-11-2001
F004 IUC31
F020 A36-005
F008 T10-07
F009 T02-18
F010 T11-03
F013 A02-03

F014 154
F016 T12-01
EOB
C
B505 TO_SKIN_IRRITATION_TAB
F001 22
F002 1
F003 03-05-1993
F004 EUCLID
F008 T02-23
F009 T14-06: ear, 500 mg/animal, semi-occlusive
F012 T46-06
EOR
F001 22
F002 2
F003 20-05-1994
F004 PAETZ_A
F008 T02-23
F009 T14-06: according to 'appraisal of the safety of chemicals in foods,
*   drugs and cosmetics' by the staff of the devision of Pharmacology, FDA,
*   Hautgifigkeit nach Draize (1959)
F012 T46-07
EOB
C
B506 TO_EYE_IRRITATION_TAB
F001 22
F002 1
F003 05-03-1992
F004 EUCLID
F008 T02-23
F009 T16-04: see remarks
F012 T46-07
EOR
F001 22
F002 2
F003 05-03-1992
F004 EUCLID
F008 T02-23
F009 T16-04: see remarks
F012 T46-07
EOR
F001 22
F002 3
F003 16-06-1993
F004 EUCLID
F008 T02-23
F009 T16-04: according to 'appraisal of the safety of chemicals in foods,
*   drugs and cosmetics' by the staff of the devision of Pharmacology, FDA,
*   Bewertung von Augen-Laesionen nach Draize (1959)
F012 T46-05
EOB
C
B508 TO_REPEATED_DOSE_TAB
F001 22
F002 1
F003 18-11-2001
F004 IUC31

F030 A36-003
F031 1
F008 T02-24
F009 T23-46
F010 T24-03
F011 T25-02
F012 T26-16
F014 Lifelong
F015 Daily
F017 200 mg/kg/day
F018 T27-05
F019 A02-03
F020 200
F022 T28-02
F029 A03-01
EOB
C
B509 TO_GENETIC_IN_VITRO_TAB
F001 22
F002 1
F003 27-01-2003
F004 IUC4
F016 A36-002
F017 1
F007 A01-03: purity > 99%
F008 T30-01
F009 T31-10
F010 1983
F011 Salmonella typhimurium TA 1535, TA 100, TA 1537, TA 98
F012 T32-03
F013 T33-02
F014 A03-03
F015 up to 12,500 ug test substance per plate
F018 greater than 12,500 ug/plate in all strains
EOB
C
B511 TO_CARCINOGENICITY_TAB
F001 22
F002 1
F003 18-11-2001
F004 IUC31
F020 A36-003
F008 T02-24
F009 T23-46
F010 T24-03
F011 T38-02
F014 3 years
F015 daily
F016 no
F017 0.2% (3 years), 0.4 % (2 years, pathology not reported)
F018 T27-05
EOB
C
B512 TO_REPRODUCTION_TAB
F001 22
F002 1
F003 18-11-2001

```
F004 IUC31
F037 A36-003
F038 1
F007 A01-02
F008 T41-01
F009 T02-24
F010 T23-46
F011 T24-03
F012 T25-02
F036 2-5 generations
F013 T40-05
F015 daily
F016 6 weeks
F017 6 weeks
F018 lifelong
F019 0.2 % (5 generations); or 0.4 % (2 generations)
F020 T27-05
F022 200
F024 T43-02
F026 200
F028 T43-05
F035 A03-01
EOB
C
B513 TO_DEVELOPMENTAL_TAB
F001 22
F002 1
F003 02-03-2003
F004 IUC4
F030 A36-003
F031 1
F008 T02-24
F009 T23-46
F010 T24-01
F011 T25-02
F012 T44-03
F015 Continuous during entire period of gestation and at least six weeks prior
*    to gestation.
F016 daily
F017 200 mg/kg/day
F018 T27-05
F020 200
F022 T43-02
F024 200
F026 T43-02
F029 A03-01
EOB
C
B601 TEXT_TAB
F002 22
F010 1.0.1
F004 1
F005 SO
F006 Bayer Corporation  Pittsburgh
**   Toxicology and Regulatory Affairs  Flemington NJ
F007 Bayer Corporation  Pittsburgh
**   Toxicology and Regulatory Affairs  Flemington NJ
```

F008 IUC4
F009 25-10-2002
F020 4511
EOR
F002 22
F010 1.0.1
F004 2
F005 SO
F006 Bayer Corporation Pittsburgh
** Toxicology and Regulatory Affairs Flemington NJ
F007 Bayer Corporation Pittsburgh
** Toxicology and Regulatory Affairs Flemington NJ
F008 IUC4
F009 25-10-2002
F020 4512
EOR
F002 22
F010 1.0.1
F004 3
F005 SO
F006 Toxicology and Regulatory Affairs Flemington NJ
F007 Toxicology and Regulatory Affairs Flemington NJ
F008 IUC4
F009 25-10-2002
F020 4513
EOR
F002 22
F010 1.0.1
F004 4
F005 SO
F006 Bayer Corporation Pittsburgh
** Toxicology and Regulatory Affairs Flemington NJ
F007 Bayer Corporation Pittsburgh
** Toxicology and Regulatory Affairs Flemington NJ
F008 IUC4
F009 25-10-2002
F020 4514
EOR
F002 22
F010 1.0.1
F004 5
F005 SO
F006 Bayer Corporation Pittsburgh
** Toxicology and Regulatory Affairs Flemington NJ
F007 Bayer Corporation Pittsburgh
** Toxicology and Regulatory Affairs Flemington NJ
F008 IUC4
F009 25-10-2002
F020 4515
EOR
F002 22
F010 1.0.1
F004 6
F005 SO
F006 Toxicology and Regulatory Affairs Flemington NJ
F007 Toxicology and Regulatory Affairs Flemington NJ
F008 IUC4

F009 25-10-2002
F020 4516
EOR
F002 22
F010 1.1.1
F004 1
F005 RM
F006 Typical purity > 98%. Purity of material used in the
** studies varies depending on the source.
F007 Typical purity > 98%. Purity of material used in the
** studies varies depending on the source.
F008 IUC31
F020 4517
EOR
F002 22
F010 1.1.1
F004 1
F005 SO
F006 Toxicology and Regulatory Affairs Flemington NJ
F007 Toxicology and Regulatory Affairs Flemington NJ
F008 IUC4
F009 25-10-2002
F020 4518
EOR
F002 22
F010 1.2
F004 1
F005 SO
F006 Bayer Corporation Pittsburgh
** Toxicology and Regulatory Affairs Flemington NJ
F007 Bayer Corporation Pittsburgh
** Toxicology and Regulatory Affairs Flemington NJ
F008 IUC4
F009 25-10-2002
F020 4519
EOR
F002 22
F010 1.2
F004 2
F005 SO
F006 Bayer Corporation Pittsburgh
** Toxicology and Regulatory Affairs Flemington NJ
F007 Bayer Corporation Pittsburgh
** Toxicology and Regulatory Affairs Flemington NJ
F008 IUC4
F009 25-10-2002
F020 4520
EOR
F002 22
F010 2.1
F004 1
F005 RE
F006 Bayer AG data
F007 Bayer AG data
F008 EUCLID
F009 05-03-1992
F020 4521

EOR
F002 22
F010 2.1
F004 1
F005 SO
F006 Bayer AG Leverkusen
** Bayer Corporation Pittsburgh
** Toxicology and Regulatory Affairs Flemington NJ
F007 Bayer AG Leverkusen
** Bayer Corporation Pittsburgh
** Toxicology and Regulatory Affairs Flemington NJ
F008 IUC4
F009 25-10-2002
F020 4523
EOR
F002 22
F010 2.1
F004 2
F005 RE
F006 The Condensed Chemical Dictionary 9th Edition (1977)
** Hawley, G.G, Van Nostrand Reinhold Co., New York. p.151
F007 The Condensed Chemical Dictionary 9th Edition (1977)
** Hawley, G.G, Van Nostrand Reinhold Co., New York. p.151
F008 WVPAE
F020 4522
EOR
F002 22
F010 2.1
F004 2
F005 SO
F006 Bayer Corporation Pittsburgh
** Toxicology and Regulatory Affairs Flemington NJ
F007 Bayer Corporation Pittsburgh
** Toxicology and Regulatory Affairs Flemington NJ
F008 IUC4
F009 25-10-2002
F020 4524
EOR
F002 22
F010 2.14
F004 1
F005 RE
F006 Bayer AG data
F007 Bayer AG data
F008 EUCLID
F020 4525
EOR
F002 22
F010 2.14
F004 1
F005 RM
F006 pH value: ca. 8 at 1 g/l water
F007 pH value: ca. 8 at 1 g/l water
F008 EUCLID
F020 4526
EOR
F002 22

F010 2.14
F004 1
F005 SO
F006 Bayer AG Leverkusen
** Bayer Corporation Pittsburgh
** Toxicology and Regulatory Affairs Flemington NJ
F007 Bayer AG Leverkusen
** Bayer Corporation Pittsburgh
** Toxicology and Regulatory Affairs Flemington NJ
F008 IUC4
F009 25-10-2002
F020 4527
EOR
F002 22
F010 2.2
F004 1
F005 RM
F006 According to the SIDS Manual, boiling points over 300 need not be
* specified. As this material has a melting point greater than 300 deg. C,
* the boiling point must be greater than 300 deg C.
F007 According to the SIDS Manual, boiling points over 300 need not be
* specified. As this material has a melting point greater than 300 deg. C,
* the boiling point must be greater than 300 deg C.
F008 EUCLID
F020 4528
EOR
F002 22
F010 2.2
F004 1
F005 SO
F006 Toxicology and Regulatory Affairs Flemington NJ
F007 Toxicology and Regulatory Affairs Flemington NJ
F008 IUC4
F009 25-10-2002
F020 4529
EOR
F002 22
F010 2.3
F004 1
F005 RE
F006 Bayer AG data
F007 Bayer AG data
F008 EUCLID
F009 05-03-1992
F020 4530
EOR
F002 22
F010 2.3
F004 1
F005 SO
F006 Bayer AG Leverkusen
** Bayer Corporation Pittsburgh
** Toxicology and Regulatory Affairs Flemington NJ
F007 Bayer AG Leverkusen
** Bayer Corporation Pittsburgh
** Toxicology and Regulatory Affairs Flemington NJ
F008 IUC4

F009 25-10-2002
F020 4532
EOR
F002 22
F010 2.3
F004 2
F005 RE
F006 The Merck Index 10th Edition (1983) Rahway, New Jersey. p.
** 230
F007 The Merck Index 10th Edition (1983) Rahway, New Jersey. p.
** 230
F008 WVPAE
F020 4531
EOR
F002 22
F010 2.3
F004 2
F005 SO
F006 Bayer Corporation Pittsburgh
** Toxicology and Regulatory Affairs Flemington NJ
F007 Bayer Corporation Pittsburgh
** Toxicology and Regulatory Affairs Flemington NJ
F008 IUC4
F009 25-10-2002
F020 4533
EOR
F002 22
F010 2.4
F004 1
F005 CL
F006 Material considered to be non-volatile as a dry solid.
F007 Material considered to be non-volatile as a dry solid.
F008 IUC31
F020 4535
EOR
F002 22
F010 2.4
F004 1
F005 RM
F006 This material is a solid salt and as such is considered to
** have negligible vapor pressure. It should be kept in mind,
** however, that it is in equilibrium with formic acid in
** solution and volatilization from solution is therefore pH
** dependen
F007 This material is a solid salt and as such is considered to
** have negligible vapor pressure. It should be kept in mind,
** however, that it is in equilibrium with formic acid in
** solution and volatilization from solution is therefore pH
** dependent
F008 EUCLID
F009 05-03-1992
F020 4534
EOR
F002 22
F010 2.4
F004 1
F005 SO

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F006 Toxicology and Regulatory Affairs  Flemington NJ
F007 Toxicology and Regulatory Affairs  Flemington NJ
F008 IUC4
F009 25-10-2002
F020 4536
EOR
F002 22
F010 2.5
F004 1
F005 RE
F006 Bayer AG data
F007 Bayer AG data
F008 EUCLID
F009 05-03-1992
F020 4537
EOR
F002 22
F010 2.5
F004 1
F005 RM
F006 n.a. (salt)
**
**   This value is also pH dependent due to equlibrium with
**   formic acid which has a log Kow of about -0.50
F007 n.a. (salt)
**
**   This value is also pH dependent due to equlibrium with
**   formic acid which has a log Kow of about -0.50
F008 EUCLID
F009 05-03-1992
F020 4538
EOR
F002 22
F010 2.5
F004 1
F005 SO
F006 Bayer AG  Leverkusen
**   Bayer Corporation  Pittsburgh
**   Toxicology and Regulatory Affairs  Flemington NJ
F007 Bayer AG  Leverkusen
**   Bayer Corporation  Pittsburgh
**   Toxicology and Regulatory Affairs  Flemington NJ
F008 IUC4
F009 25-10-2002
F020 4539
EOR
F002 22
F010 2.6.1
F004 1
F005 RE
F006 Bayer AG data
F007 Bayer AG data
F008 EUCLID
F009 05-03-1992
F020 4540
EOR
F002 22
```

F010 2.6.1
F004 1
F005 SO
F006 Bayer AG Leverkusen
** Bayer Corporation Pittsburgh
** Toxicology and Regulatory Affairs Flemington NJ
F007 Bayer AG Leverkusen
** Bayer Corporation Pittsburgh
** Toxicology and Regulatory Affairs Flemington NJ
F008 IUC4
F009 25-10-2002
F020 4548
EOR
F002 22
F010 2.6.1
F004 2
F005 RE
F006 The Merck Index 10th Edition (1983) Rahway, New Jersey. p.
** 230
F007 The Merck Index 10th Edition (1983) Rahway, New Jersey. p.
** 230
F008 IUC31
F020 4541
EOR
F002 22
F010 2.6.1
F004 2
F005 RM
F006 Listed in the Merch Index as "Soluble in water"
F007 Listed in the Merch Index as "Soluble in water"
F008 IUC31
F020 4542
EOR
F002 22
F010 2.6.1
F004 2
F005 SO
F006 Toxicology and Regulatory Affairs Flemington NJ
F007 Toxicology and Regulatory Affairs Flemington NJ
F008 IUC4
F009 25-10-2002
F020 4549
EOR
F002 22
F010 2.6.1
F004 3
F005 ME
F006 Estimation using EPIWIN 3.05 with default inputs
F007 Estimation using EPIWIN 3.05 with default inputs
F008 IUC31
F020 4547
EOR
F002 22
F010 2.6.1
F004 3
F005 RE
F006 EPIWIN 3.05, Syracuse Research Corp, Syracuse NY 13210

F007 EPIWIN 3.05, Syracuse Research Corp, Syracuse NY 13210
F008 IUC31
F020 4543
EOR
F002 22
F010 2.6.1
F004 3
F005 RM
F006 There will be a pH dependency on the Calcium solubility. At
** basic pH levels the calcium is expected to partially
** precipitate from solution as calcium hydroxide.
F007 There will be a pH dependency on the Calcium solubility. At
** basic pH levels the calcium is expected to partially
** precipitate from solution as calcium hydroxide.
F008 IUC31
F020 4544
EOR
F002 22
F010 2.6.1
F004 3
F005 RS
F006 Water solubility estimated at 1.96 moles per liter. Based on
** a molecular weight of 130 this is 255 g/L.
F007 Water solubility estimated at 1.96 moles per liter. Based on
** a molecular weight of 130 this is 255 g/L.
F008 IUC31
F020 4545
EOR
F002 22
F010 2.6.1
F004 3
F005 SO
F006 Toxicology and Regulatory Affairs Flemington NJ
F007 Toxicology and Regulatory Affairs Flemington NJ
F008 IUC4
F009 25-10-2002
F020 4550
EOR
F002 22
F010 2.6.1
F004 3
F005 TS
F006 Calcium Formate, CAS Number 544-17-2
F007 Calcium Formate, CAS Number 544-17-2
F008 IUC31
F020 4546
EOR
F002 22
F010 2.7
F004 1
F005 RM
F006 n.a.
F007 n.a.
F008 EUCLID
F009 05-03-1992
F020 4551
EOR

F002 22
F010 2.7
F004 1
F005 SO
F006 Bayer AG Leverkusen
** Bayer Corporation Pittsburgh
** Toxicology and Regulatory Affairs Flemington NJ
F007 Bayer AG Leverkusen
** Bayer Corporation Pittsburgh
** Toxicology and Regulatory Affairs Flemington NJ
F008 IUC4
F009 25-10-2002
F020 4552
EOR
F002 22
F010 3.1.1
F004 1
F005 RE
F006 Lyman et al. Handbook of Chemical Property Estimation
** Methods, American Chemical Society, Washington DC 1990.
F007 Lyman et al. Handbook of Chemical Property Estimation
** Methods, American Chemical Society, Washington DC 1990.
F008 IUC31
F020 4554
EOR
F002 22
F010 3.1.1
F004 1
F005 RM
F006 Since this material is not volatile, the only potential
** photolytic reaction that needs to be considered is direct
** photolysis at the earths surface. Direct photolysis is not
** possible because this material does not have a chromophore
** absorbi
F007 Since this material is not volatile, the only potential
** photolytic reaction that needs to be considered is direct
** photolysis at the earths surface. Direct photolysis is not
** possible because this material does not have a chromophore
** absorbing at a wavelength of 290 nm or above, and the
** presence of such a chromophore is a necessary condition for
** photolysis.
F008 IUC31
F020 4553
EOR
F002 22
F010 3.1.1
F004 1
F005 SO
F006 Toxicology and Regulatory Affairs Flemington NJ
F007 Toxicology and Regulatory Affairs Flemington NJ
F008 IUC4
F009 25-10-2002
F020 4555
EOR
F002 22
F010 3.1.2
F004 1

F005 RE
F006 Lyman et al. Handbook of Chemical Property Estimation
** Methods, American Chemical Society, Washington DC 1990.
F007 Lyman et al. Handbook of Chemical Property Estimation
** Methods, American Chemical Society, Washington DC 1990.
F008 IUC31
F020 4556
EOR
F002 22
F010 3.1.2
F004 1
F005 RM
F006 Disassociates in water to clacium ion and formate ion. Both
** of these are considered stable in water. A carboxylic acid
** is generally the final product of hydrolysis reactions.
**
** No testing is required because the material is a salt that is k
F007 Disassociates in water to clacium ion and formate ion. Both
** of these are considered stable in water. A carboxylic acid
** is generally the final product of hydrolysis reactions.
**
** No testing is required because the material is a salt that is known to
* dissociate (hydrolyze) in water upon dissolution. Testing is considered
* impossible based on chemical principles as the anticipated concentration
* of undissociated material is near zero.
F008 IUC31
F020 4557
EOR
F002 22
F010 3.1.2
F004 1
F005 SO
F006 Toxicology and Regulatory Affairs Flemington NJ
F007 Toxicology and Regulatory Affairs Flemington NJ
F008 IUC4
F009 25-10-2002
F020 4558
EOR
F002 22
F010 3.3.2
F004 1
F005 RE
F006 Meylan W. and Howard P. (1999) EPIWin Modeling Program.
** Syracuse Research Corporation. Environmental Science
** Center, 6225 Running Ridge Road, North Syracuse, NY
** 13212-2510.
F007 Meylan W. and Howard P. (1999) EPIWin Modeling Program.
** Syracuse Research Corporation. Environmental Science
** Center, 6225 Running Ridge Road, North Syracuse, NY
** 13212-2510.
F008 WVPAE
F020 4561
EOR
F002 22
F010 3.3.2
F004 1
F005 RM

```
F006 PROPERTIES OF: Calcium formate
**   -------------
**   Molecular weight:             130.11
**   Aqueous solub (mg/l):         1E+006
**   Vapour pressure (Pa):         3.41305
**                   (atm)         3.36842E-005
**                   (mm Hg)       0.0256
F007 PROPERTIES OF: Calcium formate
**   -------------
**   Molecular weight:             130.11
**   Aqueous solub (mg/l):         1E+006
**   Vapour pressure (Pa):         3.41305
**                   (atm)         3.36842E-005
**                   (mm Hg)       0.0256
**   Henry 's law c (Atm-m3/mol):     4.38264E-009
**   Air-water partition coef:        1.79237E-007
**   Octanol-water part coef(Kow):    0.00338844
**   Log Kow:                          -2.47
**
**   Biomass:water part coef:      0.800678
**   Temperature [deg C]           25
**
**   Biodeg rate c(h^-1),T1/2 biomass (h), in 2000 mg/L MLSS (h)
**   -Primary tank   0.04      15.99         10000.00
**   -Aeration tank  0.04      15.99         10000.00
**   -Settling tank  0.04      15.99         10000.00
F008 WVPAE
F020 4560
EOR
F002 22
F010 3.3.2
F004 1
F005 RS
F006
**             Concentration   Half-Life    Emissions
**               (percent)        (hr)       (kg/hr)
**      Air       0.141           1e+005       1000
**      Water     45.4            360          1000
**      Soil      54.4            360
F007
**             Concentration   Half-Life    Emissions
**               (percent)        (hr)       (kg/hr)
**      Air       0.141           1e+005       1000
**      Water     45.4            360          1000
**      Soil      54.4            360          1000
**      Sed    0.0757         1.44e+003    0
**
**                Fugacity    Reaction    Advection
**                 (atm)      (percent)   (percent)
**      Air       3.31e-012    0.000408    0.588
**      Water     9.6e-014     6.6          19
**      Soil      4.26e-012    43.8        0
**      Sed       8e-014       0.0152      0.000633
**
**
**
**      Persistence Time: 419 hr
```

```
**      Reaction Time:    521 hr
**      Advection Time:   2.14e+003 hr
**      Percent Reacted:  80.4
**      Percent Advected: 19.6
**
**      Half-Lives (hr), (Biowin (Ultimate) and Aopwin):
**         Air:      1e+005
**         Water:    360
**         Soil:     360
**         Sediment: 1440
**       -Biowin estimate: 2.912  (weeks)
**
**      Advection Times (hr):
**         Air:      100
**         Water:    1000
**         Sed
F008 WVPAE
F020 4559
EOR
F002 22
F010 3.3.2
F004 1
F005 SO
F006 Toxicology and Regulatory Affairs  Flemington NJ
F007 Toxicology and Regulatory Affairs  Flemington NJ
F008 IUC4
F009 25-10-2002
F020 4562
EOR
F002 22
F010 3.5
F004 1
F005 RE
F006 Bayer AG data
F007 Bayer AG data
F008 EUCLID
F009 05-03-1992
F020 4564
EOR
F002 22
F010 3.5
F004 1
F005 RL
F006 Assigned score of 4 (not assignable) since not enough
**   information was available to evaluate the adequacy of this
**   study.
F007 Assigned score of 4 (not assignable) since not enough
**   information was available to evaluate the adequacy of this
**   study.
F008 EUCLID
F020 4565
EOR
F002 22
F010 3.5
F004 1
F005 RM
F006 test concentration: 24 mg/l related to TS
```

F007 test concentration: 24 mg/l related to TS
F008 EUCLID
F020 4566
EOR
F002 22
F010 3.5
F004 1
F005 SO
F006 Bayer AG Leverkusen
** Bayer Corporation Pittsburgh
** Toxicology and Regulatory Affairs Flemington NJ
F007 Bayer AG Leverkusen
** Bayer Corporation Pittsburgh
** Toxicology and Regulatory Affairs Flemington NJ
F008 IUC4
F009 25-10-2002
F020 4567
EOR
F002 22
F010 3.5
F004 1
F005 TS
F006 Sodium Formate, CAS Number 141-53-7
F007 Sodium Formate, CAS Number 141-53-7
F008 IUC31
F020 4563
EOR
F002 22
F010 4.1
F004 1
F005 ME
F006 Translation: Determination of the acute effect of materials
** on fish. Working group "fish tests" in the main committee "
** Detergents " (15.10.73)
F007 Translation: Determination of the acute effect of materials
** on fish. Working group "fish tests" in the main committee "
** Detergents " (15.10.73)
F008 IUC31
F020 4568
EOR
F002 22
F010 4.1
F004 1
F005 RE
F006 Bayer AG data
F007 Bayer AG data
F008 EUCLID
F009 05-03-1992
F020 4569
EOR
F002 22
F010 4.1
F004 1
F005 SO
F006 Bayer AG Leverkusen
** Bayer Corporation Pittsburgh
** Toxicology and Regulatory Affairs Flemington NJ

F007 Bayer AG Leverkusen
** Bayer Corporation Pittsburgh
** Toxicology and Regulatory Affairs Flemington NJ
F008 IUC4
F009 25-10-2002
F020 4577
EOR
F002 22
F010 4.1
F004 2
F005 ME
F006 Translation: Lethal effect with the Zebra barbling, UBA
** suggested procedure, May 1984, lethal effect with the Zebra
** barbling Brachydanio rerio LC0, LC50, LC100, 48-96h
F007 Translation: Lethal effect with the Zebra barbling, UBA
** suggested procedure, May 1984, lethal effect with the Zebra
** barbling Brachydanio rerio LC0, LC50, LC100, 48-96h
F008 IUC31
F020 4571
EOR
F002 22
F010 4.1
F004 2
F005 RE
F006 Bruns: Bayer AG, Leverkusen, 22. 2. 1988
F007 Bruns: Bayer AG, Leverkusen, 22. 2. 1988
F008 EUCLID
F009 05-03-1992
F020 4572
EOR
F002 22
F010 4.1
F004 2
F005 RM
F006 Water parameters were not available
F007 Water parameters were not available
F020 7687
EOR
F002 22
F010 4.1
F004 2
F005 RS
F006 10 Zebrafish were tested at each of the following
** concentrations: 12.5, 100, 1000 mg/l. There was no
** mortality at any concentration. The parameters were checked
** every 24 hrs.
F007 10 Zebrafish were tested at each of the following
** concentrations: 12.5, 100, 1000 mg/l. There was no
** mortality at any concentration. The parameters were checked
** every 24 hrs.
F008 EUCLID
F020 4573
EOR
F002 22
F010 4.1
F004 2
F005 SO

F006 Bayer AG Leverkusen
** Bayer Corporation Pittsburgh
** Toxicology and Regulatory Affairs Flemington NJ
F007 Bayer AG Leverkusen
** Bayer Corporation Pittsburgh
** Toxicology and Regulatory Affairs Flemington NJ
F008 IUC4
F009 25-10-2002
F020 4578
EOR
F002 22
F010 4.1
F004 2
F005 TC
F006 Dechlorinated tap water
** Water hardness: approx. 15 degrees dh
** Ca: Mg: 4:1
** Acid capacity Ks 4.3: 0.1 ±0.02 mmol/l
** pH: 6.3-6.8
** Oxygen saturation greater than or equal to 90%
F007 Dechlorinated tap water
** Water hardness: approx. 15 degrees dh
** Ca: Mg: 4:1
** Acid capacity Ks 4.3: 0.1 ±0.02 mmol/l
** pH: 6.3-6.8
** Oxygen saturation greater than or equal to 90%
F008 WVPAE
F020 4570
EOR
F002 22
F010 4.1
F004 3
F005 RE
F006 Meylan W. and Howard P. (1999) EPIWin Modeling Program.
** Syracuse Research Corporation. Environmental Science
** Center, 6225 Running Ridge Road, North Syracuse, NY
** 13212-2510.
F007 Meylan W. and Howard P. (1999) EPIWin Modeling Program.
** Syracuse Research Corporation. Environmental Science
** Center, 6225 Running Ridge Road, North Syracuse, NY
** 13212-2510.
F008 WVPAE
F020 4574
EOR
F002 22
F010 4.1
F004 3
F005 RM
F006 The LC50 value is greater than the water solubility (160
** g/l).
F007 The LC50 value is greater than the water solubility (160
** g/l).
F008 WVPAE
F020 4575
EOR
F002 22
F010 4.1

F004 3
F005 SO
F006 Bayer Corporation Pittsburgh
** Toxicology and Regulatory Affairs Flemington NJ
F007 Bayer Corporation Pittsburgh
** Toxicology and Regulatory Affairs Flemington NJ
F008 IUC4
F009 25-10-2002
F020 4579
EOR
F002 22
F010 4.1
F004 3
F005 TS
F006 Calcium Formate, CAS Number 544-17-2
F007 Calcium Formate, CAS Number 544-17-2
F008 IUC31
F020 4576
EOR
F002 22
F010 4.2
F004 1
F005 ME
F006 Calculated using ECOSAR program with log Ko/w = -2.47
F007 Calculated using ECOSAR program with log Ko/w = -2.47
F020 7685
EOR
F002 22
F010 4.2
F004 1
F005 RE
F006 Meylan W. and Howard P. (1999) EPIWin Modeling Program.
** Syracuse Research Corporation. Environmental Science
** Center, 6225 Running Ridge Road, North Syracuse, NY
** 13212-2510.
F007 Meylan W. and Howard P. (1999) EPIWin Modeling Program.
** Syracuse Research Corporation. Environmental Science
** Center, 6225 Running Ridge Road, North Syracuse, NY
** 13212-2510.
F008 WVPAE
F020 4581
EOR
F002 22
F010 4.2
F004 1
F005 RM
F006 The EC50 value is greater than the water solubility (160
** g/l).
F007 The EC50 value is greater than the water solubility (160
** g/l).
F008 WVPAE
F020 4580
EOR
F002 22
F010 4.2
F004 1
F005 SO

F006 Bayer AG Leverkusen
** Bayer Corporation Pittsburgh
** Toxicology and Regulatory Affairs Flemington NJ
F007 Bayer AG Leverkusen
** Bayer Corporation Pittsburgh
** Toxicology and Regulatory Affairs Flemington NJ
F008 IUC4
F009 25-10-2002
F020 4582
EOR
F002 22
F010 4.3
F004 1
F005 RE
F006 Meylan W. and Howard P. (1999) EPIWin Modeling Program.
** Syracuse Research Corporation. Environmental Science
** Center, 6225 Running Ridge Road, North Syracuse, NY
** 13212-2510.
F007 Meylan W. and Howard P. (1999) EPIWin Modeling Program.
** Syracuse Research Corporation. Environmental Science
** Center, 6225 Running Ridge Road, North Syracuse, NY
** 13212-2510.
F008 WVPAE
F020 4583
EOR
F002 22
F010 4.3
F004 1
F005 RM
F006 Calculated using ECOSAR program with log Ko/w = -2.47
F007 Calculated using ECOSAR program with log Ko/w = -2.47
F020 7686
EOR
F002 22
F010 4.3
F004 1
F005 RM
F006 The EC50 value is greater than the water solubility (160
** g/l).
F007 The EC50 value is greater than the water solubility (160
** g/l).
F008 WVPAE
F020 4584
EOR
F002 22
F010 4.3
F004 1
F005 SO
F006 Bayer Corporation Pittsburgh
** Toxicology and Regulatory Affairs Flemington NJ
F007 Bayer Corporation Pittsburgh
** Toxicology and Regulatory Affairs Flemington NJ
F008 IUC4
F009 25-10-2002
F020 4585
EOR
F002 22

F010 4.4
F004 1
F005 RE
F006 Bayer AG data
F007 Bayer AG data
F008 EUCLID
F009 05-03-1992
F020 4586
EOR
F002 22
F010 4.4
F004 1
F005 SO
F006 Bayer AG Leverkusen
** Bayer Corporation Pittsburgh
** Toxicology and Regulatory Affairs Flemington NJ
F007 Bayer AG Leverkusen
** Bayer Corporation Pittsburgh
** Toxicology and Regulatory Affairs Flemington NJ
F008 IUC4
F009 25-10-2002
F020 4588
EOR
F002 22
F010 4.4
F004 1
F005 TC
F006 direct weight
F007 direct weight
F008 EUCLID
F020 4587
EOR
F002 22
F010 5.1.1
F004 1
F005 RE
F006 Loeser, E.: Bayer AG data, short report, 21. 4. 1978
F007 Loeser, E.: Bayer AG data, short report, 21. 4. 1978
F008 EUCLID
F009 05-03-1992
F020 4589
EOR
F002 22
F010 5.1.1
F004 1
F005 RM
F006 Observation period after dosing was 14 days.
F007 Observation period after dosing was 14 days.
F008 EUCLID
F020 4590
EOR
F002 22
F010 5.1.1
F004 1
F005 RM
F006 Stastical Method: Fink and Hund, Medical Research 15, 1965, 624.
F007 Stastical Method: Fink and Hund, Medical Research 15, 1965, 624.

F020 4648
EOR
F002 22
F010 5.1.1
F004 1
F005 RS
F006 Mortality and necropsy data by dose/sex: (only male rats used)
**

**	dose (g/kg)	deaths	animals with symptoms	animals used
**	1.0	0	0	10
**	2.0	1	10	10

F007 Mortality and necropsy data by dose/sex: (only male rats used)
**

**	dose (g/kg)	deaths	animals with symptoms	animals used
**	1.0	0	0	10
**	2.0	1	10	10
**	3.1	4	10	10
**	3.5	6	10	10
**	3.8	8	10	10
**	4.0	10	10	10

F020 4647
EOR
F002 22
F010 5.1.1
F004 1
F005 SO
F006 Bayer AG Leverkusen
** Bayer Corporation Pittsburgh
** Toxicology and Regulatory Affairs Flemington NJ
F007 Bayer AG Leverkusen
** Bayer Corporation Pittsburgh
** Toxicology and Regulatory Affairs Flemington NJ
F008 IUC4
F009 25-10-2002
F020 4596
EOR
F002 22
F010 5.1.1
F004 2
F005 RE
F006 Marhold, J. V.: Sbornik Vysledku Toxixologickeho Vysetreni
** Latek A Pripravku, Institut Pro Vychovu Vedoucicn
** Pracovniku Chemickeho Prumyclu, Praha, Czechoslovakia, 66
** (1972)
F007 Marhold, J. V.: Sbornik Vysledku Toxixologickeho Vysetreni
** Latek A Pripravku, Institut Pro Vychovu Vedoucicn
** Pracovniku Chemickeho Prumyclu, Praha, Czechoslovakia, 66
** (1972)
F008 EUCLID
F009 05-03-1992
F020 4591
EOR
F002 22
F010 5.1.1
F004 2

F005 RM
F006 The information presented is all that is available for this study. This
* study is considered supporting.
F007 The information presented is all that is available for this study. This
* study is considered supporting.
F020 7683
EOR
F002 22
F010 5.1.1
F004 2
F005 SO
F006 Bayer AG Leverkusen
** Bayer Corporation Pittsburgh
** Toxicology and Regulatory Affairs Flemington NJ
F007 Bayer AG Leverkusen
** Bayer Corporation Pittsburgh
** Toxicology and Regulatory Affairs Flemington NJ
F008 IUC4
F009 25-10-2002
F020 4597
EOR
F002 22
F010 5.1.1
F004 3
F005 RE
F006 Malorny, J. V.: Zeitschrift fuer Ernaehrungswissenschaft 9,
** 332-339 (1969)
F007 Malorny, J. V.: Zeitschrift fuer Ernaehrungswissenschaft 9,
** 332-339 (1969)
F008 EUCLID
F009 05-03-1992
F020 4592
EOR
F002 22
F010 5.1.1
F004 3
F005 RM
F006 The information presented is all that is available for this study. This
* study is considered supporting.
F007 The information presented is all that is available for this study. This
* study is considered supporting.
F020 7684
EOR
F002 22
F010 5.1.1
F004 3
F005 SO
F006 Bayer AG Leverkusen
** Bayer Corporation Pittsburgh
** Toxicology and Regulatory Affairs Flemington NJ
F007 Bayer AG Leverkusen
** Bayer Corporation Pittsburgh
** Toxicology and Regulatory Affairs Flemington NJ
F008 IUC4
F009 25-10-2002
F020 4598
EOR

F002 22
F010 5.1.1
F004 4
F005 RE
F006 Degussa AG data, Akute Toxizitaetspruefung von
** 'Calciumformiat'nach oraler Applikation an der Ratte,
** Degussa-US-IT-Nr. 79-0029-DKT, 1979/january
F007 Degussa AG data, Akute Toxizitaetspruefung von
** 'Calciumformiat'nach oraler Applikation an der Ratte,
** Degussa-US-IT-Nr. 79-0029-DKT, 1979/january
F008 EUCLID
F020 4595
EOR
F002 22
F010 5.1.1
F004 4
F005 RM
F006 The information presented is all that is available for this study. This
* study is considered supporting.
F007 The information presented is all that is available for this study. This
* study is considered supporting.
F020 7682
EOR
F002 22
F010 5.1.1
F004 4
F005 RS
F006 Clinical observations were reduced activity, reduced grip
** strength, cyanosis, reduced pain reflex, disturbances of
** co-ordination, and anomalies of position. Dose-response
** information is not available.
**
** Animals dying showed hemorrhage of t
F007 Clinical observations were reduced activity, reduced grip
** strength, cyanosis, reduced pain reflex, disturbances of
** co-ordination, and anomalies of position. Dose-response
** information is not available.
**
** Animals dying showed hemorrhage of the stomach and
** intestinal mucosa. Surviving animals were without adverse
** necropsy findings at the end of the 14-day observation
** period.
F008 EUCLID
F020 4593
EOR
F002 22
F010 5.1.1
F004 4
F005 SO
F006 Bayer AG Leverkusen
** Bayer Corporation Pittsburgh
** Toxicology and Regulatory Affairs Flemington NJ
F007 Bayer AG Leverkusen
** Bayer Corporation Pittsburgh
** Toxicology and Regulatory Affairs Flemington NJ
F008 IUC4
F009 25-10-2002

F020 4599
EOR
F002 22
F010 5.1.1
F004 4
F005 TS
F006 Calcium Formate, CAS Number 544-17-2
F007 Calcium Formate, CAS Number 544-17-2
F008 IUC31
F020 4594
EOR
F002 22
F010 5.1.4
F004 1
F005 RE
F006 Malorny, J. V.: Zeitschrift fuer Ernaehrungswissenschaft 9,
** 332-339 (1969)
F007 Malorny, J. V.: Zeitschrift fuer Ernaehrungswissenschaft 9,
** 332-339 (1969)
F008 EUCLID
F009 05-03-1992
F020 4600
EOR
F002 22
F010 5.1.4
F004 1
F005 SO
F006 Bayer AG Leverkusen
** Bayer Corporation Pittsburgh
** Toxicology and Regulatory Affairs Flemington NJ
F007 Bayer AG Leverkusen
** Bayer Corporation Pittsburgh
** Toxicology and Regulatory Affairs Flemington NJ
F008 IUC4
F009 25-10-2002
F020 4601
EOR
F002 22
F010 5.2.1
F004 1
F005 RE
F006 Thyssen, J.: Bayer AG data, short report, 20. 9. 1978
F007 Thyssen, J.: Bayer AG data, short report, 20. 9. 1978
F008 EUCLID
F020 4602
EOR
F002 22
F010 5.2.1
F004 1
F005 RM
F006 exposure time: 24 h
** observation time: 7 d
F007 exposure time: 24 h
** observation time: 7 d
F008 EUCLID
F020 4603
EOR

F002 22
F010 5.2.1
F004 1
F005 SO
F006 Bayer AG Leverkusen
** Bayer Corporation Pittsburgh
** Toxicology and Regulatory Affairs Flemington NJ
F007 Bayer AG Leverkusen
** Bayer Corporation Pittsburgh
** Toxicology and Regulatory Affairs Flemington NJ
F008 IUC4
F009 25-10-2002
F020 4605
EOR
F002 22
F010 5.2.1
F004 2
F005 RE
F006 Degussa AG data, Pruefung von Calciumformiat in Hautreiz-
** test am Kaninchen, Degussa-US-IT-Nr. 78-0015-DKT,
** 1978/november
F007 Degussa AG data, Pruefung von Calciumformiat in Hautreiz-
** test am Kaninchen, Degussa-US-IT-Nr. 78-0015-DKT,
** 1978/november
F008 EUCLID
F020 4604
EOR
F002 22
F010 5.2.1
F004 2
F005 SO
F006 Bayer AG Leverkusen
** Bayer Corporation Pittsburgh
** Toxicology and Regulatory Affairs Flemington NJ
F007 Bayer AG Leverkusen
** Bayer Corporation Pittsburgh
** Toxicology and Regulatory Affairs Flemington NJ
F008 IUC4
F009 25-10-2002
F020 4606
EOR
F002 22
F010 5.2.2
F004 1
F005 RE
F006 Thyssen, J.: Bayer AG data, short report, 20. 9. 1978
F007 Thyssen, J.: Bayer AG data, short report, 20. 9. 1978
F008 EUCLID
F009 05-03-1992
F020 4607
EOR
F002 22
F010 5.2.2
F004 1
F005 RM
F006 50 mg/animal, observation time: 7 d.
F007 50 mg/animal, observation time: 7 d.

F008 EUCLID
F009 05-03-1992
F020 4608
EOR
F002 22
F010 5.2.2
F004 1
F005 SO
F006 Bayer AG Leverkusen
** Bayer Corporation Pittsburgh
** Toxicology and Regulatory Affairs Flemington NJ
F007 Bayer AG Leverkusen
** Bayer Corporation Pittsburgh
** Toxicology and Regulatory Affairs Flemington NJ
F008 IUC4
F009 25-10-2002
F020 4612
EOR
F002 22
F010 5.2.2
F004 2
F005 RE
F006 Marhold, J. V.: Sbornik Vysledku Toxixologickeho Vysetreni
** Latek A Pripravku, Institut Pro Vychovu Vedoucicn
** Pracovniku Chemickeho Prumyclu, Praha, Czechoslovakia, 66
** (1972)
F007 Marhold, J. V.: Sbornik Vysledku Toxixologickeho Vysetreni
** Latek A Pripravku, Institut Pro Vychovu Vedoucicn
** Pracovniku Chemickeho Prumyclu, Praha, Czechoslovakia, 66
** (1972)
F008 EUCLID
F009 05-03-1992
F020 4609
EOR
F002 22
F010 5.2.2
F004 2
F005 RM
F006 no other data.
F007 no other data.
F008 EUCLID
F009 05-03-1992
F020 4610
EOR
F002 22
F010 5.2.2
F004 2
F005 SO
F006 Bayer AG Leverkusen
** Bayer Corporation Pittsburgh
** Toxicology and Regulatory Affairs Flemington NJ
F007 Bayer AG Leverkusen
** Bayer Corporation Pittsburgh
** Toxicology and Regulatory Affairs Flemington NJ
F008 IUC4
F009 25-10-2002
F020 4613

EOR
F002 22
F010 5.2.2
F004 3
F005 RE
F006 Degussa AG data, Pruefung von Calciumformiat in Augenreiz-
** test am Kaninchen, Degussa-US-IT-Nr. 78-0016-DKT,
** 1978/november
F007 Degussa AG data, Pruefung von Calciumformiat in Augenreiz-
** test am Kaninchen, Degussa-US-IT-Nr. 78-0016-DKT,
** 1978/november
F008 EUCLID
F020 4611
EOR
F002 22
F010 5.2.2
F004 3
F005 SO
F006 Bayer AG Leverkusen
** Bayer Corporation Pittsburgh
** Toxicology and Regulatory Affairs Flemington NJ
F007 Bayer AG Leverkusen
** Bayer Corporation Pittsburgh
** Toxicology and Regulatory Affairs Flemington NJ
F008 IUC4
F009 25-10-2002
F020 4614
EOR
F002 22
F010 5.4
F004 1
F005 ME
F006 The study design encompassed both a five-generation and
** chronic study in Wistar rats with calcium formate at 0.2% in
** drinking water. Eight males and 24 females were in the
** original test group with four controls of each sex. Both
** microscopi
F007 The study design encompassed both a five-generation and
** chronic study in Wistar rats with calcium formate at 0.2% in
** drinking water. Eight males and 24 females were in the
** original test group with four controls of each sex. Both
** microscopic and pathologic investigations were done upon
** natural death of the animals.
**
** An additional series of experiments using 0.4% calcium
** formate in the drinking water was also in progress and was
** in the second year and second generation at the time of this
** publication, histopathology results were not available for
** this dose level.
F008 WVPAE
F020 4617
EOR
F002 22
F010 5.4
F004 1
F005 RE
F006 Malorny, J. V.: Zeitschrift fuer Ernaehrungswissenschaft 9,

**   332-339 (1969)
F007 Malorny, J. V.: Zeitschrift fuer Ernaehrungswissenschaft 9,
**   332-339 (1969)
F008 WVPAE
F020 4618
EOR
F002 22
F010 5.4
F004 1
F005 RM
F006
**   Limitations to this study include the lack of data
**   presentation for the 0.4% dose group, the limited
**   description of the pathology and histopathology organ list
**   and the modest size of the concurrent control group
F007
**   Limitations to this study include the lack of data
**   presentation for the 0.4% dose group, the limited
**   description of the pathology and histopathology organ list
**   and the modest size of the concurrent control group
F008 WVPAE
F020 4619
EOR
F002 22
F010 5.4
F004 1
F005 RS
F006 Bodyweights and bodyweight gains of treated and control
**   animals were similar. Microscopic and histological
**   investigation of lung, spleen, stomach, liver and kidneys
**   showed no suspect findings. Occasional small phagocytic
**   action in reticuloe
F007 Bodyweights and bodyweight gains of treated and control
**   animals were similar. Microscopic and histological
**   investigation of lung, spleen, stomach, liver and kidneys
**   showed no suspect findings. Occasional small phagocytic
**   action in reticuloendothelium and reticulo-histocyto
**   elements of lung, spleen and stomach lymph nodes were
**   reported. Two benign spontaneous tumors were seen in old
**   animals and were considered not related to test substance
**   administration.
**
**   The study at 0.4% calcium formate had been going on for
**   about two years and it was reported that no disturbances
**   (presumably mortality, body weight, fertility, or
**   developmental toxicity) had been observed up to this point.
**   Pathology and histopathology were in progress pending
**   natural death of the test animals.
F008 WVPAE
F020 4615
EOR
F002 22
F010 5.4
F004 1
F005 SO
F006 Bayer Corporation Pittsburgh
**   Toxicology and Regulatory Affairs Flemington NJ

F007 Bayer Corporation Pittsburgh
** Toxicology and Regulatory Affairs Flemington NJ
F008 IUC4
F009 25-10-2002
F020 4620
EOR
F002 22
F010 5.4
F004 1
F005 TS
F006 Calcium Formate, CAS Number 544-17-2
F007 Calcium Formate, CAS Number 544-17-2
F008 IUC31
F020 4616
EOR
F002 22
F010 5.5
F004 1
F005 ME
F006 Number of replicates:
** Four plates per strain and dose, both with and without S9 mix
**
** Chemical used to induce liver for S9 preparation:
** 2-aminoanthracene
F007 Number of replicates:
** Four plates per strain and dose, both with and without S9 mix
**
** Chemical used to induce liver for S9 preparation:
** 2-aminoanthracene
F020 4649
EOR
F002 22
F010 5.5
F004 1
F005 RE
F006 Bayer AG data, Report No. 17969, 25. 4. 1989
F007 Bayer AG data, Report No. 17969, 25. 4. 1989
F008 EUCLID
F009 05-03-1992
F020 4622
EOR
F002 22
F010 5.5
F004 1
F005 SO
F006 Bayer AG Leverkusen
** Bayer Corporation Pittsburgh
** Toxicology and Regulatory Affairs Flemington NJ
F007 Bayer AG Leverkusen
** Bayer Corporation Pittsburgh
** Toxicology and Regulatory Affairs Flemington NJ
F008 IUC4
F009 25-10-2002
F020 4623
EOR
F002 22
F010 5.5

F004 1
F005 TC
F006 The following concentrations of calcium formate were tested:
** 20, 100, 500, 2500, and 12,500 ug/plate.
**
** Positive controls: Sodium azide (only TA 1535)
** Nitrofurantoin (only TA 100)
** 4-Nitro-1,2-phenyle
F007 The following concentrations of calcium formate were tested:
** 20, 100, 500, 2500, and 12,500 ug/plate.
**
** Positive controls: Sodium azide (only TA 1535)
** Nitrofurantoin (only TA 100)
** 4-Nitro-1,2-phenylene diamine
** (only TA 1537 and TA 98)
** 2-Aminoanthracene
**
** Solvents used: Deionized water was used with calcium
** formate and DMSO was used with the positive controls.
**
** S9 mix was used for the stimulation of mammalian metabolism.
** It was made from the livers of adult male Sprague Dawley
** rats.
F008 WVPAE
F020 4621
EOR
F002 22
F010 5.7
F004 1
F005 CL
F006
** Signs of a chronic intoxication could not be detected by
** macroscopic or histopathological examinations. There was no
** increased tumor-rate
F007
** Signs of a chronic intoxication could not be detected by
** macroscopic or histopathological examinations. There was no
** increased tumor-rate
F008 WVPAE
F020 4630
EOR
F002 22
F010 5.7
F004 1
F005 ME
F006
** The study design encompassed both a five-generation and
** chronic study in Wistar rats with calcium formate at 0.2% in
** drinking water. Eight males and 24 females were in the
** original test group with four controls of each sex. Both
** microscop
F007
** The study design encompassed both a five-generation and
** chronic study in Wistar rats with calcium formate at 0.2% in
** drinking water. Eight males and 24 females were in the
** original test group with four controls of each sex. Both
** microscopic and pathologic investigations were done upon

**   natural death of the animals.
**
**   An additional series of experiments using 0.4% calcium
**   formate in the drinking water was also in progress and was
**   in the second year and second generation at the time of this
**   publication, histopathology results were not available for
**   this dose level
F008 WVPAE
F020 4626
EOR
F002 22
F010 5.7
F004 1
F005 RE
F006 Malorny, J. V.: Zeitschrift fuer Ernaehrungswissenschaft 9,
**   332-339 (1969)
F007 Malorny, J. V.: Zeitschrift fuer Ernaehrungswissenschaft 9,
**   332-339 (1969)
F008 EUCLID
F009 05-03-1992
F020 4627
EOR
F002 22
F010 5.7
F004 1
F005 RM
F006
**   Limitations to this study include the lack achieving a
**   maximum tolerated dose, the modest size of the male F1
**   group, and the size of the concurrent control group
F007
**   Limitations to this study include the lack achieving a
**   maximum tolerated dose, the modest size of the male F1
**   group, and the size of the concurrent control group
F008 EUCLID
F020 4628
EOR
F002 22
F010 5.7
F004 1
F005 RM
F006
**   No of animals: 8 males and 24 females per dose in the F1
**   group
F007
**   No of animals: 8 males and 24 females per dose in the F1
**   group
F008 EUCLID
F009 05-03-1992
F020 4629
EOR
F002 22
F010 5.7
F004 1
F005 RS
F006
**   Bodyweights and bodyweight gains of treated and control

```
**   animals were similar. Microscopic and histological
**   investigation of lung, spleen, stomach, liver and kidneys
**   showed no suspect findings. Occasional small phagocytic
**   action in reticulo
F007
**   Bodyweights and bodyweight gains of treated and control
**   animals were similar. Microscopic and histological
**   investigation of lung, spleen, stomach, liver and kidneys
**   showed no suspect findings. Occasional small phagocytic
**   action in reticuloendothelium and reticulo-histocyto
**   elements of lung, spleen and stomach lymph nodes were
**   reported.  Two benign spontaneous tumors were seen in old
**   animals and were considered not related to test substance
**   administration.
**
**   The study at 0.4% calcium formate had been going on for
**   about two years and it was reported that no disturbances
**   (presumably mortality, body weight, fertility, or
**   developmental toxicity) had been observed up to this point.
**   Pathology and histopathology were in progress pending
**   natural death of the test animals
F008 EUCLID
F009 05-03-1992
F020 4624
EOR
F002 22
F010 5.7
F004 1
F005 SO
F006 Bayer AG  Leverkusen
**   Bayer Corporation  Pittsburgh
**   Toxicology and Regulatory Affairs  Flemington NJ
F007 Bayer AG  Leverkusen
**   Bayer Corporation  Pittsburgh
**   Toxicology and Regulatory Affairs  Flemington NJ
F008 IUC4
F009 25-10-2002
F020 4631
EOR
F002 22
F010 5.7
F004 1
F005 TS
F006 Calcium Formate, CAS Number 544-17-2
F007 Calcium Formate, CAS Number 544-17-2
F008 IUC31
F020 4625
EOR
F002 22
F010 5.8.1
F004 1
F005 CL
F006
**   No reduction of fertility; no maternal toxicity; no
**   embryotoxic or teratogenic effects were observed under these
**   conditions. The NOEL for reproduction is 0.2% in drinking
**   water or ca. 200 mg/kg
```

F007
** No reduction of fertility; no maternal toxicity; no
** embryotoxic or teratogenic effects were observed under these
** conditions. The NOEL for reproduction is 0.2% in drinking
** water or ca. 200 mg/kg
F008 IUC31
F020 4638
EOR
F002 22
F010 5.8.1
F004 1
F005 ME
F006
** The study design encompassed both a five-generation and
** chronic study in Wistar rats with calcium formate at 0.2% in
** drinking water. Eight males and 24 females were in the
** first generation group with four controls of each sex. The
** fertili
F007
** The study design encompassed both a five-generation and
** chronic study in Wistar rats with calcium formate at 0.2% in
** drinking water. Eight males and 24 females were in the
** first generation group with four controls of each sex. The
** fertility of treated animals after 6, 7 or 10 weeks of
** administration was compared with the fertility of control
** after 8 weeks of study start. The text of this report
** indicates that a study with 0.4% calcium formate using the
** same protocol is in progress and in the second generation
** with no "disturbances" observed. Thus, it appears that 0.4%
** calcium formate does not have an adverse effect on
** fertility. As data were not provided, however, the 0.2%
** level is considered the reproductive NOEL in this study
F008 IUC31
F020 4636
EOR
F002 22
F010 5.8.1
F004 1
F005 RE
F006 Malorny, J. V.: Zeitschrift fuer Ernaehrungswissenschaft 9,
** 332-339 (1969)
F007 Malorny, J. V.: Zeitschrift fuer Ernaehrungswissenschaft 9,
** 332-339 (1969)
F008 EUCLID
F009 05-03-1992
F020 4637
EOR
F002 22
F010 5.8.1
F004 1
F005 RM
F006
** Limitations to this study include the lack of data
** presentation for the 0.4% dose group; not achieving maternal
** toxicity at the high dose level; and lack of details
** concerning reproductive parameters evaluated beyond number,
** weight and len

F007
** Limitations to this study include the lack of data
** presentation for the 0.4% dose group; not achieving maternal
** toxicity at the high dose level; and lack of details
** concerning reproductive parameters evaluated beyond number,
** weight and length of pups
F008 EUCLID
F020 4632
EOR
F002 22
F010 5.8.1
F004 1
F005 RM
F006
** No. of animals: 8 males and 24 females per dose level
F007
** No. of animals: 8 males and 24 females per dose level
F008 EUCLID
F009 05-03-1992
F020 4633
EOR
F002 22
F010 5.8.1
F004 1
F005 RS
F006
** Numbers of offspring, body weights and body lengths were not
** different for treated animals as compared with controls. No
** maternal toxicity was observed, no adverse effects on the
** offspring were observed on examination
F007
** Numbers of offspring, body weights and body lengths were not
** different for treated animals as compared with controls. No
** maternal toxicity was observed, no adverse effects on the
** offspring were observed on examination
F008 EUCLID
F009 05-03-1992
F020 4634
EOR
F002 22
F010 5.8.1
F004 1
F005 SO
F006 Bayer AG Leverkusen
** Bayer Corporation Pittsburgh
** Toxicology and Regulatory Affairs Flemington NJ
F007 Bayer AG Leverkusen
** Bayer Corporation Pittsburgh
** Toxicology and Regulatory Affairs Flemington NJ
F008 IUC4
F009 25-10-2002
F020 4639
EOR
F002 22
F010 5.8.1
F004 1
F005 TS

F006 Calcium Formate, CAS Number 544-17-2
F007 Calcium Formate, CAS Number 544-17-2
F008 IUC31
F020 4635
EOR
F002 22
F010 5.8.2
F004 1
F005 CL
F006
** No reduction of fertility, maternal toxicity, embryotoxic or
** teratogenic effects were observed under these conditions.
** The NOEL for developmental and maternal toxicity is 0.2% in
** drinking water or ca. 200 mg/kg
F007
** No reduction of fertility, maternal toxicity, embryotoxic or
** teratogenic effects were observed under these conditions.
** The NOEL for developmental and maternal toxicity is 0.2% in
** drinking water or ca. 200 mg/kg
F008 IUC31
F020 4643
EOR
F002 22
F010 5.8.2
F004 1
F005 ME
F006
** The study design encompassed both a five-generation and
** chronic study in Wistar rats with calcium formate at 0.2% in
** drinking water. Eight males and 24 females were in the
** first generation group with four controls of each sex. The
** fertili
F007
** The study design encompassed both a five-generation and
** chronic study in Wistar rats with calcium formate at 0.2% in
** drinking water. Eight males and 24 females were in the
** first generation group with four controls of each sex. The
** fertility of treated animals after 6, 7 or 10 weeks of
** administration was compared with the fertility of control
** after 8 weeks of study start. A portion of the pups were
** sacrificed shortly after birth for evaluation of
** developmental toxicity. The text of this report indicates
** that a study with 0.4% calcium formate using the same
** protocol is in progress and in the second generation with no
** "disturbances" observed. Thus, it appears that 0.4% calcium
** formate does not have an adverse effect on developmental
** toxicity. As data were not provided, however, the 0.2%
** level is considered the developmental NOEL in this study
F008 WVPAE
F020 4644
EOR
F002 22
F010 5.8.2
F004 1
F005 RE
F006 Malorny, J. V.: Zeitschrift fuer Ernaehrungswissenschaft 9,
** 332-339 (1969)

F007 Malorny, J. V.: Zeitschrift fuer Ernaehrungswissenschaft 9,
** 332-339 (1969)
F008 WVPAE
F020 4640
EOR
F002 22
F010 5.8.2
F004 1
F005 RM
F006 Limitations to this study include the lack of data
** presentation for the 0.4% dose group, not achieving maternal
** toxicity at the high dose level, and lack of details
** concerning evaluation of the pups for major malformations
** and variations.
**
F007 Limitations to this study include the lack of data
** presentation for the 0.4% dose group, not achieving maternal
** toxicity at the high dose level, and lack of details
** concerning evaluation of the pups for major malformations
** and variations.
**
** Alhtough the lack of maternal toxicity can be considered a deficiency,
* escessive dietary calcium is known to be fetotoxic in mice.
**
** The dietary level uesd produced a dose of about 200 mg/kg-day calcium.
* Although there are no data to indicate that this dose produced
* hypercelcemia in the dams or offspring, it is known that significant
* hypercalcemia induces fetotoxicity (Liebgott B, Srebrolow G. Fetal
* toxicity caused by excessive maternal dietary calcium. J Can Dent Assoc
* 1989 Feb;55(2):129-33.). The mechanism is postulated to be suppression
* of para-thyroid hormone in the conceptus. Therefore, high levels of
* calcium formate will not serve as a robust model for formate
* developmental toxicity due to the disturbance of fetal calcium levels.
F008 WVPAE
F020 4641
EOR
F002 22
F010 5.8.2
F004 1
F005 RS
F006
** No statisical difference in organ and bone abnormalitites.
** Growth of treated offspring was similar to controls
F007
** No statisical difference in organ and bone abnormalitites.
** Growth of treated offspring was similar to controls
F008 WVPAE
F020 4642
EOR
F002 22
F010 5.8.2
F004 1
F005 SO
F006 Bayer Corporation Pittsburgh
** Toxicology and Regulatory Affairs Flemington NJ
F007 Bayer Corporation Pittsburgh
** Toxicology and Regulatory Affairs Flemington NJ

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F008 IUC4
F009 25-10-2002
F020 4646
EOR
F002 22
F010 5.8.2
F004 1
F005 TS
F006
**   Calcium Formate, CAS Number 544-17-
F007
**   Calcium Formate, CAS Number 544-17-
F008 IUC31
F020 4645
EOB
C
X
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