

201-15717B**I U C L I D****Data Set**

04 DEC-9 PM 1:33

RECEIVED
OPPT CBIC

Existing Chemical : ID: 79-34-5
CAS No. : 79-34-5
EINECS Name : 1,1,2,2-tetrachloroethane
EC No. : 201-197-8
TSCA Name : Ethane, 1,1,2,2-tetrachloro-
Molecular Formula : C₂H₂Cl₄

Producer related part
Company : Atofina
Creation date : 24.04.2001

Substance related part
Company : Atofina
Creation date : 24.04.2001

Status :
Memo :

Printing date : 09.08.2002
Revision date :
Date of last update : 09.08.2002

Number of pages : 12

Chapter (profile) : Chapter: 1, 2, 3, 4, 5, 6, 7, 8, 10
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. GENERAL INFORMATION

ID: 79-34-5

DATE: 09.08.2002

1.0.1 APPLICANT AND COMPANY INFORMATION

Type : cooperating company
Name : 2,4 Pentanedione Producers Association
Contact person :
Date :
Street : 1250 Connecticut Avenue, NW, Suite 700
Town : 20036 Washington, DC
Country : United States
Phone :
Telefax :
Telex :
Cedex :
Email :
Homepage :

Source : EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)
10.07.2001

Type :
Name : Enichem S.p.A.
Contact person :
Date :
Street : Via Taramelli,26
Town : 20124 Milan
Country : Italy
Phone :
Telefax :
Telex :
Cedex :
Email :
Homepage :

Source : EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)
11.02.2000

Type :
Name : ICI Chemicals & Polymers Limited
Contact person :
Date :
Street : PO Box 14, The Heath
Town : WA7 4QF Runcorn, Cheshire
Country : United Kingdom
Phone :
Telefax :
Telex :
Cedex :
Email :
Homepage :

Source : EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)
11.02.2000

1.02 LOCATION OF PRODUCTION SITE, IMPORTER OR FORMULATOR

1. GENERAL INFORMATION

ID: 79-34-5

DATE: 09.08.2002

1.0.3 IDENTITY OF RECIPIENTS

1.0.4 DETAILS ON CATEGORY/TEMPLATE

1.1.0 SUBSTANCE IDENTIFICATION

1.1.1 GENERAL SUBSTANCE INFORMATION

Purity type :
Substance type : organic
Physical status : liquid
Purity :
Colour :
Odour :
Source : EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)
11.02.2000

1.1.2 SPECTRA

1.2 SYNONYMS AND TRADENAMES

1,1,2,2-czterochloroetan; 1,1,2,2-tetrachloorethaan; 1,1,2,2-tetrachloroethan; 1,1,2,2-tetrachlorethane;
1,1,2,2-tetracloroetano; 1,1-dichloro-2,2-dichloroethane; Acetylene chloride; Dichloro-2,2-dichloroethane;
Ethane, 1,1,2,2-tetrachloro

Source : Atochem Paris la Defense
EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)
17.03.1994

Ethane 1,1,2,2-tetrachloro; 1,1-dichloro-2,2-dichloroethene; acetylene tetrachloride; sym-tetrachloroethane; tetrachloroethane; TETRAS; 1,1,2,2-Tetracloroetano (Italian)

Source : Enichem S.p.A. Milan
EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)
29.05.1994

s-tetrachloroethane; sym-tetrachloroethane; Tetrachloroethane; Tetrachlorure d'acetylene; NCI-c03554;
A13-04597; EPA Pesticide Chemical Code 078601; Westron; Acetosal; Acetylene tetrachloride; Cellon;
Bonoform

Source : Atochem Paris la Defense
EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)
08.11.1993

Sym Tetrachloroethane

Source : ICI Chemicals & Polymers Limited Runcorn, Cheshire
EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)
02.06.1994

1. GENERAL INFORMATION

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1.3 IMPURITIES

1.4 ADDITIVES

1.5 TOTAL QUANTITY

1.6.1 LABELLING

Labelling	:	as in Directive 67/548/EEC
Specific limits	:	yes
Symbols	:	T+, N, ,
Nota	:	, other RM: S,
R-Phrases	:	(26/27) Very toxic by inhalation and in contact with skin (51/53) Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment
S-Phrases	:	(1/2) Keep locked up and out of reach of children (38) In case of insufficient ventilation, wear suitable respiratory equipment (45) In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible) (61) Avoid release to the environment. Refer to special instructions/Safety data sets
Source 11.02.2000	:	EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)

1.6.2 CLASSIFICATION

Classified	:	as in Directive 67/548/EEC
Class of danger	:	dangerous for the environment
R-Phrases	:	(51) Toxic to aquatic organisms (53) May cause long-term adverse effects in the aquatic environment
Specific limits	:	
1 st Concentration	:	
2 nd Concentration	:	
3 rd Concentration	:	
4 th Concentration	:	
5 th Concentration	:	
6 th Concentration	:	
7 th Concentration	:	
8 th Concentration	:	
1 st Classification	:	
2 nd Classification	:	
3 rd Classification	:	
4 th Classification	:	
5 th Classification	:	
6 th Classification	:	
7 th Classification	:	
8 th Classification	:	
Source 11.02.2000	:	EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)
Classified	:	as in Directive 67/548/EEC
Class of danger	:	very toxic

1. GENERAL INFORMATION

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R-Phrases : (26/27) Very toxic by inhalation and in contact with skin

Specific limits1st Concentration2nd Concentration3rd Concentration4th Concentration5th Concentration6th Concentration7th Concentration8th Concentration1st Classification2nd Classification3rd Classification4th Classification5th Classification6th Classification7th Classification8th Classification

Source : EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)
11.02.2000

1.6.3 PACKAGING**1.7 USE PATTERN****1.7.1 DETAILED USE PATTERN****1.7.2 METHODS OF MANUFACTURE****1.8 REGULATORY MEASURES****1.8.1 OCCUPATIONAL EXPOSURE LIMIT VALUES**

Type of limit : MAK (DE)

Limit value : 7 mg/m³

Source : Atochem Paris la Defense
EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)
17.03.1994 (1)

Type of limit : TLV (US)
Limit value : 6.9 mg/m³

Source : Atochem Paris la Defense
EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)
17.03.1994 (2)

Type of limit : TLV (US)
Limit value : 6.9 mg/m³

1. GENERAL INFORMATION

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Remark : Notation: skin
Source : Enichem S.p.A. Milan
 EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)
 29.05.1994 (3)

Type of limit : other: VME
Limit value : 7 mg/m3
Short term exposure limit value
Limit value : 35 mg/m3
Time schedule : 15 minute(s)
Frequency : 4 times

Country : France
Source : Atochem Paris la Defense
 EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)
 17.03.1994 (4)

Remark : Not listed UK HSE EH40
 ICI Company Standard - 1ppm
Source : ICI Chemicals & Polymers Limited Runcorn, Cheshire
 EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)
 02.06.1994

1.8.2 ACCEPTABLE RESIDUES LEVELS

1.8.3 WATER POLLUTION

1.8.4 MAJOR ACCIDENT HAZARDS

1.8.5 AIR POLLUTION

1.8.6 LISTINGS E.G. CHEMICAL INVENTORIES

1.9.1 DEGRADATION/TRANSFORMATION PRODUCTS

1.9.2 COMPONENTS

1.10 SOURCE OF EXPOSURE

Remark : Continuous process. This chemical is an intermediate of the
 production of trichloroethylene.
 One production site.
 Effluents: as prescribed in the directive EEC 76/464
Source : Atochem Paris la Defense
 EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)
 07.06.1994

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Remark : Minimal exposure used as intermediate.
Source : ICI Chemicals & Polymers Limited Runcorn, Cheshire
EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)
02.06.1994

1.11 ADDITIONAL REMARKS

Remark : None
Source : ICI Chemicals & Polymers Limited Runcorn, Cheshire
EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)
02.06.1994

1.12 LAST LITERATURE SEARCH**1.13 REVIEWS**

2.1 MELTING POINT

Value : = -44 °C
Sublimation :
Method :
Year :
GLP : no data
Test substance :

Reliability : (2) valid with restrictions
 Data from literature.

10.09.2001 (5)

Value : = -43.8 °C

Reliability : (2) valid with restrictions
 Data from Handbook

10.09.2001 (6)

Value : = -43 °C

Reliability : (2) valid with restrictions
 Data from Handbook

10.09.2001 (7)

Value : = -36 °C

Reliability : (2) valid with restrictions
 Data from Handbook

10.09.2001 (8)

2.2 BOILING POINT

Value : = 146.5 °C at 1013 hPa
Decomposition :
Method :
Year :
GLP : no data
Test substance :

Reliability : (2) valid with restrictions
 Data from Handbook

10.09.2001 (9)

2.3 DENSITY

Type : density
Value : = 1.5953 at 20 °C
Method :
Year :
GLP : no
Test substance :

Reliability : (2) valid with restrictions

10.09.2001 (10)

2. PHYSICO-CHEMICAL DATA

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Type : density
Value : = 1.5886 g/cm³ at 25 °C
Method :
Year :
GLP : no
Test substance :

Source : Atofina Paris la Defense
 EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)
Reliability : (2) valid with restrictions
 07.09.2001 (11)

2.3.1 GRANULOMETRY

2.4 VAPOUR PRESSURE

Value : = 6.5 hPa at 20 °C
Decomposition :
Method :
Year :
GLP : no data
Test substance : no data

Reliability : (2) valid with restrictions
 Data from Handbook
 10.09.2001 (12)

Value : = 7.045 hPa at 25 °C
Decomposition :
Method :
Year :
GLP : no data
Test substance : no data

Reliability : (2) valid with restrictions
 Data from Handbook
 10.09.2001 (13)

Value : = 12.23 hPa at 30 °C
Decomposition :
Method :
Year :
GLP : no data
Test substance : no data

Reliability : (2) valid with restrictions
 Data from Handbook
 10.09.2001 (14)

2.5 PARTITION COEFFICIENT

Partition coefficient :
Log pow : = 2.39 at 25 °C
pH value :
Method : other (measured)

2. PHYSICO-CHEMICAL DATA

ID: 79-34-5

DATE: 09.08.2002

Year :
GLP : no data
Test substance :

Reliability : (2) valid with restrictions
 10.09.2001 (15)

2.6.1 SOLUBILITY IN DIFFERENT MEDIA

Solubility in :
Value : = 2.9 g/l at 20 °C
pH value :
concentration : at °C
Temperature effects :
Examine different pol. :
pKa : at 25 °C
Description :
Stable :
Deg. product :
Method :
Year :
GLP : no data
Test substance :

Reliability : (2) valid with restrictions
 Data from Handbook
 10.09.2001 (16)

Solubility in :
Value : = 2.86 g/l at 25 °C
pH value :
concentration : at °C
Temperature effects :
Examine different pol. :
pKa : at 25 °C
Description :
Stable :
Deg. product :
Method :
Year :
GLP : no data
Test substance :

Reliability : (2) valid with restrictions
 Data from Handbook
 10.09.2001 (17)

2.6.2 SURFACE TENSION

Test type : other
Value : = 35.6 mN/m at 20 °C
Concentration :
Method :
Year :
GLP : no
Test substance : other TS: pure substance

 10.09.2001 (18)

Test type : other
Value : = 34.4 mN/m at 30 °C
Concentration :
Method :
Year :
GLP : no data
Test substance : other TS: pure substance

10.09.2001

(19)

Test type : other
Value : = 33.3 mN/m at 40 °C
Concentration :
Method :
Year :
GLP : no
Test substance : other TS: pure substance

Reliability : (2) valid with restrictions
 Data from Handbook

10.09.2001

(20)

2.7 FLASH POINT

28.06.2001

2.8 AUTO FLAMMABILITY**2.9 FLAMMABILITY****2.10 EXPLOSIVE PROPERTIES****2.11 OXIDIZING PROPERTIES****2.12 DISSOCIATION CONSTANT****2.13 VISCOSITY****2.14 ADDITIONAL REMARKS**

Memo : Henry's Law constant at 25°C (measured) = 37.177 Pa.m³/mole

Remark : Distribution coefficients are reported for 21 chlorinated hydrocarbons plus C₆H₆ [71-43-2] and PhMe [108-88-3] in dil. air-water systems over the temperature range 0-30 °C.

The measurements were performed with a simple experimental apparatus consisting of an equil. cell followed by gas-chromatography analysis.

This technique achieves a random error of less than $\pm 0.1\%$ and a systematic error, primarily attributable to gas-chromatography peak separation and integration error, of $>5\%$ for most of the compounds considered which exhibit room-temperature distribution coefficients between 100 and 1000.

07.09.2001

(21)

DRAFT

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 : 2000000 molecule/cm³
Rate constant : < .0000000000001 cm³/(molecule*sec)
Degradation : = 100 % after 1160 day(s)
Deg. product :
Method : other (measured)
Year :
GLP : no data
Test substance :

Result : <0.1% loss per 12h sunlight day.
 10.09.2001

(22)

Type : air
Light source :
Light spectrum : nm
Relative intensity : based on intensity of sunlight
INDIRECT PHOTOLYSIS
Sensitizer : OH
Conc. of sensitizer : 1000000 molecule/cm³
Rate constant : = .000000000000126 cm³/(molecule*sec)
Degradation : = 50 % after 63 day(s)

Attached document : Atmospheric fate of 1,1-2,2-tetrachloroethane

Reaction with the atmospheric OH radical.

Method

Principle of the method: OH radicals are generated from the photolysis of a precursor which can be H₂O, H₂O₂ or HNO₃. The concentration of the substance is put in excess and considered constant during the experiment. The rate constant can be inferred from the rate of disappearance of the OH radical. An extensive study was done using that technique by Jiang et al.(1)

Results:

$$k(\text{OH}) = 2.72 \pm 0.42 \cdot 10^{-12} \cdot (T/300)^{0.22} \cdot \exp(-(915 \pm 62)/T)$$

$$k(\text{OH}) = 1.26 \cdot 10^{-13} \text{ cm}^3 \text{ mol}^{-1} \text{ s}^{-1} \text{ at } 298 \text{ K.}$$

Previous results have been reported in the review of Atkinson. (2).

$$k = 2.37 \pm 4.8 \cdot 10^{-13} \text{ cm}^3 \text{ mol}^{-1} \text{ s}^{-1} \text{ at } 292 \text{ K}$$

$$k = 2.26 \pm 4.6 \cdot 10^{-13} \text{ cm}^3 \text{ mol}^{-1} \text{ s}^{-1} \text{ at } 298 \text{ K}$$

$$k = 2.66 \pm 5.4 \cdot 10^{-13} \text{ cm}^3 \text{ mol}^{-1} \text{ s}^{-1} \text{ at } 312 \text{ K}$$

The results from Jiang et al because of the experimental technique used and control of impurities

seems the most reliable.

Atmospheric lifetime of 1,1-2,2-tetrachloroethane.

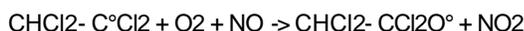
Assuming an average OH° concentration of 106 cm⁻³ it is possible to calculate a 1/2 lifetime of $t = \ln 2/k(\text{OH}^\circ)$ of 63 days or an atmospheric lifetime of 92 days on the basis of the Jiang et al rate constant.

Atmospheric degradation products of 1,1-2,2-tetrachloroethane

It can be inferred from the structure that the oxidation of 1,1-2,2-tetrachloroethane should lead to the formation of phosgene and C(=O)HCl as the intermediate compounds which will further hydrolyze in atmospheric water to give HF and CO₂. The removal of phosgene by wet deposition has an estimated lifetime of 70 days.(3)

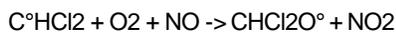
3.1.4.1.2.2 Atmospheric degradation.

The possible atmospheric oxidation scheme of 1,1-2,2-tetrachloroethane is described below:



At this stage two pathways can be considered:

Carbon-carbon bond cleavage leading to the formation of phosgene:



Chlorine atom abstraction leading to the formation of chloroacetylchloride:



Phosgene will further hydrolyze in atmospheric water to give HCl and CO₂. The removal of phosgene by wet deposition has an estimated lifetime of 70 days.(3) Dichloroacetylchloride should also undergo hydrolysis in atmospheric water to form dichloroacetic acid removed by rain.

These reaction products have been observed by Spence et al.(1978) (8).

Reaction with stratospheric ozone.

Organic substances containing chlorine, if primarily present in the atmospheric compartment and if their lifetime is long

enough can reach the stratosphere and decompose through photolysis and other chemical reaction (e.g. with OH[°]). Chlorine atoms can then participate to the catalytic ozone destruction cycles.

In the case of 1,1 -2,2-tetrachloroethane the atmospheric lifetime is too short to enable a significant fraction of the compound emitted to reach the stratosphere. Similar conclusion was taken in the last scientific assessment for ozone depletion (3) as far as short-lived substances containing chlorine are concerned.

The ozone depletion potential cannot be calculated with conventional methods such as those used for the long-lived species like CFCs and most HCFCs and will depend on the place of emission of that substance (4). A study using algorithm approach (5) attempted to estimate the ODP of 1,1 -2,2-tetrachloroethane with a result of less than 0.001 and an estimated lifetime of about 1 month. However this method cannot take into account the specific behavior of short-lived species as explained in (4). Therefore, although it can be concluded that the ODP of 1,1 -2,2-tetrachloroethane is very small, no accepted number have been calculated.

Contribution to the greenhouse effect.

Although no GWP value are reported, the direct global warming potential of 1,1 -2,2-tetrachloroethane should be small essentially because of its short atmospheric lifetime. The GWP values of substances with comparable lifetime are generally less than 100 . (6).

Contribution to the formation of ozone at ground level.

1,1 -2,2-tetrachloroethane reacts too slowly with the OH[°] radical to be considered as a significant contributor to the formation of tropospheric ozone. Halocarbon with comparable reactivity with OH[°] are reported to have low Photochemical Ozone Creation Potential value e.g. chloroform, methylene chloride, tetrachloroethylene show POCP of less than 10 (100 for ethylene). (7)

Conclusion.

1,1 -2,2-tetrachloroethane has an average atmospheric lifetime of 91 days. It has negligible impact on stratospheric ozone, greenhouse effect and minor contribution to the formation of tropospheric ozone. Decomposition in the atmosphere should be complete and produce HF and CO₂. Expected intermediate products formed during the atmospheric oxidation are phosgene and C(=O)HCl.

Bibliography

(1)- Jiang et al, J.Phys.Chem. 1993, 97, 5050-5053.

(2)-R.Atkinson Gas phase Tropospheric Chemistry of Organic

compounds J.Phys.chem. Monography N° 2, 1994

(3)- WMO 1998, Scientific assessment of Ozone Depletion, World Meteorological Organization, Global Ozone Research and Monitoring Project- Report N°. 44.

(4)- Olsen et al, Geophys. Res. Let., Vol. 27, N° 10, P; 1475-1478, May 15, 2000

(5)- J.S.Nimitz and S.R.Skaggs, Env. Sci. Technol. 1992, 26, 739-744

(6)- IPCC 2000, Climate Change 2000, The Science of Climate Change, Contribution of Working Group I to the third Assessment Report of the Intergovernmental Panel on Climate Change. In press.

(7)-Derwent et al, Atmospheric environment vol.32, N°14/15, pp. 2429-2441.

(8)-SPENCE, J.W. and HANST, P.L., 1978.Oxidation of chlorinated ethanes.J. Air Poll. Contr. Assoc., 28, 250-253.

Reliability Flag
10.09.2001

: (1) valid without restriction
: Risk Assessment

(23)

Type
Light source
Light spectrum
Relative intensity
INDIRECT PHOTOLYSIS

: air
:
: nm
: based on intensity of sunlight

Sensitizer
Conc. of sensitizer
Rate constant
Degradation
Deg. product
Method
Year
GLP
Test substance

: OH
: 500000 molecule/cm³
: = .000000000003 cm³/(molecule*sec)
: = 50 % after 53 day(s)
:
: other (calculated)
:
:
: no
:

Reliability
10.09.2001

: (1) valid without restriction

(24)

Result

: The influence of UV radiation on the stability of 10 ppm 1,1,2,2-tetrachloroethane, mixed with 4 ppm chlorine gas has been investigated at 22.5 degree C. After 2 minutes of radiation at a wave length of 360 nm, 35% of the mixture had been degraded to 0.2 ppm CO, 4 ppm HCl, 0.5 ppm CCl₂O and 2.5 ppm CCl₂HCOCI.

10.09.2001

Remark

: Laboratory investigations under stratospheric conditions have shown an initial degradation to trichloroethylene (i.e. a splitting off of HCl as the primary breakdown stage).This

trichloroethene then further reacts by chlorine-sensitized photooxidation to become dichloroacetylchloride (ref.1), which is degraded to CO₂ and HCL, with phosgene as intermediate. Small amounts of trichloromethane and tetrachloromethane may occur as by-products, which are themselves degraded to CO₂, HCl and H₂O (ref.2).

10.09.2001

(25)

3.1.2 STABILITY IN WATER

Type : abiotic
t1/2 pH4 : at °C
t1/2 pH7 : = .4 year at 25 °C
t1/2 pH9 : at °C
Deg. product :
Method : other
Year :
GLP : no data
Test substance :
Deg. products : 79-01-6 201-167-4 trichloroethylene

Result : Kinetic analysis
 Preliminary studies were made to find appropriate temperatures and base concentration range at which the reaction would proceed.
 The dependence of hydrolysis rate on concentration of base was determined by varying OH concentration by at least a factor of 10 within the range pH 7-14.
 All reactions were found to be either first order in base or pH independent.
 Solutions were made 0.001 M in HCl to measure the "neutral" hydrolysis rate in order to assure negligible reactions with OH⁻. There was no evidence of any acid catalysis.
 The data were reduced as first order or pseudo first order, with natural logarithm of reactant concentration plotted against time in minutes, the slope giving k (observ).
 The second order rate constant for base-catalyzed reactions was obtained by dividing k (observ) by base concentration.
 Each individual rate constant value was determined by 5-20 time-concentration points, with each sample analyzed in triplicate.

Under "neutral" conditions, measurements were performed at approximately 175, 159 and 85°C.

Under alkaline conditions, the temperatures were 49.5, 35, 21 and 0°C.

Arrhenius parameters :

NEUTRAL

A = (1.57±0.50)e8 min⁻¹

E (Activation Energy) = 92.4±3.2 kJ

k (neutral, 25°C) = 9.70e-9 min⁻¹

BASIC

A = (1.54±0.14)e15 1/mol min

E (Activation Energy) = 78.1±1.0 kJ

k_b (pH 7, 25°C) = 3.02e-6 min⁻¹

k(observ) = k+k_b = 3.03e-6

Test condition : Aqueous solutions were prepared by shaking the test

3. ENVIRONMENTAL FATE AND PATHWAYS

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substance for 2 min with deionized water, previously distilled and boiled.
 Final solution (0.1M, pH7 phosphate buffered or diluted NaOH or HCl) were less than 10% saturated in the organic substrate.
 All solutions were refrigerated, if not used immediately.
 Hydrolysis experiments utilized either zero dead-volume stainless steel tubes (2 ml volume) or glass bulbs. The stainless steel tubes were filled by using a needle syringe. The bulbs were filled by capillary action. The ends were flamed sealed enclosing about 350 µl of liquid and a 10-15 µl air space.
 The lower temperature were achieved by using water baths.
 The reaction tubes/bulbs used for high-temperature runs were air thermostated by use of a gas chromatograph oven.
 Adsorption on steel or glass was checked.

Analysis were performed by gas chromatography.

Test substance : obtained from Aldrich or Eastman or Pfaltz and Bauer. Highest purity available.

10.09.2001

(26)

Type : abiotic
t1/2 pH4 : at °C
t1/2 pH7 : at °C
t1/2 pH9 : at °C
Deg. product :
Method :
Year : 1987
GLP :
Test substance : no data

Result : A measured aqueous hydrolysis rate constant of $K_b = 2.3 \times 10^{-7}$ mol⁻¹ yr⁻¹ at pH of 9 and 25 °C corresponds to half-lives of 1.1 and 111 days at pH of 9 and 7.

Reliability : (4) not assignable

10.09.2001

(27)

Type : abiotic
t1/2 pH4 : at °C
t1/2 pH7 : at °C
t1/2 pH9 : at °C
Deg. product :
Method : other
Year : 1988
GLP : no data
Test substance : no data
Deg. products : 79-01-6 201-167-4 trichloroethylene

Remark : No significant differences in the kinetics or products were observed in the sediment pores compared to those in water at the same pH, indicating that the effects of ionic strength, surface catalysis and adsorption are unimportant for the low-carbon sediment studied.

Result : Neutral and base-catalysed hydrolyses of the test substance in pure water yielded trichloroethylene as essentially the sole degradation product.

Result : - Half-life calculated from kinetic data, according to Lyman's equation : $t_{1/2} = 0.693/k$ (Ref. 2), for hydrolysis of

1,1,2-tetrachloroethane in pure water, at 25°C :

pH	10E+8 k, s-1	t1/2
6.05	1.4+-0.4	573 d
7.01	22.0+-3.5	36.5 d
9.0	1500+-250	12.8 h
9.0	2920+-640	6.6 h
10.0	12100+-1400	1.6 h

- Half-life in sediment pore-water at 25°C and pH between 7 and 7.5 was found to be 29.1 d. the kinetic constant (10E+8 k, s-1) was 27.6+-4.0.

Test condition

: The focus of this work was to study hydrolysis under conditions approximating groundwater environments as closely as possible : most experiments were performed at 25 °C.

Sediments were provided by EPA Environmental Research Laboratory, Ada, Ok, as Lula C1, a sandy material collected at a depth of between 5.4 and 6.4 m. It was described as having a total organic carbon content of 0.02+-0.005%, a total surface area of 11+ 1 m²/g and a cation-exchange capacity of 2.5+- 0.2 maquiv NH⁺/g.

Sediment-extracted pore water was obtained by saturating sediments samples with Milli-Q water, and recovering the water after equilibrated overnight .

The pore water was analyzed by ion chromatography, had a pH of about 7-7.5 and a buffering capacity of about 1 mM.

Aqueous solutions of the compounds were added to vials or ampules by a syringe.

Sediments (6.8 g) were added to the vials. Aqueous samples (1.35 ml) were injected slowly into the bottom of the sediments to displace the air.

Samples were incubated in a temperature-controlled bath (+-0.1 °C) at the desired temperature.

At appropriate time intervals, samples were cooled and stored at 2°C until analysis at the end of the run.

Halogenated compounds were analyzed by gas chromatography after extraction with hexane or isooctane.

Sorption of the compound was shown in experiments to be minor, as expected for a low-carbon sediment.

Test substance
10.09.2001

: Commercial source not specified, and used as received.

(28)

Type

: abiotic

t1/2 pH4

: at °C

t1/2 pH7

: = 102 day(s) at 25 °C

t1/2 pH9

: = 1 day(s) at 25 °C

Deg. product

:

Method

: other (calculated)

Year

: 1987

GLP

:

Test substance

: no data

Deg. products

: 79-01-6 201-167-4 trichloroethylene

Remark

: Kinetics of elimination reaction

Test condition

At each temperature, 3 or more independent sets of experimental data were obtained. Each set consisted of 6-11 measurements of the concentration of both 1,1,2,2-tetrachloroethane and trichloroethylene. In all cases, the disappearance of 1,1,2,2-Tetrachloroethane is balanced by a corresponding appearance of trichloroethylene. The elimination reaction is also found to be base promoted for values of pH in the range 5-9. Pseudo-first order rate constants were obtained. According to the curve given in the publication, the duration of experiment was 80 hours.

: The abiotic elimination of HCl from the test substance was studied in 0.100M phosphate-buffered distilled water. The reaction was investigated for pH 5-9 and at 11 different temperatures ranging from 30 to 95°C.

From the results, the half-life was calculated at 25°C at pH 7 and pH 9.

200 µl of a standard solution of the test substance in methanol was added to 60 ml of the desired buffer to give a nominal test substance concentration of 450 nmol/l. The sealed ampules containing the samples were incubated in a water bath maintained at a constant temperature within $\pm 0.1^\circ\text{C}$.

After incubation, the ampules were placed in ice-water for rapid cooling and then stored in a refrigerator at 4°C. The samples were analyzed as soon as possible, always within 24 h after refrigeration.

The neck of the ampules was broken and 50 ml of the sample was transferred into a serum vial, with 5 ml of pentane and analyzed by gas chromatography.

The adsorption of compounds on glass surfaces of the test vessels was examined.

Control experiments were conducted under sterile conditions to determine the extent of microbially mediated degradations.

No difference in the degradation rates was observed in sterile and non sterile ampules.

Test substance
10.09.2001

: 98 % from Aldrich chemical

(29)

Type : abiotic
t1/2 pH4 : at °C
t1/2 pH7 : at °C
t1/2 pH9 : at °C
Deg. product :
Method :
Year : 1983
GLP :
Test substance :

Result

: A study found that at ppm concentration levels, 1,1,2,2-tetrachloroethane undergoes hydrolytic dehydrohalogenation to trichloroethylene in a sterile, anaerobic solution at pH 7. In 28 days, 25% of the chemical had degraded and the amount of degradation was not affected by contact with a sulfide redox buffer of hematin.

3. ENVIRONMENTAL FATE AND PATHWAYS

ID: 79-34-5

DATE: 09.08.2002

Reliability : (4) not assignable
10.09.2001 (30)

3.1.3 STABILITY IN SOIL**3.2.1 MONITORING DATA**

10.09.2001 (31)

3.2.2 FIELD STUDIES**3.3.1 TRANSPORT BETWEEN ENVIRONMENTAL COMPARTMENTS**

Type : adsorption
Media : soil - air
Air : % (Fugacity Model Level I)
Water : % (Fugacity Model Level I)
Soil : % (Fugacity Model Level I)
Biota : % (Fugacity Model Level II/III)
Soil : % (Fugacity Model Level II/III)
Method : other
Year :

Method : Not described.
Result : A Koc of 46 was determined on the basis of a soil - water equilibrium isotherm from water at 20°C onto a Willamette silt loam (1.6 % organic matter, 26 % clay, 3.3% sand, 69 % silt). this figure suggests that 1,1,2,2-tetrachloroethane will be highly mobile in soil.

10.09.2001 (32)

Type : volatility
Media : water - air
Air : % (Fugacity Model Level I)
Water : % (Fugacity Model Level I)
Soil : % (Fugacity Model Level I)
Biota : % (Fugacity Model Level II/III)
Soil : % (Fugacity Model Level II/III)
Method : other
Year : 1975

Result : The time for 50% evaporation was 56 minutes and for 90% was greater than 120 minutes.

Test condition : -Ref 1
Hollow fiber-mass spectroscopic method of analysis was used. Solutions of 1 ppm (weight basis) of the test substance were prepared by dissolving a known amount of 1,1,2,2-tetrachloroethane in 100 ml methanol and then mixing an aliquot (0.1 ml) with a liter of deionized water. The solutions (200 ml) were poured into a 250 ml beaker and stirred at 200 rpm with a propeller stirrer. After the starting of the stirrer, mass spectra were scanned after 1 minute and periodically thereafter. The maximum peak height obtained was considered to be 1 ppm,

and subsequent concentrations were determined from the peaks heights by assuming a linear relationship between peak height and concentration.
The solutions were at room temperature (25°C).

- Ref 2

In an another publication (same author), evaporation half-life from 1 ppm aqueous solutions were determined and compared to calculated half-lives.

The experimental conditions included 200 rpm stirring with a shallow-pitch propeller stirrer at around 25°C, and an average solution depth of 6.5 cm.

The experimental half life obtained was 55.2 minutes, while the calculated half-lives were : Mackay's Formula = 12 minutes and Liss and Slater's formula = 40.5 minutes.

Test substance : Not specified. (33)
10.09.2001

Type : volatility
Media : water - air
Air : % (Fugacity Model Level I)
Water : % (Fugacity Model Level I)
Soil : % (Fugacity Model Level I)
Biota : % (Fugacity Model Level II/III)
Soil : % (Fugacity Model Level II/III)
Method : other
Year : 1980

Result : Evaporation half-life: $t_{1/2} = 9.2$ minutes at 2270 ppm
(24.8°C)
 $t_{1/2} = 8.6$ minutes at 0.1 ppm
(24°C)

Test condition : Rates of evaporation were measured gravimetrically by a Mettler H54 balance.
A stop watch was used to record the time for weight loss. Stainless-steel planchets (4.6 cm²) with a wall height of 6 mm were used as the sample containers. The liquid level was about 4 mm height.
The mechanical stirring was carried out by a Teflon magnetic stirring bar at a controlled speed of 100+-10 rpm.
The solutions were maintained at a depth of 1.7 cm, at a temperature of 24.8 °C.
The half-lives were measured at two drastically different initial concentrations. The high concentration (2270ppm) corresponds to about 80 % solubility limit.

Test substance : Not specified. (34)
10.09.2001

Type : volatility
Media : water - air
Air : % (Fugacity Model Level I)
Water : % (Fugacity Model Level I)
Soil : % (Fugacity Model Level I)
Biota : % (Fugacity Model Level II/III)
Soil : % (Fugacity Model Level II/III)
Method : other
Year :

Result : 1-The volatilization half-life from a model river (1m deep, flowing 1m/sec, with a wind speed 3m/sec, has been estimated to be 6.3 hours (ref:1).

2-The volatilization half-life from a model pond, which considers the effect of adsorption, has been estimated to be 3.5 days (ref:2).

10.09.2001

(35)

Type : fugacity model level I
Media :
Air : 92.26 % (Fugacity Model Level I)
Water : 7.46 % (Fugacity Model Level I)
Soil : .14 % (Fugacity Model Level I)
Biota : % (Fugacity Model Level II/III)
Soil : % (Fugacity Model Level II/III)
Method :
Year :

Test condition : Model used : Nord base

physico-chemical parameters :

Temperature : 20°C
Molecular weight : 170
Vapor pressure : 600 Pa
Solubility : 2900 g/m³
Solubility : 17.06 mol/m³
Henry's law constant : 35.17 Pa.m³/mol
log octanol/water partition coefficient : 2.39
Organic C-water partition coefficient : 100.64
Air-water partition coefficient : 0.01
Soil-water partition coefficient : 3.02
Sediment-water partition coefficient : 6.04
Amount of chemical : 1 mole
Fugacity : 0.37477329e-6 Pa
Total VZ products : 2668279.78

10.09.2001

3.3.2 DISTRIBUTION

27.06.2001

3.4 MODE OF DEGRADATION IN ACTUAL USE

3.5 BIODEGRADATION

Type : aerobic
Inoculum : activated sludge
Concentration : 100 mg/l related to Test substance
related to
Contact time :
Degradation : = 0 (±) % after 28 day(s)
Result : under test conditions no biodegradation observed
Deg. product :
Method : OECD Guide-line 301 C "Ready Biodegradability: Modified MITI Test (I)"
Year :
GLP : no data
Test substance : no data

Test condition	<ul style="list-style-type: none"> : - Test Conditions of cultivation <ul style="list-style-type: none"> (1) Concentration of test substance : 100 mg/l (2) Concentration of activated sludge [as the concentration of suspended solid] : 30 mg/l (3) Volume of test solution:300 ml (4) Cultivation temperature : 25 °C (5) Cultivation duration : 28 days - Measurement and analysis <ul style="list-style-type: none"> - Total organic carbon analyzer : TOC - Gas chromatography : GC - Results : percentage biodegradation (average) <ul style="list-style-type: none"> - TOC 0 - GC 10 	
Reliability Flag 10.09.2001	<ul style="list-style-type: none"> : (1) valid without restriction : Critical study for SIDS endpoint 	(36)
Type	: aerobic	
Inoculum	: predominantly domestic sewage, adapted	
Deg. product Method	:	
Year	: 1981	
GLP	:	
Test substance	: no data	
Remark	<ul style="list-style-type: none"> : - Result: No significant degradation under conditions of the test. - 0% degradation at 7 day (5 and 10 mg/l) 29 and 23 % degradation at 28 day (5 and 10 mg/l respectively) - 7% and 0% volatilization loss at 25°C (at 5 and 10 mg/l respectively) 	
Test condition	<ul style="list-style-type: none"> : The author who incubated the tetrachloroethane with sewage seed for 7 days and followed that with three successive 7-day subcultures found no significant degradation under these conditions. <p>Test method :</p> <ul style="list-style-type: none"> - static-culture flask-screening procedure of Bunch and Chambers, utilizing biochemical oxygen demand (BOD), dilution water containing 5 mg of yeast extract per liter, as the synthetic medium - 2 concentrations of test compound: 5 and 10 mg/l - Inoculum: domestic wastewater - 7 day static incubation at 25°C in the dark, followed by 3 weekly subcultures (totaling 28 days of incubation) - Analysis method: GC <p>Biodegradability studies were carried out in 250 ml glass - stoppered reagent bottles to minimize possible volatilization of the test compound.</p> <p>The substrate containing media in reagent bottle was inoculated with prechilled yeast extract and 10 ml of prechilled settled domestic wastewater as inoculum. Volatility controls were held at both refrigerated and 25°C</p>	

		temperatures for 10 days and then analyzed by GC and for TOC to determine loss of substance from volatilization. Analysis were carried out by a direct injection method (without a solvent extraction) chromatographically.	
Reliability	:	(3) invalid	
10.09.2001			(37)
Type	:	aerobic	
Inoculum	:	activated sludge, domestic, adapted	
Deg. product	:		
Method	:		
Year	:	1983	
GLP	:	no data	
Test substance	:	no data	
Result	:	At a concentration of 201 mg/l of the test substance, it was shown that the main removal mechanism was a air-stripping process (93.5%) , assuming a 27% biodegradation.	
Test condition	:	Complete-mix, bench-scale, continuous -flow activated-sludge reactors were used to treat a synthetic wastewater containing a "base mix" plus the pollutant(s) under study. The base-mix included : <ul style="list-style-type: none"> - ethylene glycol - ethyl alcohol - glucose - glutamic acid - aceic acid - phenol - ammonium sulfate - phosphoric acid - salts <p>The "base-mix" and pollutants were added so that the BOD5 of the wastewater would be approximately 250 mg/l. The pollutants were studied as single-pollutant or in combinations of three to a system.</p> <p>The activated sludge systems consisted of stainless steel internal recycle 3.0 l reactors. The wastewater was pumped from a sealed feed tank to the reactor. The effluent from the settling unit flowed by gravity to a collection tank. The off-gas was pulled by a vacuum pump.</p> <p>Activated sludge for initial seeding was obtained from a local municipal activated sludge plant.</p> <p>Three individual systems were acclimated to the synthetic wastewater and the pollutant(s) to be evaluated. The activated sludge systems were operated at mean cell residence times of 2,4 and 6 days. The mean cell residence times were maintained by wasting sludge once a day. After a one-month acclimation period, influent, effluent, mixed liquor and offgas samples were collected for analyses over a 60-day period.</p> <p>The treatment performances of the activated sludge systems were monitored with respect to BOD5, TOC, COD and specific pollutants analysis (gas chromatography).</p>	
10.09.2001			(38)

3. ENVIRONMENTAL FATE AND PATHWAYS

ID: 79-34-5

DATE: 09.08.2002

Type : aerobic
Inoculum :
Deg. product :
Method :
Year : 1982
GLP :
Test substance : no data

Remark : 41% degradation was obtained in 24 days in a modified shake flask biodegradability test using an unacclimated inoculum, and 19% degradation in a river die-away test while 5 other chlorinated ethanes and ethenes were undegraded.

Reliability : (4) not assignable
 10.09.2001

(39)

Type : anaerobic
Inoculum :
Deg. product :
Method :
Year : 1983
GLP : no data
Test substance : other TS: reagent grade

Result : After a 9-12 weeks acclimation period, removal of 97+ -3 % of the test substance, after a two-day flow-through period, with a test concentration of 27+-1 µg/l .

Test condition : Continuous -flow fixed-film studies with methanogenesis. A fixed-bed reactor was used, which has initially been adapted to chlorinated aliphatic hydrocarbons for 12 months.

Anoxic conditions were achieved by connecting two laboratory-scale glass columns (2.5 cm*25 cm) in series . Glass beds were used as the support medium for the biofilms in order to minimize adsorptive effects.

Sterile defined growth medium was continuously applied to the lead column with a syringe pump equipped with a 60 ml plastic syringe. The growth medium contained 250 mg/l acetate.

The lead column was initially seeded with primary sewage effluent and produced an anoxic effluent (dissolved oxygen by the winkler method was below the detection limit of 0.5 mg/l) that became the influent to the second anoxic column.

Primary digested sewage sludge was used to seed the second column for methanogenesis.

A mixture of halogenated aliphatic compounds (about 160 µg/l for each) was pumped to the second column influent feed.

The column system were operated at 22°C in the dark to prevent growth of photosynthetic organisms for 15 months.

The methanogenic growth medium was amended with molybdate at a concentration of 1.5 mM to inhibit sulfate reduction.

The anoxic column effluents were collected in 20 ml glass syringe barrel with tight-fitting teflon floats to prevent volatilization losses.

Extraction of organic compounds were performed directly on samples on the syringes.

Analysis of halogenated aliphatic compounds with a detection limit of 0.1 µg/l in water were conducted using pentane-extraction, gas chromatography procedure with

Reliability 10.09.2001	: electron-capture detection. (2) valid with restrictions	(40)
Type Inoculum Deg. product Method Year GLP Test substance	: anaerobic : : : : 1980 : : no data	
Remark	: A static test under anaerobic conditions showed that at concentrations up to 100 mg/m ³ chlorinated compounds only inhibited the growth of clostridia and some facultative anaerobes within the first 3 to 5 days of a total period of 1 to 2 weeks. This was followed by rapid bacterial growth, with 50 to 70% of organically bound chlorine being converted to chloride ions. Used strains has been isolated as hexachlorohexane degraders and exhibited a dechlorinating enzyme system.	
Reliability 10.09.2001	: (3) invalid lack of information on test conditions. No specific information on 1,1,2,2- tetrachloroethane	(41)
Type Inoculum Deg. product Method Year GLP Test substance	: anaerobic : : : : 1987 : : other TS: purity : 98 %	
Remark	: Products studies indicated that reduction by vicinal dehalogenation was the major fate process.	
Result	: Results of primary degradation : At an initial 1,1,2,2-tetrachloroethane concentration of 3.5 E-7 mol/l of suspension, half-life time due to chemical hydrolysis and biodegradation was 6.6 days.	
Test condition	: The degradation of selected halogenated ethanes was studied in anoxic sediment-water suspensions at 1 to 20% sediment concentration. Batch kinetic experiments were used to quantify decay. Sediment-water slurries were collected from ponds. Kinetics experiments were performed using a batch method in which sediment-water aliquots were distributed into a series of test tubes and spiked with a known concentration of chemical under a nitrogen atmosphere. Time-concentration data were collected by periodically sacrificing a tube for analysis. A stock solution of the tested substance was made in acetonitrile such that 20 µl additions of chemical into 10 ml sediment-water gave the desired initial experimental concentration. At specific intervals, the tubes were extracted with 4 ml hexane by vortex-mixing at high speed. The hexane was	

recovered from the tubes by centrifuging. The hexane layer was removed from samples not analyzed on the same day as extracted and placed in a clean tube.

Hexane extracts were analyzed using a Tracor model 220 gas chromatograph equipped with an electron-capture detector.

Reliability : (2) valid with restrictions (42)
10.09.2001

Type : anaerobic
Inoculum :
Deg. product :
Method :
Year : 1996
GLP : no data
Test substance : other TS: purity :99 %

Result : Biotic transformations of TeCA :
TeCA removal in the first and second spikings occurred without lag.
Trichloroethylene (TCE), cis-1,2-dichloroethene (cDCE) and trans-1,2-dichloroethene (tDCE) were formed simultaneously during the first 6 days. Much smaller amounts of 1,1,2-trichloroethane (1,1,2-TCA) and 1,2-dichloroethane (1,2-DCA) appeared later.
The five products persisted in the first two spiking tests for at least 4 weeks.

Compound (%)

Spiking	1,1,2-TCA	1,2-DCA	TCE	tDCE	cDCE	ethane	ethene
First	3.2	1.3	16.5	21.4	51.6	0.3	0.6
Second	3.1	1.4	9.1	22.6	54.8	0.3	0.8

(For first spiking, mean values between day 6 and day 17.
For second spiking, mean values between day 6 and day 19.)

In the third and subsequent spikings, the transformation for the first 12 days was similar.

1,1,2-TCA and 1,2-DCA appeared earlier than in the earlier tests.

Compound (%)

Spiking	1,1,2-TCA	1,2-DCA	TCE	tDCE	cDCE	ethane	ethene
third	5.3	1.9	15.1	20.1	51.7	0.2	0.1
fourth	4.2	0.5	8.7	25.4	61.4	0.5	0.3

(For third spiking, mean values between day 3 and day 10.
For fourth spiking, mean values between day 7 and day 13.)

Abiotic transformations of TeCA :
It resulted in TCE formation in all bottles, the rate of conversion depending on the experimental conditions.
TeCA was converted to TCE by abiotic dehydrochlorination.

Test condition : - Culture media :

Reduced anaerobic mineral medium was used in all experiments.

- Source of organisms : Anaerobic sludge from a laboratory-scale municipal sludge digester was used.
- Analytical methods : Chlorinated compounds were analyzed by gas chromatography with an electrolytic conductivity detector.
- Experimental design : Batch bottle tests were used in a serie of tests. The sludge (30 ml each bottle) and reduced anaerobic mineral medium (130 ml each bottle) were dispensed into each bottle while purging with N₂ and CO₂. Sterile syringes and needles were used for feeding chlorinated compound. The bottles were incubated at 35°C. Gas production and gas composition were periodically analyzed. Chlorinated compounds were measured daily during the first week and then every 2-3 days.

- 1,1,2,2-tetrachloroethane (TeCA) degradation was tested in a sludge seeded culture that was fed TeCA four times over about 4 months. The TeCA concentration fed was about 60 µmol/l in the first spiking, 70 µmol/l in the second spiking, 80 µmol/l in the third spiking and 105 µmol/l in the fourth and following spikings.

- Abiotic tests with TeCA : In order to understand abiotic transformations of TeCA under anaerobic conditions, reduced cell-free extracts were prepared.

Attached document
Reliability
10.09.2001

: Teca.tif
: (2) valid with restrictions

(43)

Type
Inoculum

: anaerobic
:

Result

: The products of anaerobic biodegradation of the test substance were determined in a 6-week study to be (in decreasing order):
cis-1,2-dichloroethylene, trans-1,2-dichloroethylene, trichloroethylene, 1,1,2-trichloroethane, 1,1-dichloroethylene and vinyl chloride.

Reliability

: (4) not assignable
Document not available.

10.09.2001

(44)

3.6 BOD₅, COD OR BOD₅/COD RATIO

3.7 BIOACCUMULATION

Species : Cyprinus carpio (Fish, fresh water)
Exposure period : 42 day(s) at 25 °C
Concentration : .26 mg/l
BCF : = 4.5 - 13.2
Elimination : no data

3. ENVIRONMENTAL FATE AND PATHWAYS

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Method : OECD Guide-line 305 C "Bioaccumulation: Test for the Degree of Bioconcentration in Fish"
Year : 1981
GLP : no data
Test substance : no data

Remark : At 0,26mg/l test substance, 4.5 was the lower limit value of BCF measured and 13.2 the upper limit value measured.

At 0.026 mg/l test substance concentration the lower limit value of BCF was 4.1 and 13.1, the upper limit value.

Test condition : - Condition of acclimation
 Fish were reared in an acclimation tank according to flow through system at temperature of 25+2°C for about 28 days. During this period, abnormal fish were removed. Then fish were transferred to test tanks and reared again at the same temperature for about one month.

- weight : about 30 g
 length : about 10 cm
 lipid content : 2-6%

- Feeding
 The amount corresponding to about 2% of the total body weight of test fish was fed twice a day by halves.

- The test water was supplied at a rate of 200-800 ml/min in the glass tank of 100 l.

- The concentration of dissolved oxygen was 6-8 mg/l.
 - Number of fish : 15-20 fish/level

Analysis of test water and test fish:
 - test water analysis : twice a week
 - test fish analysis : every two weeks (n=2)
 - Control fish analysis : before the initiation and the termination of exposure (n=2)

Reliability Flag : (1) valid without restriction
 10.09.2001 : Critical study for SIDS endpoint

(45)

Species : Lepomis macrochirus (Fish, fresh water)
Exposure period : 14 day(s) at 16 °C
Concentration : 9.62 µg/l
BCF : = 8
Elimination : yes
Method : other
Year : 1978
GLP : no
Test substance : no data

Remark : - 1,1,2,2-tetrachloroethane was carbon-14 labelled on 1,2-14C (MW=167.86).
 - Elimination half-life in tissues < 1 day

Test condition : - Water hardness: 35 CaCO₃ mg/l
 - Dissolved O₂: 5.9 to 8.6 mg/l
 - pH: 6.3 to 7.9

- Test species :
 Bluegill sunfish (Lepomis macrochirus) , 0.37-0.95 g, 25-35 mm.

- Test system :

Studies were conducted in a flow-through system closed system).

100 bluegill were placed into an aquarium and continuously exposed to a sublethal concentration of the carbon 14 labeled substance.

Representative water and fish samples were collected periodically (0,1,2,4,7,14,21,and 28 days) until apparent equilibrium between concentrations in fish tissue (whole body) and exposure water was observed.

The remaining fish were transferred into an aquarium through which pollutant-free water flowed at a rate equivalent to that during exposure.

In order to evaluate the persistence of the chemical, chemical analysis were performed on fish sampled during this elimination phase (7 days) to determine the half-life of chemical in the tissues.

During each sampling interval (exposure and depuration), 5 fish were removed from each test aquarium, bottled dry, and analyzed radiometrically on a whole-fish basis.

Reliability**Flag**

10.09.2001

- : (2) valid with restrictions
- : Critical study for SIDS endpoint

(46)

Species**Exposure period****Concentration****BCF****Elimination****Method****Year****GLP****Test substance**

- : Pimephales promelas (Fish, fresh water)
- : 28 day(s) at °C
- :
- : = 7
- : no data
- :
- : 1984
- :
- : other TS

Test condition

- : Surviving fish from each test concentration were composited into single samples for the determination of tissue residues.

Whole fish samples were homogenized with 70 g of anhydrous sodium sulfate previously cooled to about 5°C. The homogenate was transferred to a 300 ml Shell column and extracted by eluting the column with 250 ml hexane collected in a 250 ml flask. An aliquot was diluted to an appropriate volume for analysis. Analysis was performed by gas chromatography.

Test substance

- : purchased from Aldrich Chemical Company
- : purity > 95%

Reliability

12.09.2001

- : (4) not assignable

(47)

3.8 ADDITIONAL REMARKS

4.1 ACUTE/PROLONGED TOXICITY TO FISH

Type	:	flow through
Species	:	Pimephales promelas (Fish, fresh water)
Exposure period	:	96 hour(s)
Unit	:	mg/l
LC50	:	= 20 - 20.9 measured/nominal
LC50,24h	:	= 21.9 - 23.8 measured/nominal
LC50,48h	:	= 21.2 - 23.1 measured/nominal
LC50,72h	:	= 20 - 20.8 measured/nominal
Limit test	:	
Analytical monitoring	:	yes
Method	:	other
Year	:	1983
GLP	:	no data
Test substance	:	other TS
Method	:	U.S. EPA The committee on methods for toxicity tests with aquatic organisms: Methods for acute toxicity tests with fish, macroinvertebrates and amphibians. Ecological Research Series (EPA-660/3-75-009), 61 pp., 1975.
Result	:	LC50 96h = 20.4 mg/l 95% confidence limit : 20-20.9
Test condition	:	Test animals: laboratory- reared fathead minnows, 30 to 35 days old. The rearing water was the same as the diluent water (temperature : 25 +-2 °C) Fish in the rearing tanks were fed live brine shrimp nauplii in excess until 12 to 24 h before testing, then not fed during the exposure period. - Unfiltered Lake Superior water was the source of dilution water. - total hardness : 45.1 (45.0 - 45.5) mg/l CaCO3 - total alkalinity : 41.8 (35.6- 43.4) mg/l CaCO3 - pH 6.7 - 7.6 - dissolved O2 : 8 (mean) mg/l (7.6 - 9.2) - 5 concentrations and a control, in duplicate chemical methods : The substance was analyzed by gaz chromatography with an electron capture detector. statistical method : Trimmed Spearman-Karber method for estimating median lethal concentration (Hamilton et al 1977)
Test substance	:	purchased from Aldrich Chemical Company purity > 95%
Reliability Flag	:	(1) valid without restriction
11.09.2001	:	Critical study for SIDS endpoint
Type	:	semistatic
Species	:	Oryzias latipes (Fish, fresh water)
Exposure period	:	48 hour(s)
Unit	:	mg/l
LC50	:	= 31
Limit test	:	
Analytical monitoring	:	no data

(48)

4. ECOTOXICITY

ID: 79-34-5

DATE: 09.08.2002

Method : other
Year : 1992
GLP : no data
Test substance : no data

Method : - Test method: In accordance with Japanese Industrial Standard (JIS K 0102-1986-71) titled "Testing methods for industrial waste water".

- Static system or semi-static system (Removal of test water at every 8-16 h)
 - The 48 h LC50 value was estimated by Doudoroff method or Probit method

- Fish were reared in an acclimatization tank according to flow-trough system at temperature of 25±2 °C for about 28 days. During the period, abnormal fish were removed.

- Dilution water : underground water pumped up from the ground of Kurume Research laboratories.
 Water temperature, pH and dissolved oxygen were continuously measured.
 The quality of dilution water used for the test was confirmed to meet the ministerial ordinance of Ministry of Health and Welfare (August 31, 1978) in total hardness and evaporated residue.
 The other items was confirmed to meet the water quality criteria for fisheries (Shadanhosin Nihon Suisansigen Hogokyokai, March 1983).

test solution : preparation not described
 no information on tested concentration
 Test tank : round glass vessel
 Volume of test water : 4l/level
 Temperature : 25±2 °C
 Number of fish : 10 fish/level
 No information on oxygen content, pH during testing
 No indication on the protocol used : static or semi-static

Study considered not valid because of this lack of information.

Reliability : (1) valid without restriction
 14.09.2001

(49)

Type : flow through
Species : Jordanella floridae (Fish, fresh water)
Exposure period : 96 hour(s)
Unit : mg/l
LC50 : = 18.5 measured/nominal
LC50, 24 h : = 21.26 measured/nominal
LC50, 48 h : = 18.99 measured/nominal
LC50, 72 h : = 18.48 measured/nominal
Limit test :
Analytical monitoring : yes
Method : other
Year : 1991
GLP : no data
Test substance : no data

Method : - U.S.EPA: The committee on methods for toxicity tests with aquatic organisms: Methods for acute toxicity

	tests with fish, macroinvertebrates and amphibians. Ecological Research Series (EPA-660/3-75-009), 61 pp.;, 1975.	
Result	: - Statistical methods : Spearman-Karber method (Hamilton et al, 1977) : - Result of static tests (nominal concentrations) : LC50, 96h = 26.8 mg/l ; 95% CL : 21.3 -33.7	
Test condition	: - In the flow-through test, the % of measured /nominal was 81-95. : - Dilution water : dechlorinated Lake Superior water : - Temperature : 25+-2°C : - The photoperiod consisted of 16 h of wide-spectrum lighting and 15 min of simulated dawn/dusk with low-level incandescent light. : - Laboratory-reared juvenile (2-4 month) flagfish were used. Fish were not fed during the test. : - The static-renewal tests were conducted in glass aquaria (3 l) Five or six duplicate, nominal concentrations of the test solution were prepared in a logarithmic serie and renewed every 24 h. Five juvenil flagfish were placed in each aquarium and mortality observed at 24, 48, 72 and 96 h. Flow-through tests were conducted with the apparatus described by Smith et al, 1977. Five or six duplicate, logarithmically distributed concentrations of the test solution were used in 30 l aquaria. Fresh solutions were added at a rate of 6 l/h. Each aquarium was sampled at least 3 times to determine the concentrations of the test solutions. 10 juvenile flagfish were placed in each aquarium and mortality observed at 12, 24, 48, 72 and 96 h. : - Aeration was not used in either the static or flow-through tests. However, dissolved oxygen levels were measured at greater than 90% saturation. : - Analytical methods : Solvent extraction followed by gas chromatography analysis.	
Reliability Flag 11.09.2001	: (2) valid with restrictions : Critical study for SIDS endpoint	(50)
Type	: semistatic	
Species	: Poecilia reticulata (Fish, fresh water)	
Exposure period	: 7 day(s)	
Unit	: mg/l	
LC50	: = 36.7	
Limit test	:	
Analytical monitoring	: no	
Method	: other	
Year	: 1981	
GLP	: no data	
Test substance	: no data	
Test condition	: - Test species : guppies (Poecilia reticulata) 2-3 month old. Each vessel (1.5 l) was filled with 1 l of standard water	

prepared according to Alabaster and Abram (1964) (Hardness: 25 mg/l CaCO₃) and covered with glass.
100 µl of stock solution was added per liter.
-The concentrations increased in geometrical progression with a ratio of 1.8 to 3.2.
-8 guppies were tested at each concentration.
The test solution was renewed daily and the guppies were fed 0.5 h before with a commercial fish food.
-Dissolved Oxygen: > 5mg/l
-Temperature: 22 degree C
LC50's were calculated according to Litchfield and Wilcoxon (1949)

Reliability : (2) valid with restrictions (51)
11.09.2001

Type : static
Species : Cyprinodon variegatus (Fish, estuary, marine)
Exposure period : 96 hour(s)
Unit : mg/l
NOEC : < 8.8
LC50 : = 4.7 - 32
LC50, 24h : = 14 - 120
LC50, 48 h : = 12 - 20
LC50, 72 h : = 5.1 - 33
Limit test :
Analytical monitoring : no
Method : other
Year : 1981
GLP : no data
Test substance : other TS

Method : - U.S.EPA: The committee on methods for toxicity tests with aquatic organisms: Methods for acute toxicity tests with fish, macroinvertebrates and amphibians. Ecological Research Series (EPA-660/3-75-009), 61 pp., 1975.

Remark : Type of water : Salt water
Result : LC50,96h = 12 mg/l
95% limit : 4.7 - 32 mg/l

Test condition : Test species : Juvenile sheepshead minnows, 8-15 mm length.
Fish were maintained in laboratory in flowing, filtered seawater of ambient salinity from 10-31 0/00 and temperature from 25-31 °C.
Fish were fed 24 h Artemia salina nauplii daily until there were used as test animals.

Tests were conducted in either 4 l glass jars containing 3 l of test solution or 19 l glass jars containing 15 l.
All dilution water was filtered (5 µm) natural seawater of ambient salinity.
10 fish were tested per container. There were no aeration.

The dissolved oxygen concentration was measured in each test container at initiation of testing and daily thereafter. pH was measured in the control and low and high test concentrations at the initiation and after 96 h of testing.

control mortality < 10 %

LC 50 calculations were performed according to Stephan, C.E (1977,1978).

4. ECOTOXICITY

ID: 79-34-5

DATE: 09.08.2002

Test substance	: purity > 80%	
Reliability	: (3) invalid	
	unmeasured concentration, open vessels.	
11.09.2001		(52)
Type	: static	
Species	: Lepomis macrochirus (Fish, fresh water)	
Exposure period	: 96 hour(s)	
Unit	: mg/l	
LC50	: = 20 - 22	
Limit test	:	
Analytical monitoring	: no	
Method	: other	
Year	: 1981	
GLP	: no data	
Test substance	: other TS: >= 80%	
Method	: - U.S.EPA: The committee on methods for toxicity tests with aquatic organisms: Methods for acute toxicity tests with fish, macroinvertebrates and amphibians. Ecological Research Series (EPA-660/3-75-009), 61 pp., 1975.	
	- Statistical methods : The LC50 and 95% confidence intervals were calculated where possible, by the moving average angle method (Harris, 1959). The nominal concentrations are transformed to logarithms and corresponding % mortalities to angles. Each group of these successive angles was then averaged and the LC50 was estimated by linear interpolation between the successive concentrations whose average angles bracketed 45°. When the test did not meet Harris' method requirements, the LC50 were calculated by the log probit method.	
Test condition	: Test animals were young of the year bluegill, wet weight ranging from 0.32-1.2 g. Each test population was held in a separate tank receiving well-water at a minimum flow rate of 4 volume replacements per day. Chemical and physical characteristics of the well-water were measured weekly:	
	- total hardness : 28-44 mg/l CaCO ₃ ,	
	- total alkalinity : 20-30 mg/l CaCO ₃ ,	
	- pH 6.4-7.4,	
	- dissolved O ₂ : 5.3-7.0 mg/l,	
	- specific conductance : 95-170 µmhos/cm,	
	- temperature : 20-24°C.	
	To control volatilization, the test jars were capped.	
	Dilution water used to prepare the test solutions was deionized water reconstituted according to the procedure US EPA 1975.	
	- Water hardness: 32-48 mg/l CaCO ₃	
	- Water alkalinity: 28-34 mg/l CaCO ₃	
	- pH: 6.7-7.8	
	- Dissolved oxygen: 7.0-8.8 mg/l	
	Ten fish were added to each test jar. The pH and dissolved oxygen concentration of test solution were measured at 0 and 96 h.	
Reliability	: (3) invalid	

11.09.2001 unmeasured concentrations.
Static assay. (53)

4.2 ACUTE TOXICITY TO AQUATIC INVERTEBRATES

Type : static
Species : Daphnia magna (Crustacea)
Exposure period : 48 hour(s)
Unit : mg/l
EC50 : = 23
Analytical monitoring : yes
Method : other
Year : 1983
GLP : no data
Test substance : other TS: Aldrich Chemical Co, purity from 95 to 99%

Remark : - Method: ASTM, (1980).Standard practice for conducting acute toxicity tests with fishes, macroinvertebrates and amphibians.ASTM Standard E 729-80, 1.Philadelphia, PA:American Society for Testing and Materials.

Result : Acute toxicity values calculated were the median effective concentration (EC) based on complete immobilization and the median lethal concentration (LC) based on death as defined by cessation of heart beat and gut movement.
 Immobilization and death were determined by microscopic examination with a 30* dissection scope.

Values of EC50 (immobilization) and of LC50 (lethality) are given for fed and unfed daphnia with 95% confidence limits:

	Unfed	Fed
EC50	23.0 (16.3-34.5) mg/l	25.2 (22.2-28.2) mg/l
LC50	62.1 (55.9-70.7) mg/l	56.9 (49.9-66.3) mg/l

Test condition : No mortality was observed among controls.
 Test organisms:
 Adults daphnids were obtained from laboratory stock reared at the US EPA,Duluth, MN.
 Brood cultures of 25 animals in 11 beakers were maintained by renewing food (30 mg/l dry wt), a slurry of trout chow and yeast and water 3 times a week.
 - less than 24h old daphnids collected from brood animals approximately 3 weeks old were used during the test

Test conditions

- Stock solutions were prepared by saturating Lake Superior water with the test substance on a magnetic stirrer plate

- test temperature : 20°C + 1°C

- exposure vessel type : 200 ml Erlenmeyer flasks filled with 200 or 160 ml for unfed and fed tests, respectively.

Flasks were stoppered with foil wrapped, neoprene stoppers.

- dilution water source : Lake Superior water passed through a 5µ fiber filter, heated to 20°C and aerated with filtered air.
- Hardness: 44.7 CaCO₃ mg/l
- Alkalinity: 41.5 CaCO₃ mg/l
- Dissolved oxygen and pH: from 7.9 to 9.9 mg/l O₂ and 7.1 to 7.7, for unfed acute tests
from 4.1 to 8.4 mg/l O₂ and 7.0 to 7.5 for fed acute tests

lighting :16h light/8H dark photoperiod coupled with a 15 min. transition period.

test design :
4 replicates with 5 animals each were used for the control and 6 toxicant levels

The 48 h median effective concentration based on immobilisation and the median lethal concentration based on death were derived by the measured mean toxicant concentrations (average of initial and final test solution concentrations) and were calculated by probit (Stephan 1977)

Reliability Flag : (1) valid without restriction
12.09.2001 : Directive 67/548/EEC, Critical study for SIDS endpoint

(54)

Type : static
Species : Daphnia magna (Crustacea)
Exposure period : 48 hour(s)
Unit : mg/l
LC50 : = 6.8 - 13
LC50, 24h : = 14 - 26
LC0 : < 1.7
Analytical monitoring : no
Method : other
Year : 1980
GLP : no data
Test substance : other TS: purity >= 80 %

Remark : - Method: U.S. EPA: Methods for acute toxicity tests with fish, macroinvertebrates and amphibians. Ecological Research Series (EPA-660/3-75-009), 61 pp, 1975.

Test condition : - Daphnia magna are < 24h old
- Temperature : 22±1°C
- Hardness: 173 mg/l CaCO₃
- pH = 7.4 - 9.4
- Dissolved O₂: 6.5 - 9.1 mg/l in 48h exposure period

The chemical was added to 500 ml of diluent water in 2 l jars.

The 500 ml volume of test solution was divided into three 150 ml aliquots in 250 ml beakers to provide triplicate exposures. The remaining 50 ml of control, high, middle and low test concentrations were used to measure the 0-hour dissolved O₂ concentration and pH of the solutions. Five daphnids were placed in each 150 ml test solution within 30 minutes of the solution preparation. 15 daphnids were placed directly into the 2 l jars containing diluent water prior to addition of the test

material.

The tests were also conducted in unreplicated 500 ml solutions containing 15 daphnids if dividing the solution into triplicate test vessels presented a risk of the loss of the test substance through volatilization.

In addition, these vessels were covered with plastic wrap secured with an elastic band.

A negative control consisting of the same dilution water, test conditions and test organisms, but without test substance was maintained concurrently with each test.

the dissolved oxygen concentration, pH and temperature of test solutions were measured at the initiation and termination of the toxicity test in the high, middle and low test concentrations and controls. These parameters were only measured at the end of an exposure if a potential loss of the test substance existed due to volatilization.

Observations of test populations were made a 24 and 48 h of exposure and any mortalities were recorded.

Mortality among water flea control populations never exceeded 10% in any test.

Reliability
14.09.2001

: (2) valid with restrictions

(55)

Type
Species
Exposure period
Unit
Method
Year
GLP
Test substance

: other
: Daphnia magna (Crustacea)
:
:
:
: 1995
:
: other TS: Chem syn, purity >86%

Remark

: This study examines the hypothesis that exposure of Daphnia magna to sublethal levels of the test substance may affect subsequent sensitivity of the animals.
Prior exposure (24 h) of daphnia to sublethal level of 1,1,2,2-tetrachloroethane had no effect on their sensitivity to effective levels of this chemical.
Effective burden (24 h exposure) was independent of the sublethal body burden .

Reliability
10.09.2001

: (4) not assignable

(56)

Type
Species
Exposure period
Unit
EC50
EC50,24 h
EC50,48h
EC50,72h
Analytical monitoring
Method
Year
GLP
Test substance

:
: Mysidopsis bahia (Crustacea)
: 96 hour(s)
: mg/l
: = 7.71 - 11
: = 10.7 - 13.7
: = 9.74 - 12.4
: = 8.2 - 11.12
: no data
: other
: 1978
: no
: no data

4. ECOTOXICITY

ID: 79-34-5

DATE: 09.08.2002

Method : - Method: U.S. EPA: Methods for acute toxicity tests with fish, macroinvertebrates and amphibians. Ecological Research Series (EPA-660/3-75-009), 61 pp, 1975.

Reliability : (4) not assignable
10.09.2001

(57)

4.3 TOXICITY TO AQUATIC PLANTS E.G. ALGAE

Species : Scenedesmus subspicatus (Algae)
Endpoint : biomass
Exposure period : 72 hour(s)
Unit : mg/l
EC50 : = 47
Method : OECD Guide-line 201 "Algae, Growth Inhibition Test"
Year : 1995
GLP : no data
Test substance : other TS: Aldrich, purity >= 98%

Result : The high reproducibility of the closed vessel tests were demonstrated.

The cell density in the control cultures increased by a factor > 16 within 3 days.

Comparison of EC50 values for 1,1,2,2-tetrachloroethane in open and closed vessels :

	open	closed
EC50 (ppm)	50	47
EC10 (ppm)	12.72	9.80

Test condition : The algae were cultured and the test performed according to the guidelines with some modification due to the volatility of the test substance.

500 ml flasks were fitted with cuvettes connected to glass tubes (diameter 10 mm) inserted into the flask through a silicon screw cap with teflon seal.

The flasks with nutrient solution were aerated prior the test begin 10 minutes with air containing 3% CO₂ as carbon source.

After adding the alga solution to the various amounts of the tests compounds, the flasks were immediately closed as describes above (closed vessels) or with a screw cap (open vessels).

Alga concentrations in the closed vessel were measured by turning the whole test equipment upside down and insering the cuvettes into the path of light of the spectrophotometer.

The test flask now on top of the spectrophotometer was then covered with a black box to prevent light from entering with measurement.

Measurements from the open vessel were done using open cuvettes.

Measurements were carried out once every day at the same time.

4. ECOTOXICITY

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Concentrations were measured at the beginning of the test
 No measurement at the end of the test

Reliability : (2) valid with restrictions
Flag : Critical study for SIDS endpoint
 11.09.2001 (58)

Species : Selenastrum capricornutum (Algae)
Endpoint :
Exposure period : 72 hour(s)
Unit : mg/l
EC50 : = 76.9
EC50,48 h : = 73.4
NOEC, 96 h : < 10
Limit test :
Analytical monitoring : no
Method :
Year : 1978
GLP : no
Test substance : no data

Remark : Publication not available.
Reliability : (4) not assignable
 10.09.2001 (59)

Species : Selenastrum capricornutum (Algae)
Endpoint :
Exposure period : 96 hour(s)
Unit : mg/l
EC50 : = 136
Method :
Year : 1978
GLP : no
Test substance : no data

Method : US EPA.The selenastrum capricornutum Printz Algal Assay
 Bottle Test.EPA 600/9-78-018 (July 1978).
Reliability : (4) not assignable
 10.09.2001 (57)

Species : Skeletonema costatum (Algae)
Endpoint :
Exposure period : 96 hour(s)
Unit : mg/l
EC50 : = 6.44
Method :
Year : 1978
GLP :
Test substance : no data
 10.09.2001 (57)

4.4 TOXICITY TO MICROORGANISMS E.G. BACTERIA

Type : aquatic
Species : other bacteria
Exposure period :
Unit :
Analytical monitoring : no data
Method : other

Year : 1991
GLP : no data
Test substance : no data

Method : All tests were carried out in sealed 125 ml serum bottles (except for Microtox test) to prevent the loss of volatile chemicals.
Experimental methods allowed the partitioning of the toxicants between the gas and liquid phase. For sealed serum bottles, this partitioning could be quantified using Henry's law constants and the relative volumes of gas and liquid. The equilibrium concentration in the liquid phase was used as the EC50.

- Nitrosomonas
Measure of activity : Ammonia use
Bacteria : 450 mg/l
pH : 6.5-8.0
Atmosphere : N₂/O₂ = 1.6/1
Temperature 25°C
Vessel : 125 ml serum bottle
Liquid volume : 50 ml
Shaking : yes
Data collection times : 24 h

The seed bacteria for the nitrifying enrichment culture was obtained from the mixed liquor of an activated sludge plant.

- Methanogens
Measure of activity : Gas production
Bacteria : 900 mg/l
pH : 7
Atmosphere : N₂/CO₂ = 2/1
Temperature : 35°C
Vessel : 125 ml serum bottle
Liquid volume : 50 ml
Shaking : no
Data collection times : 24, 72, 96 h

Anaerobic toxicity assays were conducted using an enrichment culture. The 400 l mix reactor was operated at 35°C. It was fed acetate (50g/l) as a sole organic carbon source in a buffered inorganic nutrient solution once per day.

- Aerobic heterotrophs
Measure of activity : Oxygen consumption
Bacteria : 200-1800 mg/l
pH : 7
Atmosphere : N₂/O₂ = 1/1
Temperature : 25°C and 35°C
Vessel : 125 ml serum bottle
Liquid volume : 25 ml
Shaking : yes
Data collection times : 15, 27, 38, 49h

Seed bacteria were obtained from the mixed liquor of an activated sludge wastewater treatment plant.

- Microtox test
Measure of activity : Bioluminescence
Bacteria : 900 mg/l

pH : 6.5-7.5
 Atmosphere : atmosphere
 Temperature : 15°C
 Vessel : open cuvettes
 Liquid volume : 1 ml
 Shaking : no
 Data collection times : 5 minutes

The test is based on the bioluminescence of *Photobacterium phosphoreum*.

Remark : - Method: described in Blum and Speece, 1991. A database of chemical toxicity to environmental bacteria and its use in interspecies comparisons and correlations. *J. Water Pollut. Control Fed.*, 63, 198-207.

Result : - *Nitrosomonas* sp.
 EC50, 24 h = 1.43 mg/l

- Methanogens
 EC50, 24 h = 4.42 mg/l

- Aerobic heterotrophs
 EC50, 24 h = 127.3 mg/l

- *Photobacterium phosphoreum*
 EC50, 5 min = 5.43 mg/l

10.09.2001

(60)

Type : aquatic
Species : *Photobacterium phosphoreum* (Bacteria)
Exposure period : 5 minute(s)
Unit : mg/l
EC50 : = 8.6
Analytical monitoring : yes
Method : other
Year : 1982
GLP : no data
Test substance : no data

Remark : - Method: described by: Beckman Instruments, Inc., Operating instructions Microtox toxicity analyser model 2055. Interim manual 110679. Microbics operations, Carlsbad, Calif., 1979.

10.09.2001

(61)

4.5.1 CHRONIC TOXICITY TO FISH

Species : *Jordanella floridae* (Fish, fresh water)
Endpoint : other
Exposure period : 10 day(s)
Unit : mg/l
NOEC : = 4.9 calculated
LOEC : = 10.6 calculated
Analytical monitoring : yes
Method : other
Year : 1991
GLP : no data
Test substance : no data

Method : The methods employed were similar to the early life stage (ELS) toxicity test developed for the fathead minnow (Benoit

Result

et al, 1982. Environ. Pollut. , 28A, 189-197).

: 1,1,2,2-Tetrachloroethane (mean +- sd, mg/l)

	Control	1.807	3.284	4.931	10.597*	22.016
		+0.166	+0.387	+2.562	+1.256	+2.550
Hatchability %	100	97	97	97	100	100
10-day survival %	100	86	91	86	53	4
	Control	2.241	3.749	6.147	11.663*	15.819
		+0.344	+0.755	+1.094	+1.630	+4.341
28-day survival%	62	76	74	60	14	0
Weight mg	29.0	38.3	30.5	26.3	79.2	
	+24.6	+36.7	+36.7	+20.3	+48.9	

* P<0.01

Hatching success and survival parameters were analyzed using Lee-Desu statistic (1972) to determine which exposure level differed significantly from control. A difference was considered statistically significant when P < 0.01.

Based on this statistical analyses, the measured NOEC and LOEC for reduced 10 day larval survival are 4.9mg/l and 10.6 mg/l respectively. For 28 day juvenile survival the measured NOEC and LOEC are 6.15 and 11.7 mg/l respectively.

The estimated maximum acceptable concentration defined as the geometric mean of the LOEC and NOEC (4.9 mg/l) was 7.2 mg/l for reduced 10 day larval survival and 8.45 for 28 day juvenile survival.

Test condition

- : - Dilution water : dechlorinated Lake Superior water
- Temperature : 25+-1°C

Flow-through tests were conducted with the apparatus described by Smith et al, 1977.

Five duplicate, logarithmically distributed concentrations of the test solution were used in 30 l aquaria.

Fresh solutions were added at a rate of 6 l/h.

- Aeration was not used , however, dissolved oxygen levels were measured at greater than 90% saturation.

- Water samples were analyzed 5 days per week throughout the 28-day exposure period.

- The fish were added after stable chemical concentrations were attained (48 to 72 h after dosing commenced).

- Two age groups of flagfish were used :
embryo/larval fish, with data collected on hatching and 10-day larval survival
2 week old fry with data generated on survival and growth over 28 days.

- The embryo/larval tests began with 50 fertilized eggs (25 per duplicate) at each test concentration and the two controls. Eggs were <24 h old.

After hatching, the larvae were transferred to fry retainers and held for a 10-day, post-hatch exposure period.
Observations on both egg and fish mortality were recorded daily.

- The 28-day survival and growth test commenced with 50 fry (one week old) per test level and the controls.
Duplicate exposures were used (25 fish per duplicate). Observations on mortality were recorded daily.

- The growth parameter employed was the final weight after 28 days toxicant exposure.

- Analytical methods : Solvent extraction followed by gas chromatography analysis.

Reliability
10.09.2001

: (2) valid with restrictions

(62)

Species
Endpoint
Exposure period
Unit
NOEC
LOEC
Method
Year
GLP
Test substance

: Pimephales promelas (Fish, fresh water)
: weight of young fish
: 32 day(s)
: mg/l
: = 1.4
: = 4
: other
: 1985
: no data
: other TS: 98-99% purity

Method

: Referred to :
BENOIT, D.A. et al, 1982. A fathead minnow (Pimephales promelas) early life stage toxicity test method evaluation and exposure to four organic chemicals. J. Environ. Pollut.

Remark

: An early-life -stage test (ELST) was performed with 24-hour old fathead minnow eggs (Pimephales promelas), which extended beyond the larval stage to that of young fish.

Result

: Mean conc. % survival mean individual
(mg/l) wet weight (mg)

0.012 (control)	95	191
1.4	100	186
4.0	95	150
6.8	95	144
13.7	12.5	25
28.4	0	0

Test condition

: The early life stage (ELS) fish toxicity test was performed in a compact continuous flow mini-diluter exposure system which delivers 3 liters of test water per hour to each of 5 concentrations plus a control.
All tests were conducted with this apparatus.

- Lake Superior water was the source of dilution water.
- total hardness : 45 mg/l CaCO₃
- total alkalinity : 42 mg/l CaCO₃
- pH 7.4 (mean)
- dissolved O₂ : 7 (mean) mg/l

chemical methods :

The substance was analyzed by gaz chromatography with an electron capture detector.
Reliability : (1) valid without restriction (63)
 11.09.2001

Species : Oryzias latipes (Fish, fresh water)
Endpoint :
Exposure period : 90 day(s)
Unit : mg/l
Analytical monitoring : yes
Method : other
Year : 1989
GLP : no
Test substance : no data

Method : Flow through test as described by Walker et al.(1985) :

Exposure methodology

The exposure system is schematically represented in Fig. 1, and portions are photographed as Figs 2 -6. To maintain consistent concentrations of these materials successfully throughout an extended test period, a stable supply of concentrated stock was necessary for subsequent addition to exposure aquaria. The toxicant reservoir consisted of three serially connected sealed 45.41 pyrex carboys (Fig. 3). Test chemicals and test water were added to each carboy, and the contents magnetically stirred. Whereas such a system should produce a stable stock concentration at or near the saturation limit intrinsic to the test compound, an equilibrium somewhat below this theoretical maximum was typically achieved. Concentrations of all test chemicals increased as the rate of withdrawal of dissolved material decreased. To initiate a test, toxicant-laden water was withdrawn from the nearest, or dispensing, carboy in the three-carboy series by precision liquid dispensing syringe pumps (PLD-II, Hamilton Company, Reno, NV, Figs 3 and 5) and delivered through microbore tubing to each of six appropriate mixing chambers (Figs 4-6). As stock solution was removed from the dispensing carboy, an equal volume of toxicant free water from the water reservoir was added to the farthest carboy in the series. Toxicant concentration in all carboys was determined periodically throughout each 28-day exposure period and additional toxicant added as needed. Toxicant-free water entered the system by gravity .. flow from an elevated water reservoir through a solenoid controlled valve, filling a seven -compartment water partitioner (Fig. 4) similar to that described by Schimmel et al. (1974). Float switches within the water partitioner activated a programmable laboratory controller (Iddec PLE-30R, Industrial Electric Supply Co., Birmingham, AL; Fig. 5) which in turn activated the series of PLD injectors. All injectors drew from the dispensing carboy but received different instructions from the controller regarding number of injections per cycle. The flow of diluent water into the water partitioner is variable by design to provide a range of cycling times. For these evaluations, cycling time was usually 30-40 min, providing a minimum of six volume additions per 24 h in each treatment and control aquarium.. Furthermore, syringe size and distance of plunger withdrawal can be varied, thereby facilitating introduction of a wide

variety of toxicant masses and hence test concentrations. Toxicant-laden and unamended water converged in a 20.5 x 10.8 x 8.5 cm mixing chamber, shown in exploded fashion in Fig. 7. To minimize volatilization through atmospheric contact, toxicant was delivered through 1 mm 1D Teflon[®] or polyethylene tubing below the surface of the 1.5 cm residual fluid level within each mixing chamber and then mixed by the turbulence of incoming diluent water. The mixing chamber emptied by a self-starting siphon into the 12.5 x 12.0 x 22.0 cm splitter box at a rate of 500 ml/cycle (±5%), which, in turn, emptied through standpipes to four 20 x 23 x 10 cm replicate exposure aquaria. Fish were contained in meshed chambers (10 cm ID petri dishes, each with a 9 cm high nylon mesh collar; Fig. 6) within treatment aquaria. Treatment aquaria filled to a depth of 8 cm, at which time toxicant-laden water discharged through self-starting siphons to a depth of 1 cm. Contaminated effluent filtered through activated carbon (Filtersorb 400, Calgon Corp., Houston, TX) before being pumped into one of two evaporative ponds. Mixing chambers, splitter boxes, and treatment aquaria, all constructed of glass and silicone cement, were housed within a 341.6 cm long by 92.7 cm wide by 53.3 cm high resin-coated plywood exposure chamber covered with a pitched top, 343 cm high along its center (Fig. 2). Ingress and egress was accomplished through capped ports, and manipulation of materials within the chamber was through eight gloved ports along each side of the chamber. Treatment aquaria were housed within a central water bath maintained at 27 ± 1 °C in a 12 :12 h light : dark regimen. The exposure chamber was maintained at a slight negative pressure by exhaust fans which also served to draw incoming air and remove gaseous toxicants through carbon filters (BPL activated carbon, 12 x 30 mesh, Calgon Corp., Houston, TX). Fish were observed periodically each day throughout the exposure period, and dead fish were removed and recorded upon discovery. Toxicant concentrations were monitored two or three times each week throughout each exposure period.

Result

: Results of histopathological examination are summarized below

Exposure group	24 wk	36 wk	52 wk
Aquarium control	0/73	1/71	NE
Flow through control	1?/72	NE	NE
Low 4 TeCE	NE	NE	NE
Intermediate 8 TeCE	0/42	NE	NE
Intermediate 13 TeCE	0/75	1/74	1*/102

* indicates a cholangiocellular lesion
NE : not examined

Because significant incidences of neoplasms were not seen in the high exposure group only one control group or group exposed to lower TeCE were examined.

Test condition

: TeCE is not carcinogenic to the medaka
: Three hundred 6 day old fry (medaka) were utilized.

Tests specimens were allotted to the following treatment groups:

1 - Aquarium control group (situated outside the exposure

system)
2 - Flow through control group(situated inside the exposure system and thus subject to low levels of volatile test compounds)
3- Low concentration exposure group (continuous 1,1,2,2-tetrachloroethane(TeCE) exposure for 90 days)
4- Intermediate concentration exposure group (intermittent TeCE exposure administered once weekly for 24 hours throughout the 90 days exposure period)
5- high concentration exposure group (intermittent TeCE exposure administered once weekly for 24 hours throughout the 90 days exposure period)

About 100 specimens from each treatment group were sampled for histopathological examination at 24, 36 and 52 weeks post initial exposure.

TeCE concentrations were measured by electron-capture gas chromatography.

Average concentrations of TeCE in treatment groups of guppy

treatment group	TeCE concentrations mg/l
Aquarium control	not detected
Flow through control	0.024 +- 0.015
Low concentration	3.970 +- 1.350
Intermediate concentration	7.760 +- 0.350
High concentration	13.93 +- 1.260

> 92% of each species of each treatment group survived to grow out.

Histopathological examination of three whole specimens from each treatment group taken at the end of the 90-day exposure did not reveal any toxicant-related pathological effects

Attached document

- : Walkerfig1.doc
- : Walkerfig2-6.doc
- : Walkerfig7.doc
- : (2) valid with restrictions

Reliability
10.09.2001

(64)

- Species** : Poecilia reticulata (Fish, fresh water)
- Endpoint** :
- Exposure period** : 90 day(s)
- Unit** : mg/l
- Analytical monitoring** : yes
- Method** : other
- Year** : 1989
- GLP** : no
- Test substance** : no data

Method : Flow through test as described by Walker et al.(1985) :

Exposure methodology

The exposure system is schematically represented in Fig. 1, and portions are photographed as Figs 2-6. To maintain consistent concentrations of these materials successfully throughout an extended test period, a stable supply of concentrated stock was necessary for subsequent addition to

exposure aquaria. The toxicant reservoir consisted of three serially connected sealed 45.41 pyrex carboys (Fig. 3). Test chemicals and test water were added to each carboy, and the contents magnetically stirred. Whereas such a system should produce a stable stock concentration at or near the saturation limit intrinsic to the test compound, an equilibrium somewhat below this theoretical maximum was typically achieved. Concentrations of all test chemicals increased as the rate of withdrawal of dissolved material decreased. To initiate a test, toxicant-laden water was withdrawn from the nearest, or dispensing, carboy in the three-carboy series by precision liquid dispensing syringe pumps (PLD-II, Hamilton Company, Reno, NV, Figs 3 and 5) and delivered through microbore tubing to each of six appropriate mixing chambers (Figs 4-6). As stock solution was removed from the dispensing carboy, an equal volume of toxicant free water from the water reservoir was added to the farthest carboy in the series. Toxicant concentration in all carboys was determined periodically throughout each 28-day exposure period and additional toxicant added as needed. Toxicant-free water entered the system by gravity flow from an elevated water reservoir through a solenoid controlled valve, filling a seven-compartment water partitioner (Fig. 4) similar to that described by Schimmel et al. (1974). Float switches within the water partitioner activated a programmable laboratory controller (Idec PLE-30R, Industrial Electric Supply Co., Birmingham, AL; Fig. 5) which in turn activated the series of PLD injectors. All injectors drew from the dispensing carboy but received different instructions from the controller regarding number of injections per cycle. The flow of diluent water into the water partitioner is variable by design to provide a range of cycling times. For these evaluations, cycling time was usually 30-40 min, providing a minimum of six volume additions per 24 h in each treatment and control aquarium. Furthermore, syringe size and distance of plunger withdrawal can be varied, thereby facilitating introduction of a wide variety of toxicant masses and hence test concentrations. Toxicant-laden and unamended water converged in a 20.5 x 10.8 x 8.5 cm mixing chamber, shown in exploded fashion in Fig. 7. To minimize volatilization through atmospheric contact, toxicant was delivered through 1 mm 1D Teflon₂ or polyethylene tubing below the surface of the 1.5 cm residual fluid level within each mixing chamber and then mixed by the turbulence of incoming diluent water. The mixing chamber emptied by a self-starting siphon into the 12.5 x 12.0 x 22.0 cm splitter box at a rate of 500 ml/cycle ($\pm 5\%$), which, in turn, emptied through standpipes to four 20 x 23 x 10 cm replicate exposure aquaria. Fish were contained in meshed chambers (10 cm ID petri dishes, each with a 9 cm high nylon mesh collar; Fig. 6) within treatment aquaria. Treatment aquaria filled to a depth of 8 cm, at which time toxicant-laden water discharged through self-starting siphons to a depth of 1 cm. Contaminated effluent filtered through activated carbon (Filtersorb 400, Calgon Corp., Houston, TX) before being pumped into one of two evaporative ponds. Mixing chambers, splitter boxes, and treatment aquaria, all constructed of glass and silicone cement, were housed within a 341.6 cm long by 92.7 cm wide by 53.3 cm high resin-coated plywood exposure chamber covered with a pitched top, 343 cm high along its center (Fig. 2). Ingress and egress was accomplished through capped ports, and

manipulation of materials within the chamber was through eight gloved ports along each side of the chamber. Treatment aquaria were housed within a central water bath maintained at 27 ± 1 °C in a 12 :12 h light : dark regimen. The exposure chamber was maintained at a slight negative pressure by exhaust fans which also served to draw incoming air and remove gaseous toxicants through carbon filters (BPL activated carbon, 12 x 30 mesh, Calgon Corp., Houston, TX). Fish were observed periodically each day throughout the exposure period, and dead fish were removed and recorded upon discovery. Toxicant concentrations were monitored two or three times each week throughout each exposure period.

Result

: Results of histopathological examination are summarized below

Exposure group	24 wk	36 wk	52 wk
Aquarium control	NE	1/74	NE
Flow through control	NE	NE	NE
Low 3.4 TeCE	NE	NE	NE
Intermediate 7 TeCE	NE	NE	NE
Intermediate 13 TeCE	0/76	0/75	2/97

NE : not examined

Because significant incidences of neoplasms were not seen in the high exposure group only one control group or group exposed to lower TeCE were examined.

Test condition

TeCE is not carcinogenic to the guppies.
: Three hundred 2 day old fry (guppy) were used for individual treatments except for the aquarium control group which received only 260 guppies .

Tests specimens were allotted to the following treatment groups:

- 1 - Aquarium control group (situated outside the exposure system)
- 2 - Flow through control group(situated inside the exposure system and thus subject to low levels of volatile test compounds)
- 3- Low concentration exposure group (continuous 1,1,2,2-tetrachloroethane(TeCE) exposure for 90 days)
- 4- Intermediate concentration exposure group (intermittent TeCE exposure administered once weekly for 24 hours throughout the 90 days exposure period)
- 5- high concentration exposure group (intermittent TeCE exposure administered once weekly for 24 hours throughout the 90 days exposure period)

About 100 specimens from each treatment group were sampled for histopathological examination at 24, 36 and 52 weeks post initial exposure.

TeCE concentrations were measured by electron-capture gas chromatography.

Average concentrations of TeCE in treatment groups of guppy

treatment group	TeCE concentrations mg/l
-----------------	-----------------------------

Aquarium control	not detected
Flow through control	0.030 +- 0.017
Low concentration	3.450 +- 1.090
Intermediate concentration	6.930 +- 0.450
High concentration	12.780 +- 1.30

> 92% of each species of each treatment group survived to grow up.

Histopathological examination of three whole specimens from each treatment group taken at the end of the 90-day exposure did not reveal any toxicant-related pathological effects

Attached document : Walkerfig1.doc
Walkerfig2-6.doc
Walkerfig7.doc

Reliability : (2) valid with restrictions
10.09.2001

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4.5.2 CHRONIC TOXICITY TO AQUATIC INVERTEBRATES

Species : Daphnia magna (Crustacea)
Endpoint : reproduction rate
Exposure period : 28 day(s)
Unit : mg/l
NOEC : = 6.9
LCEC : = 14
Analytical monitoring : yes
Method : other
Year : 1983
GLP : no data
Test substance : other TS: Aldrich Chemical Co, purity from 95 to 99%

Remark : - Method: ASTM
COMOTTO, R.: ASTM (American Society for Testing and Materials) proposed standards practice for conducting renewal life cycle toxicity tests with the daphnid Daphnia magna. Draft N°4, Philadelphia, PA: American Society for Testing and Materials, 1978.

Result : Results

chemical concentration mg/l	Number of young produced
0.0 (controls)	162 +- 49
0.42 +- 0.036	84 +- 50
0.86 +- 0.085	69 +- 39
1.7 +- 0.17	71 +- 40
3.4 +- 0.39	78 +- 37
6.9* +- 0.9	78 +- 18
14** +- 1.4	23 +- 5

* NOEC based on reproduction ($P \leq 0.01$)

**LOEC Based on reproduction (significantly different from controls, $P \leq 0.05$)

No data on length of adult

Test condition : Test containers : 200ml erlenmeyer flasks filled to 160 ml.
Each of 7-10 replicate flasks at six test concentrations (geometric series with a 0.5 dilution factor) contained 1 daphnid.

Flasks stoppered with foil wrapped neoprene stoppers
 Toxicant and food solutions were renewed 3 times each week
 Young daphnids were filtered from each flask after transfer
 of the adults, washed onto a watch glass and counted alive
 with an Artec counter.
 Chronic toxicity was determined by reproductive success of
 animals surviving the 28 day test.

Lake superior water
 hardness of water 44.7 (CaCO₃)
 alkalinity : 41.5 (CaCO₃)
 dissolved O₂: from 5.4 to 8.9
 pH : 6.6 to 7.9

Reliability : (1) valid without restriction (54)
 11.09.2001

4.6.1 TOXICITY TO SEDIMENT DWELLING ORGANISMS

4.6.2 TOXICITY TO TERRESTRIAL PLANTS

Remark : Investigations were carried out more than 30 years ago on
 the effects on terrestrial plants, when
 1,1,2,2-tetrachloroethane, a known insect-control fumigant,
 was also under consideration as a plant pesticide for fruit
 orchards. Studies by Gast and Early on various experimental
 plants (cotton, cucumbers, tomatoes, maize, beans) showed
 that a concentration of 0.5 % compound, applied to moist
 soil, had no adverse effect, except in beans, which
 exhibited "slight damage". Ten times that amount caused weak
 to moderate plant damage. The authors did not provide details
 on the toxic effect. (65)
 12.09.2001

4.6.3 TOXICITY TO SOIL DWELLING ORGANISMS

Type : filter paper
Species : Eisenia fetida (Worm (Annelida), soil dwelling)
Endpoint : mortality
Exposure period : 48 hour(s)
Unit : mg/cm² filter paper
LC50 : = 14
Method : OECD Guide-line 207 "Earthworm, Acute Toxicity Test"
Year :
GLP : no data
Test substance : other TS

Test condition : Contact test :
 The glass vials were completely covered with filter paper.
 Soluble organic chemical was applied on moist filter paper
 using distilled water as the solvent.
 One adult earthworm (300-500 mg) was added per vial and the
 vials were kept at 20°C in a darkened incubator for 48 h.
 After 48 h, mortality was determined.
 At least five concentrations were evaluated in the
 definitive test, with 10 or more replicates used for each
 concentration tested. Controls containing no test chemical

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were present in each series of experiments.

The LC50 value was calculated using the method of Litchfield and Wilcoxon (1949).

The LC50 values are reported as μ of test chemical per square centimeter of filter paper.

Test substance : From Aldrich or Eastman or Fisher Scientific Co.
Chemical selected was at least 98% purity.

Reliability : (2) valid with restrictions
10.09.2001

(66)

4.6.4 TOX. TO OTHER NON MAMM. TERR. SPECIES**4.7 BIOLOGICAL EFFECTS MONITORING****4.8 BIOTRANSFORMATION AND KINETICS****4.9 ADDITIONAL REMARKS**

5.0 TOXICOKINETICS, METABOLISM AND DISTRIBUTION**5.1.1 ACUTE ORAL TOXICITY**

Type	:	LD50	
Value	:	= 800 mg/kg bw	
Species	:	rat	
Strain	:	no data	
Sex	:	no data	
Number of animals	:		
Vehicle	:	no data	
Doses	:	no data	
Method	:	other: not specified	
Year	:	1982	
GLP	:	no data	
Test substance	:	as prescribed by 1.1 - 1.4	
Remark	:	Data from handbook : No informations on symptoms . No information on number of animals used in the study.	
Source	:	ATOFINA Paris la Defense EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)	
Reliability	:	(2) valid with restrictions data from handbook or collection data (german BUA collection)	
Flag	:	Critical study for SIDS endpoint	(67)
26.10.2001			
Type	:	LD50	
Value	:	= 250 - 430 mg/kg bw	
Species	:	rat	
Strain	:	other: Carworth-Wistar	
Sex	:	male/female	
Number of animals	:	5	
Vehicle	:	other: corn oil	
Doses	:	no data	
Method	:	other: not specified	
Year	:	1969	
GLP	:	no data	
Test substance	:	as prescribed by 1.1 - 1.4	
Remark	:	No information on symptoms . No information on findings following the 15d observation period.	
Source	:	ATOFINA Paris la Defense EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)	
Reliability	:	(2) valid with restrictions Test procedure in accordance with national standard methods with acceptable restrictions	
Flag	:	Critical study for SIDS endpoint	(68)
26.10.2001			
Type	:	LD50	
Value	:	= 570 mg/kg bw	
Species	:	rat	
Strain	:	no data	
Sex	:	no data	
Number of animals	:		
Vehicle	:	no data	
Doses	:	no data	

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Method	:	other: not specified	
Year	:	1972	
GLP	:	no data	
Test substance	:	as prescribed by 1.1 - 1.4	
Remark	:	Data from handbook : No informations on symptoms . No information on number of animals used in the study.	
Source	:	ATOFINA Paris La Defense, France	
Reliability	:	(2) valid with restrictions data from handbook or collection data (german BUA collection)	
Flag	:	Critical study for SIDS endpoint	
26.10.2001			(69)
Type	:	LD50	
Value	:	= 250 mg/kg bw	
Species	:	rat	
Strain	:	other: albino rats, strain not specified	
Sex	:	no data	
Number of animals	:	10	
Vehicle	:	peanut oil	
Doses	:	no data	
Method	:	other: not specified	
Year	:	1977	
GLP	:	no data	
Test substance	:	as prescribed by 1.1 - 1.4	
Remark	:	No data were presented on acute toxicity results. Basis for the selection of 250 mg/kg called "LD50" were not presented. No reference was given for the origin of the 250 mg/kg value. In the study only the single dose of 250 mg/kg was used. No information on symptoms was presented	
Source	:	ATOFINA Paris la Defense EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)	
Reliability	:	(3) invalid significant methodological deficiencies	
Flag	:	Critical study for SIDS endpoint	
26.10.2001			(70)
Type	:	LDLo	
Value	:	= 479 mg/kg bw	
Species	:	dog	
Strain	:	no data	
Sex	:	no data	
Number of animals	:		
Vehicle	:	no data	
Doses	:	no data	
Method	:	other: not specified	
Year	:	1932	
GLP	:	no	
Test substance	:	as prescribed by 1.1 - 1.4	
Remark	:	Data from handbook. No details available on the original study which was published in year 1932 except the following : Liver toxicity; behavioral depressing effects.	
Source	:	ATOFINA Paris la Defense, France EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)	
Reliability	:	(2) valid with restrictions data from handbook or collection data (german BUA collection)	
26.10.2001			(71)

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5.1.2 ACUTE INHALATION TOXICITY

Type : LC50
Value : = 8.6 mg/l
Species : rat
Strain : no data
Sex : no data
Number of animals :
Vehicle : other: air
Doses : no data
Exposure time : 4 hour(s)
Method : other: not specified
Year : 1980
GLP : no data
Test substance : as prescribed by 1.1 - 1.4

Remark : Threshold for hepatotoxic effects was between 4 and 7 mg/l
 8,6 mg/l = 1200 ppm
Source : ATOFINA Paris la Defense, France
 EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)
Reliability : (2) valid with restrictions
 data from handbook
Flag : Critical study for SIDS endpoint
 26.10.2001 (72)

Type : other: single test concentration
Value : = 6.86 mg/l
Species : rat
Strain : Sherman
Sex : male/female
Number of animals : 6
Vehicle : other: air
Doses : no data
Exposure time : 4 hour(s)
Method : other: not specified
Year : 1969
GLP : no
Test substance : as prescribed by 1.1 - 1.4

Remark : Single tested concentration : 1000 ppm (6,8 mg/l) exposure
 for 4 h induced 3/6 death in a group of 6 rats
 Type: Acute Lethal Toxicity
 No information on symptoms
Source : ATOFINA Paris la Defense, France
 EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)
Test substance : Groups of 6 male or female albino rats were exposed for 4
 hours in a 120 liter sealed chamber in a static technique to
 nominal concentrations not analytically verified. Exposure
 to the vapor was followed by a 41-day observation period.
 Mortality was recorded.
Reliability : (2) valid with restrictions
 study well documented, meets generally accepted scientific
 principles, acceptable for assessment
 26.10.2001 (68)

Type : LC50
Value : = 4.5 mg/l
Species : mouse
Strain : no data
Sex : no data

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Number of animals	:		
Vehicle	:	other: air	
Doses	:	no data	
Exposure time	:	8 hour(s)	
Method	:	other: not specified	
Year	:	1966	
GLP	:	no data	
Test substance	:	as prescribed by 1.1 - 1.4	
Remark	:	No information on symptoms 4.5 mg/l is equivalent to 640 ppm	
Source	:	ATOFINA Paris la Defense, France EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)	
Reliability	:	(2) valid with restrictions data from handbook or collection data (german BUA collection)	
26.10.2001			(73)
Type	:	other: single test concentration	
Value	:	= 5900 - 6600 ppm	
Species	:	mouse	
Strain	:	no data	
Sex	:	male	
Number of animals	:	10	
Vehicle	:	other: air	
Doses	:		
Exposure time	:	3 hour(s)	
Method	:	other	
Year	:	1962	
GLP	:	no data	
Test substance	:	as prescribed by 1.1 - 1.4	
Remark	:	Single concentration tested in a single exposure experiment. The study was repeated twice. The study was not designed for acute toxicity level determination.	
Result	:	Mortality : at the end of the observation period (one week after the 3-h exposure), mortality was 4/10 for the 6600 ppm (45.3 mg/l) exposure and 3/10 for the 5900 ppm exposure (40.5 mg/l) Mortality occurred 2 to 7 days post-exposure. Irritation of mucous membranes and central nervous system depressing effects were reported. The microscopic examinations revealed slight to moderate congestion and fatty degeneration of the liver, and congestion of the other main organs (not specified).	
Source	:	ATOFINA Paris la Defense,France EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)	
Reliability	:	(2) valid with restrictions study well documented, meets generally accepted scientific principles, acceptable for assessment	
26.10.2001			(74)
Type	:	LCLo	
Value	:	= 19 mg/l	
Species	:	cat	
Strain	:	no data	
Sex	:	no data	
Number of animals	:		
Vehicle	:	other: air	
Doses	:	no data	
Exposure time	:	45 minute(s)	
Method	:	other: not specified	
Year	:	1936	

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GLP : no
Test substance : as prescribed by 1.1 - 1.4

Remark : Depressing effects on central nervous system, lacrimation, salivation.
Source : ATOFINA Paris la Defense, France
 EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)
Reliability : (4) not assignable
 data from secondary source
 26.10.2001 (75)

5.1.3 ACUTE DERMAL TOXICITY

Type : LD50
Value : = 3990 mg/kg bw
Species : rabbit
Strain : no data
Sex : no data
Number of animals : 10
Vehicle : no data
Doses : no data
Method : other (calculated)
Year : 1979
GLP : no data
Test substance : as prescribed by 1.1 - 1.4

Source : ATOFINA Paris la Defense, France
 EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)
Test condition : Ten rabbits per group were used. Neat substance was applied to the clipped skin of the trunk and maintained on contact with skin during 24 hours under an impervious bandage.
Reliability : (2) valid with restrictions
 study well documented, meets generally accepted scientific principles, acceptable for assessment
Flag : Critical study for SIDS endpoint
 26.10.2001 (76)

Type : LD50
Value : = 4900 - 8200 mg/kg bw
Species : rabbit
Strain : New Zealand white
Sex : male
Number of animals : 4
Vehicle : no data
Doses :
Method : other: not specified
Year : 1969
GLP : no
Test substance : as prescribed by 1.1 - 1.4

Remark : No information on symptoms
Result : LD50 reported as 3.99 (3.10-5.13) ml/kg. With a density of the liquid of 1.6, these value are equivalent to 6.4 (4.9-8.2) respectively.
Source : ATOFINA Paris la Defense, France
 EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)
Test condition : The test material was maintained during 24 hours on the clipped skin of the trunk under an impervious plastic film. Rabbits were maintained immobilized during the 24h-contact

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period, after which the animals were caged for the subsequent 14-day observation period. Four animals per group were used.

Reliability : (2) valid with restrictions
Test procedure in accordance with national standard methods with acceptable restrictions

Flag : Critical study for SIDS endpoint

26.10.2001 (68)

5.1.4 ACUTE TOXICITY, OTHER ROUTES

Type : LC50
Value : = 821 mg/kg bw
Species : mouse
Strain : no data
Sex : no data
Number of animals :
Vehicle : no data
Doses : no data
Route of admin. : i.p.
Exposure time :
Method : no data
Year : 1959
GLP : no data
Test substance :
Source : ATOFINA Paris la Defense, France
EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)
Reliability : (4) not assignable
data from secondary source

26.10.2001 (77)

Type : LC50
Value : = 1108 mg/kg bw
Species : mouse
Strain :
Sex :
Number of animals :
Vehicle :
Doses :
Route of admin. : s.c.
Exposure time :
Method : other: not specified
Year : 1958
GLP : no
Test substance : as prescribed by 1.1 - 1.4
Remark : Depressing effect on central nervous system.
Source : ATOFINA Paris la Defense, France
EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)
Reliability : (4) not assignable
data from secondary source

26.10.2001 (78)

5.2.1 SKIN IRRITATION

Species : rabbit
Concentration : undiluted
Exposure : Open
Exposure time : 24 hour(s)

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Number of animals : 5
Vehicle :
PDII :
Result : highly irritating
Classification : irritating
Method : other: not specified
Year : 1969
GLP : no
Test substance : as prescribed by 1.1 - 1.4

Remark : Result: highly irritating (6/8)
 0.01 ml of neat materail applied on intact skin.
Source : ATOFINA Paris la Defense,France
 EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)
Reliability : (2) valid with restrictions
 study well documented, meets generally accepted scientific
 principles, acceptable for assessment
Flag : Critical study for SIDS endpoint

Flag
 21.06.2001

(68)

5.2.2 EYE IRRITATION

Species : rabbit
Concentration : undiluted
Dose : .1 ml
Exposure time :
Comment : not rinsed
Number of animals : 6
Vehicle :
Result : irritating
Classification : irritating
Method : other
Year : 1974
GLP : no
Test substance : as prescribed by 1.1 - 1.4

Remark : Result: irritating (42.5/110)
 Method: FDA, 1965
 0.1 ml of neat material applied on the eye of 6 rabbits.
Source : ATOFINA Paris la Defense, France
 EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)
Reliability : (2) valid with restrictions
 study well documented, meets generally accepted scientific
 principles, acceptable for assessment
Flag : Critical study for SIDS endpoint

Flag
 21.06.2001

(79)

5.3 SENSITIZATION

Type : no data
Species :

10.05.2001

5.4 REPEATED DOSE TOXICITY

5. TOXICITY

ID: 79-34-5

DATE: 09.08.2002

Type :
Species : rat
Sex : male
Strain : Fischer 344
Route of admin. : gavage
Exposure period : 3 weeks
Frequency of treatm. : daily
Post exposure period : none
Doses : 104 and 208 mg/kg BW
Control group : yes
NOAEL : < 104 mg/kg bw
LOAEL : <= 104 mg/kg bw
Method : other
Year : 1996
GLP : yes
Test substance : as prescribed by 1.1 - 1.4

Method : Mechanistic study with the aim of establishing if the capacity of test material to induce hyaline droplet nephropathy in mature male rats is a determining factor in the induction of renal tubul cell neoplasms.
Result : LOAEL <0.62 mmol/kg (104 mg/kg) (liver lesions)

TOXIC RESPONSE/EFFECTS BY DOSE LEVEL :

- Mortality : all rats receiving 1.24 mmol/kg (208 mg/kg) died or were killed moribund before the end of the study.
- clinical signs : rats of the 1.24 mmol/kg group were thin and lethargic ; they presented diarrhea, abnormal breathing and ruffled fur.
- Bodyweight gain : animals receiving 0.62 mmol/kg has no growth difference versus control animals.
- Urinalysis : there were no statistically significant difference in all parameters between rats receiving 0.62 mmol/kg and controls.
- Organ weight : the absolute and relative liver weight of rats receiving 0.62 mmol/kg were greater than those of the controls.
- Histopathology : No change in the kidney were attributable to the test material in animals receiving 0.62 mmol/kg including amount, size and shape of tubule hyaline droplets and PCNA labeling index of cortical tubules.
In the liver, cytoplasmic vacuolisation of hepatocytes occurred in all rats receiving 0.62 mmol/kg. The change was mild to moderate and consisted in multifocal areas of hepatocytes with clear droplets within the cytoplasm.

Source : ATOFINA Paris la Defense, France
 EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)

Test condition : TEST ORGANISM :
 - Age : 15 weeks
 - Number of animals : 5 male/group

ADMINISTRATION/EXPOSURE :

- Vehicle : corn oil
- Doses : 0.62 mmol/kg (102 mg/kg) and 1.24 mmol/kg (208 mg/kg)

CLINICAL OBSERVATIONS AND FREQUENCY :

- Clinical signs : yes, twice daily
- Mortality : yes, twice daily
- Bodyweight gain : yes, weekly

	- Haematology, biochemistry : no
	- Urinalysis : yes , urines of all animals collected overnight, 4 days before the end of the gavage period ; parameters examined were creatinine, glucose, total protein, aspartate aminotransferase, gamma-glutamyltranspeptidase, N-acetyl beta-D-glucosaminidase, volume, specific gravity.
	- Organ weights : right kidney, liver, right testis of all rats at the end of the study
	- Histology : right kidney, left lobe of the liver and gross lesions were examined on all animals.
	- Other : cell proliferation analyses on kidney sections of all rats (S-phase analysis after proliferating cell nuclear antigen staining ; 4000 cells/per animal scored)
	STATISTICS :
	- Continuous variables : Dunnett test, Dunn test, Jonkheere test
	- Proliferating cells : Standard Student t Test
Reliability	: (2) valid with restrictions
	study well documented, meets generally accepted scientific principles, acceptable for assessment
Flag	: Critical study for SIDS endpoint
26.10.2001	
Type	:
Species	: rat
Sex	: male/female
Strain	: Osborne-Mendel
Route of admin.	: gavage
Exposure period	: 78 weeks
Frequency of treatm.	: once daily 5d/wk
Post exposure period	: 32 wks
Doses	: time-weighted average doses: 62 and 108 mg/kg/day (males); 43 and 76 mg/kg/day (females)
Control group	: yes
NOAEL	: < 43 - 62 mg/kg bw
LOAEL	: <= 43 - 62 mg/kg bw
Method	: other
Year	: 1978
GLP	: no data
Test substance	: as prescribed by 1.1 - 1.4
Remark	: Limitations of the study : significance of bodyweight decrease not given; No hemathological and biochemical investigations ; histopathology at the end of observation period only.
Result	: NOAEL : < 62 mg/kg/d (males) and < 43 mg/kg/d (females)
	TOXIC RESPONSE/EFFECTS BY DOSE LEVELS :
	- Mortality-Time to death : increase mortality at higher dose ; survival at 105 weeks : 50% of high and low dosed males; 40% and 58% of high and low dose females respectively.
	- Clinical signs : no data
	- Bodyweight gain : reversible dose-related decrease with both dose treatment
	- Histopathology : No increase of incidence of non-neoplastic lesions in any of the examined organs and tissues at any dose.
Source	: ATOFINA Paris la Defense, France EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)

(80)

Test condition	: TEST ORGANISM : - Age : 7 weeks - Number of animals :2 groups of 50 males and 50 females; control groups : 40 males and 40 females ADMINISTRATION/EXPOSURE : - Doses : High dose animals received 100 mg/kg/d ; in males this was increased after 14 weeks to 130 mg/kg/d for 18 weeks followed by 9 cycles of 4weeks at this dose and 1 week treatment three for 45 weeks (total 78 weeks) ; in females, the dose was reduced after 25 weeks to 80 mg/kg/d for 7 weeks followed by the cyclic treatment at this dose for 45 weeks. Low dose males received 50 mg/kg/d for 14 weeks and 65 mg/kg/d for 64 weeks ; females received 50 mg/kg/d for 25 weeks and 40 mg/kg/d for 53 weeks. Half of the control groups received corn oil (match controls) ; the second half was not treated (untreated controls) CLINICAL OBSERVATIONS and FREQUENCY: - Clinical signs : yes - Mortality : yes - Bodyweight : yes - Food and water consumption : not specified - Biochemistry : no - Urinalysis : no ORGANS EXAMINED ATNECRPSY - Macroscopic and Microscopic : all main organs and tissues STATISTICAL METHOD (2) valid with restrictions Test procedure in accordance with national standard methods with acceptable restrictions
Reliability	: Critical study for SIDS endpoint
Flag 08.06.2001	: Critical study for SIDS endpoint
Type	:
Species	: rat
Sex	: male
Strain	: other: albino rats, strain not specified
Route of admin.	: gavage
Exposure period	: 6 to 27 weeks
Frequency of treatm.	: no data
Post exposure period	: 2 weeks
Doses	: 3.2 , 8.0 and 20 mg/kg
Control group	: yes
LOAEL	: = 3.2 mg/kg bw
Method	: other
Year	: 1977
GLP	: no data
Test substance	: as prescribed by 1.1 - 1.4
Remark	: Limited validity study due to lack of reporting on important parameters (bodyweight, mortality, haematology...)
Result	: NOAEL < 3.2 mg/kg LOAEL = 3.2 mg/kg (27 week exposure) - Mortality : no data - Clinical signs : none described

(81)

- Bodyweight gain : no data
- Haemathology : no data
- Clinical biochemistry : increase of LDH and decrease of esterase activities were linked with the damage seen in the organes
- Organ weights : No data
- Histopathology :
 - At the highest doses there were damages in liver, kidney, testes and thyroid gland. These damages were not reversile in the testes and thyroid after the 2-week reversibility period in high dose groups. No damage were found in the trachea.
 - At 3.2 mg/kg there were only minor hepatic and renal effects

Source : ATOFINA Paris la Defense, France
EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)

Test condition : TEST ORGANISM :
- Age : no data
- Weight at study initiation : 230-280 g
- Number of animals : 10 males/group

ADMINISTRATION/EXPOSURE :
- Vehicle : peanut oil
- Dose : 8 and 20 mg/kg (6 wk exposure) ; 3.2 and 8 mg/kg (27 wk exposure)
- Frequency of gavage not specified

CLINICAL OBSERVATIONS AND FREQUENCY :
- Clinical signs : no data
- Mortality : no data
- Bodyweight gain : no data
- Haematology: no data
- Biochemistry : SDH, LDH, G6 -PDH, G6 -P, AIP, unspecified esterase, Lison.
- Urinalysis : no data
- Organ weights : no data
- Histology: liver, kidney, thyroide, testes, adrenals.

STATISTICS :
- Wilcoxon rank test
- Standard Student t Test
Reliability : (3) invalid
significant methodological deficiencies

26.10.2001

(70)

Type :
Species : mouse
Sex : male/fem ale
Strain : B6C3F1
Route of admin. : gavage
Exposure period : 78 wks
Frequency of treatm. : 5d/wk
Post exposure period : 12 wks
Doses : time-weighted average doses: 142 and 284 mg/kg/day
Control group : yes
NOAEL : < 142 mg/kg bw
LOAEL : < 142 mg/kg bw
Method : other
Year : 1978
GLP : no data
Test substance : as prescribed by 1.1 - 1.4

Remark	:	Limitations of the study : significance of bodyweight decrease not given; No hemathological and biochemical investigations ; histopathology at the end of observation period only.
Result	:	NOAEL : < 142 mg/kg/d (males and females)
		<p>TOXIC RESPONSE/EFFECTS BY DOSE LEVELS :</p> <ul style="list-style-type: none"> - Mortality-Time to death : dose related increased mortality - Clinical signs : no data - Bodyweight gain : slight dose related decrease - Histopathology : No increase of incidence of non-neoplastic lesions in any of the organs and tissues examined at any dose
Source	:	ATOFINA Paris la Defense, France EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)
Test condition	:	<p>TEST ORGANISM :</p> <ul style="list-style-type: none"> - Age : 5 weeks - Number of animals :2 groups of 50 males and 50 females; control groups : 40 males and 40 females <p>ADMINISTRATION/EXPOSURE :</p> <ul style="list-style-type: none"> - Doses : Initially high dose and low dose animals received 200 mg/kg/d and 100 mg/kg/d respectively; these dose were increased after 18 weeks to 300 mg/kg/d and 150 mg/kg respectively during 3 weeks. These dose were further increased to 400 and 200 mg/kg during 5 weeks but returned to 300 and 150 mg/kg/d respectively during the following 52 weeks (total 78 weeks). Half of the control groups received corn oil (match controls) ; the second half was not treated (untreated controls) <p>CLINICAL OBSERVATIONS and FREQUENCY:</p> <ul style="list-style-type: none"> - Clinical signs : yes - Mortality : yes - Bodyweight : yes - Food and water consumption : not specified - Biochemistry : no - Urinalysis : no <p>ORGANS EXAMINED AT NECRPSY</p> <ul style="list-style-type: none"> - Macroscopic and Microscopic : all main organs and tissues
Reliability	:	<p>STATISTICAL METHOD</p> <ul style="list-style-type: none"> (2) valid with restrictions Test procedure in accordance with national standard methods with acceptable restrictions
Flag 08.06.2001	:	Critical study for SIDS endpoint
Type	:	
Species	:	rat
Sex	:	male
Strain	:	Wistar
Route of admin.	:	inhalation
Exposure period	:	13 weeks (57 exposures)
Frequency of treatm.	:	5 h/day; 5 d/week
Post exposure period	:	none
Doses	:	single dose varying between 108 and 516 ppm
Control group	:	yes

(81)

5. TOXICITY

ID: 79-34-5

DATE: 09.08.2002

NOAEL : < 516 ppm
LOAEL : < 516 ppm
Method : other: not specified
Year : 1983
GLP : no data
Test substance : as prescribed by 1.1 - 1.4

Remark : Rats of Wistar and Brown Norway strains were used
Result : NOAEL : < 108-516 ppm (single fluctuating tested dose)

Toxic response/effect :
 - Mortality : not specified
 - Clinical signs : not specified
 - Bodyweight gain : decreased versus control for both strains (230g versus 371g in controls and 157g versus 309g in controls, respectively for Wistar and Brown Norway)
 - Biochemistry : no effect on ASAT, ALAT and creatinine at any time for both strains
 - Urinalysis : proteinuria was lower in exposed rats of both strains versus their respective controls at the same age ($p < 0.001$) : 13 versus 43 mg/24h in controls and 1.76 versus 14.87 in controls for Wistar and Brown Norway respectively.
 - Histopathology : Kidneys shown only minimal glomerulotoxicity in both species and only when using electronic microscopy.

Source : ATOFINA Paris la Defense, France
 EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)

Test condition : Test organism :
 - Strains : Wistar and Brown Norway
 - Age : 6 weeks
 - Weight at study initiation : 100-120 g
 - Number of animals : control groups : 10-14 males; exposed groups : 20-21 males.

Administration/Exposure :
 - Type of exposure : Animals were exposed whole body by inhalation in 2 m³ chambers with atmospheric renewal of 2m³/hour.
 - Doses : each daily exposure comprised 3 periods. During the first 30 minutes, the concentration of the test material vapours increased in the chamber from zero to 466 ppm. Then, during 2h30 the concentrations fluctuated between 466 and 516 ppm. Finally the concentration decreased during 2 h progressively down to 108 ppm when the animals were removed from the chambers. So the total duration of exposure is 5 h. All concentrations were measured through a specific analytical device.

Interim sacrifice after 18, 37 and 57 exposures

Clinical observations :
 - Clinical signs : not specified
 - Mortality : not specified
 - Bodyweight : yes , followed all along the 13 week exposure
 - Food and water consumption : not specified
 - Biochemistry : creatinine, ASAT, ALAT
 - Urinalysis : proteines

Organs examined at necropsy
 - Microscopic : kidney (optical, immunofluorescence and electronic microscopy)

Statistical method : Student T test

5. TOXICITY

ID: 79-34-5

DATE: 09.08.2002

Reliability	:	(2) valid with restrictions study well documented, meets generally accepted scientific principles, acceptable for assessment	
Flag 21.06.2001	:	Critical study for SIDS endpoint	(82)
Type	:		
Species	:	rat	
Sex	:	female	
Strain	:	Sprague-Dawley	
Route of admin.	:	inhalation	
Exposure period	:	15 weeks (78 exposures)	
Frequency of treatm.	:	5-6 h/day; 5 d/week	
Post exposure period	:	none	
Doses	:	560 ppm	
Control group	:	yes	
NOAEL	:	< 560 ppm	
LOAEL	:	< 560 ppm	
Method	:	other: not specified	
Year	:	1977	
GLP	:	no data	
Test substance	:	as prescribed by 1.1 - 1.4	
Remark	:	Sub-groups sacrificed after 2, 4, 9, 39 and exposures.	
Result	:	NOAEL of 1,1,2,2-tetrachloroethane: < 560 ppm (single tested dose)	
		TOXIC RESPONSE/EFFECT with 1,1,2,2-tetrachloroethane:	
		- Mortality : not specified	
		- Clinical signs : transient CNS depressing effects during first exposures.	
		- Bodyweight gain : decreased during the last weeks of exposure	
		- Haemathology : slight decrease of hematocrit, red and white cells	
		- Organ weights : increased liver weight in each interim and final sacrifice	
		- Histopathology : Liver hyperplasia and hepatocellular histological lesions seen during the first weeks regressed after 19 exposure and disappeared after 39 exposures. All other organs examined appeared normal.	
		- Other examinations : increased DNA biosynthesis appeared after 4 exposures (313% versus controls). That effect disappeared when measured during the following weeks.	
Source	:	ATOFINA Paris la Defense, France EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)	
Test condition	:	Test organism : - Age : adult - Weight at study initiation : not stated - Number of animals : 165 female Sprague Dawley rats were divided into one control group and 2 treated group.	
		Administration/Exposure : - Type of exposure : Animals were exposed whole body by inhalation in chambers with atmospheric renewal of 2m3/hour. - Doses : One of the two treatment groups was exposed to vapours of 1,1,2,2-tetrachloroethane at nominal concentration of 560 ppm. An unexposed group served as control. Some animals (unspecified number) were sacrificed after 2, 4, 9, 19, 39 and 63 exposures.	

5. TOXICITY

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Clinical observations :
 - Clinical signs : yes
 - Mortality : yes
 - Bodyweight : yes , followed all along the 15 week exposure
 - Food and water consumption : not specified
 - Haematology: yes, blood cytology followed
 - Urinalysis : not specified

Organs examined at necropsy
 - Macroscopic and microscopic : liver, kidney, adrenals, ovaries, uterus.

Other examinations :
 - Hepatic DNA neosynthesis was determined 4 h after injection of 3H Thymidine.

Statistical method : not specified
 Reliability : (2) valid with restrictions
 study well documented, meets generally accepted scientific principles, acceptable for assessment
 Flag : Critical study for SIDS endpoint

Reliability**Flag**

26.10.2001

(83)

Type**Species****Sex****Strain****Route of admin.****Exposure period****Frequency of treatm.****Post exposure period****Doses****Control group****NOAEL****LOAEL****Method****Year****GLP****Test substance**

:
 : rat
 : no data
 : no data
 : inhalation
 : 26 days
 : 4 h/day and 5 x 15 minutes during 4 h/day
 : none
 : 7 ppm (continuous exposure); 19 ppm (fluctuating exposure)
 : no data specified
 : < 7 ppm
 : < 7 ppm
 : other: not specified
 : 1977
 : no data
 : as prescribed by 1.1 - 1.4

Result**Source****Reliability**

08.06.2001

: Increased excitability, decreased urinary protein level.
 Changes persistent along the 26 days (no adaptation).
 : ATOFINA Paris la Defense, France
 EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)
 : (4) not assignable
 abstract

(84)

Type**Species****Sex****Strain****Route of admin.****Exposure period****Frequency of treatm.****Post exposure period****Doses****Control group****NOAEL****LOAEL****Method**

:
 : rat
 : male
 : no data
 : inhalation
 : 9 months
 : 4h/day, 5d/week
 : none
 : single dose : 1 3.3 mg/m³ (1.94 ppm)
 : yes
 : < 13.3 mg/m³
 : <= 13.3 mg/m³
 : other

5. TOXICITY

ID: 79-34-5

DATE: 09.08.2002

- Year** : 1972
GLP : no data
Test substance : as prescribed by 1.1 - 1.4
- Remark** : Limitations of the study : single dose testing ; generally poor description of effects.
- Result** : NOAEL < 13.3 mg/m³
 LOAEL = or < 13.3 mg/m³ (as findings may be considered minimal at this single tested concentration)
- Mortality : no significant difference between treated and control animals.
 - Clinical signs : none described
 - Bodyweight gain : At the end of 110 days, the exposed rats weighed significantly less than control (415 versus 435 g) but the difference was no longer present after 265 days due to wide individual variations).
 - Hematology : leucocytes were 90% higher than the controls after 110 days. No data on WBC were mentioned thereafter.
 - Clinical biochemistry : serum globulins were increased after 110 days and at the end of the study in treated rats; fat content of the liver was increased in treated animals after 265 days (34%); the ACTH activity in hypophyse was decreased at interim and final sacrifices (65 % to 13 %).
 - Organ weights : decrease relative weight of thyroide
 - Histopathology : mild liver changes, no testicular changes after more than 10 days exposure; follicular desquamation in thyroid ; no changes in other organs.
- Source** : ATOFINA Paris la Defense, France
 EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)
- Test condition** : TEST ORGANISM :
 - Age : 60 days
 - Weight at study initiation : 210-270 g
 - Number of animals : 210 males equally divided in one exposed and one control group
- ADMINISTRATION/EXPOSURE :
 - Vehicle : air
 - Dose : single dose tested : 13.3 +/- 0.24 mg/m³ (1.94 ppm)
 - Whole body exposure in 200 l chambers; dynamic flow (5000 l/h)
 - Interim sacrifices of 7 animals/group after 110 and 265 days of exposure
- CLINICAL OBSERVATIONS AND FREQUENCY :
 - Clinical signs : yes
 - Mortality : yes,
 - Bodyweight gain : yes
 - Haematology: blood formula, white blood cells count.
 - Biochemistry : SGOT, SGPT, BSP excretion, serum albumine, serum globuline, total fat in the liver and kidney, ACTH activity of pituitary gland. Also SHD, alc Phosphatase and unspecified Esterases.
 - Urinalysis : no
 - Organ weights : hypophyse, brain, thyroide, thymus, lung, heart, liver, spleen, kidney, adrenals and testes of all rats at the end of the study
 - Histology : liver, kidney, thyroide, lungs, spleen, adrenals, brain, testes of all rats

STATISTICS :

5. TOXICITY

ID: 79-34-5

DATE: 09.08.2002

Reliability	:	- Standard Student t Test (3) invalid significant methodological deficiencies	
Flag	:	Critical study for SIDS endpoint	
29.10.2001			(85)
Type	:		
Species	:	rat	
Sex	:	male	
Strain	:	no data	
Route of admin.	:	inhalation	
Exposure period	:	4 weeks	
Frequency of treatm.	:	2h/d , 2d/wk	
Post exposure period	:	no	
Doses	:	9000 ppm (16.8 mg/l)	
Control group	:	yes	
NOAEL	:	< 9000 ppm	
LOAEL	:	< 9000 ppm	
Method	:	other	
Year	:	1962	
GLP	:	no data	
Test substance	:	as prescribed by 1.1 - 1.4	
Result	:	- Mortality : all animals survived. - Clinical signs : hypermotility followed by CNS depression including almost complete loss of consciousness 1-1.5 hours after the 2-hour exposure. - Bodyweight gain : no marked difference between exposed and control animals. - Haemathology : tendency to decreased hemoglobin and red bood cell counts. - Histopathology : congestion and fatty degeneration of the liver.Changes in the liver were qualified as "not severe" by the authors. Congestion of other main organs (no details given).	
Source	:	ATOFINA Paris la Defense,France EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)	
Test condition	:	TEST ORGANISM : - Age : no data - Weight at study initiation : 250 g - Number of animals : 6 exposed and 2 controls male rats ADMINISTRATION/EXPOSURE : - Vehicle : air - Dose : single dose tested - Whole body exposure using a dynamic flow chamber(no details given) CLINICAL OBSERVATIONS AND FREQUENCY : - Clinical signs : yes - Mortality : yes, - Bodyweight gain : yes - Haematology: hemoglobin, blood cells counts. - Biochemistry : no. - Urinalysis : no - Organ weights : no - Histology : liver and main organs (not specified)	
Reliability	:	STATISTICS : no (3) invalid significant methodological deficiencies	

5. TOXICITY

ID: 79-34-5

DATE: 09.08.2002

08.06.2001

(74)

Type :
Species : mouse
Sex : male
Strain : no data
Route of admin. : inhalation
Exposure period : 4 weeks
Frequency of treatm. : 2 hours once a week
Post exposure period : no
Doses : 7000 ppm (48100 mg/m3)
Control group : no
NOAEL : < 7000 ppm
LOAEL : < 7000 ppm
Method : other
Year : 1962
GLP : no data
Test substance : as prescribed by 1.1 - 1.4

Result : - Mortality : All nine mice died within the 4 week test period with delayed mortality after exposure to the vapors of the test material.
 - Histology : Slight to moderate congestion and fatty degeneration of the liver, and congestion of other organs (no details given) were observed.

Source : ATOFINA Paris la Defense, France
 EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)

Test condition : TEST ORGANISM :
 - Age : no data
 - Weight at study initiation : 15 g
 - Number of animals : 9 exposed male mice

ADMINISTRATION/EXPOSURE :
 - Vehicle : air
 - Dose : single dose tested
 - Whole body exposure using a dynamic flow chamber(no details given)

CLINICAL OBSERVATIONS AND FREQUENCY :
 - Clinical signs : yes
 - Mortality : yes
 - Bodyweight gain : no
 - Haematology: no.
 - Biochemistry : no.
 - Urinalysis : no
 - Organ weights : no
 - Histology : liver and main organs (not specified)

STATISTICS : no

Reliability : (3) invalid significant methodological deficiencies

11.06.2001

(74)

Type :
Species : rabbit
Sex : no data
Strain : no data
Route of admin. : inhalation
Exposure period : 7 to 11 months
Frequency of treatm. : 3 to 4 h/day
Post exposure period : none

5. TOXICITY

ID: 79-34-5

DATE: 09.08.2002

Doses : 15 ppm
Control group : no data specified
NOAEL : < 15 ppm
LOAEL : < 15 ppm
Method : other: not specified
Year : 1971
GLP : no
Test substance : as prescribed by 1.1 - 1.4

Result : Slight effects on liver at the test concentration (15 ppm = 100 mg/m3)
Source : ATOFINA Paris la Defense, France
 EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)
Reliability : (4) not assignable
 data from secondary source

08.06.2001

(86)

Type :
Species : rabbit
Sex : no data
Strain : no data
Route of admin. : inhalation
Exposure period : 4 weeks
Frequency of treatm. : 8 to 9 hours daily
Post exposure period : no data
Doses : 100 to 160 ppm
Control group : no data specified
NOAEL : > 160 ppm
LOAEL : > 160 ppm
Method : other: not specified
Year : 1943
GLP : no
Test substance : as prescribed by 1.1 - 1.4

Remark : Result considered as surprising as experience in human indicates injury has occurred at much lower concentrations
Result : No effect ; no typical organ changes were found
Source : ATOFINA Paris la Defense, France
 EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)
Reliability : (4) not assignable
 Secondary literature

08.06.2001

(86)

Type :
Species : cat
Sex : no data
Strain : no data
Route of admin. : inhalation
Exposure period : 4 weeks
Frequency of treatm. : 8 to 9 h/day
Post exposure period : no data
Doses : 100 to 160 ppm
Control group : no data specified
NOAEL : > 160 ppm
LOAEL : > 160 ppm
Method : other: not specified
Year : 1943
GLP : no
Test substance : as prescribed by 1.1 - 1.4

Remark : Result considered as surprising as experience in human

5. TOXICITY

ID: 79-34-5

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	indicates injury has occurred at much lower concentrations	
Result	: No effect ; no typical organ changes were found	
Source	: ATOFINA Paris la Defense, France EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)	
Reliability	: (4) not assignable data from secondary source	
08.06.2001		(87)
Type	:	
Species	: monkey	
Sex	: male	
Strain	: other: macaca cynomolga Linné	
Route of admin.	: inhalation	
Exposure period	: 9 months	
Frequency of treatm.	: 2h/, 6d/wk (190 exposures)	
Post exposure period	: no	
Doses	: 1000 to 4000 ppm	
Control group	: no	
NOAEL	: < 1000 ppm	
LOAEL	: < 1000 ppm	
Method	: other	
Year	: 1962	
GLP	: no data	
Test substance	: as prescribed by 1.1 - 1.4	
Result	: - General condition : diarrhea, anorexia (1000 ppm = 6870 mg/m3 - up to 12 wks) ; almost complete unconsciousness (2000-4000 ppm = 13740-27480 mg/m3 from 15 wks up to end) 20 min to 1h after exposure to vapors. - Bodyweight : gradual increase from the 3rd to 5th month and decrease down to original weight at the 9th month. - Hematology: slight trend to an increase in white blood cells and a decrease of red blood cells and hemoglobin. - Urine no changes in albumin and urobilinogen - Histology : Slight to moderate congestion and fatty degeneration of the liver. Congestion of spleen. No changes in other organs.	
Source	: ATOFINA Paris la Defense,France EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)	
Test condition	: TEST ORGANISM : - Age : no data - Weight at study initiation : 7 kg - Number of animals : 1 male ADMINISTRATION/EXPOSURE : - Vehicle : air - Dose : single dose tested - Whole body exposure using a dynamic flow chamber(no details given) CLINICAL OBSERVATIONS AND FREQUENCY : - Clinical signs : yes - Mortality : yes - Bodyweight gain : yes - Haematology: yes. - Biochemistry : no. - Urinalysis : yes - Organ weights : no - Histology : liver, heart, lung, kidney, pancreas, spleen, testis.	

Reliability : STATISTICS : n
 : (3) invalid
 : significant methodological deficiencies
 18.06.2001 (74)

5.5 GENETIC TOXICITY 'IN VITRO'

Type : Ames test
System of testing : Salmonella typhimurium strains TA 98, TA 100, TA 1535, TA 1537
Test concentration : -2.4 to -1.0 log µMole/g agar
Cycotoxic concentr. : no data
Metabolic activation : with and without
Result : positive
Method : other: plate incorporation
Year : 1991
GLP : no data
Test substance : as prescribed by 1.1 - 1.4

Remark : Result: weak positive with and without metabolic activation
 in TA 100 strain, negative in TA 1535 strain
Source : ATOFINA Paris la Defense, France
 EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)
Reliability : (2) valid with restrictions
 Test procedure in accordance with national standard methods
 with acceptable restrictions
Flag : Critical study for SIDS endpoint
 22.05.2001 (88)

Type : Ames test
System of testing : Salmonella typhimurium, strains TA 97, TA98, TA100 and TA102
Test concentration : 10 µg/l to 10 g/l (Plate incorporation test) ; 100 µl/disc (spot test) ; 5µl to
 100 µl in 3000µl (preincubation test)
Cycotoxic concentr. : no data
Metabolic activation : with and without
Result : positive
Method : other
Year : 1989
GLP : no data
Test substance : as prescribed by 1.1 - 1.4

Result : - Without metabolic activation :
 the test material was active only in TA100 in the spot test.
 It was negative in all other strains and test conditions

- With metabolic activation :
 the test material was only active in strains TA97 and TA98
 in the plate incorporation test. It was inactive in all
 other strains and test conditions.

Source : ATOFINA Paris la Defense, France
 EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)

Test condition : Metabolic Activation: Arochlor induced rat liver microsomes.
 Method: plate incorporation test ; spot test (48h incubation
 at 37°C); preincubation test (30 min. pre-incubation at
 37°C).

Reliability : (2) valid with restrictions
 study well documented, meets generally accepted scientific
 principles, acceptable for assessment

Flag : Critical study for SIDS endpoint
 22.05.2001 (89)

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Type : Salmonella typhimurium reverse mutation assay
System of testing : strain TA 100
Test concentration : up to toxic concentrations
Cycotoxic concentr. : no data
Metabolic activation : with and without
Result : negative
Method : other
Year : 1988
GLP : no data
Test substance : as prescribed by 1.1 - 1.4

Source : ATOFINA Paris la Defense, France
 EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)
Reliability : (4) not assignable
 abstract

03.05.2001

(90)

Type : Ames test
System of testing : Salmonella typhimurium, strains TA 1535, TA 1537, TA 98 and TA 100
Test concentration : not stated
Cycotoxic concentr. : no data
Metabolic activation : with and without
Result : negative
Method : other
Year : 1984
GLP : no data
Test substance : as prescribed by 1.1 - 1.4

Remark : Method: plate incorporation
 S9 fraction of rat microsomes Arochlor induced.
 Bacteria were exposed to the vapors of the test material in a sealed 9-liter dessicator placed at 37°C during 8 hours. Then the bacteria were allow to incubate during 48 hours at 37°C our side of the desicator. The achived test concentration was not measured and is assumed to be the vapour saturation at 37°C.

Source : ATOFINA Paris la Defense, France
 EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)

Reliability : (2) valid with restrictions
 Test procedure in accordance with national standard methods with acceptable restrictions

Flag : Critical study for SIDS endpoint

13.06.2001

(91)

Type : Ames test
System of testing : Salmonella typhimurium strains TA1535, TA1537, TA98 and TA100
Test concentration : not stated
Cycotoxic concentr. : not stated
Metabolic activation : with and without
Result : negative
Method : other
Year : 1988
GLP : no data
Test substance : as prescribed by 1.1 - 1.4

Source : ATOFINA Paris la Defense,France
 EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)

Test condition : Metabolic activation was preformed with Aroclor 1254-induced livers derived from Osborne-Mendel rats and B6C3F1 mice of both sexes.

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		The standard method was modified by using a 9-liter desiccator due to the volatility of the test material.	
Reliability	:	(2) valid with restrictions Test procedure in accordance with national standard methods with acceptable restrictions	
Flag 26.10.2001	:	Critical study for SIDS endpoint	(92)
Type	:	Ames test	
System of testing	:	Salmonella Typhimurium strains TA 97, TA98, TA100, TA104	
Test concentration	:	0.01, 0.025, 0.05, 0.1, 0.25, 0.5, 1.0 mg/plate	
Cycotoxic concentr.	:	>= 1mg/plate	
Metabolic activation	:	with and without	
Result	:	positive	
Method	:	other	
Year	:	1987	
GLP	:	no data	
Test substance	:	as prescribed by 1.1 - 1.4	
Result	:	Positive in TA98, TA100 and TA97 with and without S9 Negative in TA104 with and without S9	
Source	:	ATOFINA Paris la Defense, France	
Test condition	:	EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA) - Positive control : yes - Negative control : yes - Metabolic activation : Aroclor1254 induced rat liver microsome S9 mix - Plate number : duplicate/triplicate	
Reliability	:	(2) valid with restrictions Test procedure in accordance with national standard methods with acceptable restrictions	
Flag 26.10.2001	:	Critical study for SIDS endpoint	(93)
Type	:	Ames test	
System of testing	:	Salmonella typhimurium strains TA 100, TA 98, TA 1535, TA 1537, TA 1538	
Test concentration	:	range of concentrations up to 4 mg/plate	
Cycotoxic concentr.	:	4 mg/plate	
Metabolic activation	:	with and without	
Result	:	negative	
Method	:	other: not specified	
Year	:	1980	
GLP	:	no data	
Test substance	:	as prescribed by 1.1 - 1.4	
Remark	:	Metabolic Activation: S9 rat microsomes Solvent : DMSO Result: negative on all tested Strains at concentrations up to 4 mg/plate (which was toxic to the bacteria).	
Source	:	ATOFINA Paris la Defense, France EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)	
Reliability	:	(2) valid with restrictions Test procedure in accordance with national standard methods with acceptable restrictions	
Flag 03.05.2001	:	Critical study for SIDS endpoint	(94)
Type	:	Ames test	
System of testing	:	Salmonella Typhimurium, STRAINS : TA1535, TA1537, TA98, TA100	
Test concentration	:	up to 1 mg/plate in DMSO	

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Cycotoxic concentr.	:	1 mg/plate	
Metabolic activation	:	with and without	
Result	:	negative	
Method	:	other	
Year	:	1983	
GLP	:	no data	
Test substance	:	as prescribed by 1.1 - 1.4	
Source	:	ATOFINA Paris la Defense, France EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)	
Reliability	:	(2) valid with restrictions Test procedure in accordance with national standard methods with acceptable restrictions	
Flag 26.10.2001	:	Critical study for SIDS endpoint	(95)
Type	:	Ames test	
System of testing	:	Salmonella typhimurium strains TA 1530, TA 1535, TA 1538	
Test concentration	:	no data	
Cycotoxic concentr.	:	no data	
Metabolic activation	:	no data	
Result	:	positive	
Method	:	other: not specified	
Year	:	1977	
GLP	:	no data	
Test substance	:	as prescribed by 1.1 - 1.4	
Remark	:	Results in this paper are imported from another previous article from the same team (see Brem et al, 1974)	
Result	:	Positive on TA 1535, negative on TA 1538.	
Source	:	ATOFINA Paris la Defense, France EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)	
Reliability	:	(4) not assignable Secondary literature	
13.06.2001			(96)
Type	:	Ames test	
System of testing	:	Salmonella typhimurium TA 1530, TA 1535, TA 1538	
Test concentration	:	5 to 23 µMol/plate	
Cycotoxic concentr.	:	no data	
Metabolic activation	:	without	
Result	:	positive	
Method	:	other: not specified	
Year	:	1974	
GLP	:	no	
Test substance	:	as prescribed by 1.1 - 1.4	
Remark	:	Result: positive on Strains TA 1530 and 1535. negative on strain TA 1538	
Source	:	ATOFINA Paris la Defense, France EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)	
Reliability	:	(2) valid with restrictions study well documented, meets generally accepted scientific principles, acceptable for assessment	
Flag 03.05.2001	:	Critical study for SIDS endpoint	(97)
Type	:	Bacterial forward mutation assay	
System of testing	:	L-Arabinoside resistance test of Salmonella typhimurium	
Test concentration	:	0,06 to 2979 nmol/plate	
Cycotoxic concentr.	:	1787 nmol/plate	

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Metabolic activation	: with and without	
Result	: negative	
Method	: other	
Year	: 1991	
GLP	: no data	
Test substance	: as prescribed by 1.1 - 1.4	
Remark	: Strain BAL13 was used in preincubation. Metabolic activation by rat microsomes S9 fraction induced by Arochlor1254.	
Source	: ATOFINA Paris la Defense, France EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)	
Reliability	: (2) valid with restrictions study well documented, meets generally accepted scientific principles, acceptable for assessment	
Flag 03.05.2001	: Critical study for SIDS endpoint	(98)
Type	: Bacterial gene mutation assay	
System of testing	: Escherichia Coli,	
Test concentration	: 10 µl/plate	
Cycotoxic concentr.	: no data	
Metabolic activation	: without	
Result	: positive	
Method	: other	
Year	: 1974	
GLP	: no data	
Test substance	: as prescribed by 1.1 - 1.4	
Source	: ATOFINA Paris la Defense,France EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)	
Test condition	: Assay with polymerase-deficient E. coli. Test substance deposited on a sterile disc placed on the top of the surface of agar plates where the bacteria were spread. Incubation at 37°C for 8 hours. Assay carried out in duplicate on at least 3 different occasions.	
Reliability	: (2) valid with restrictions study well documented, meets generally accepted scientific principles, acceptable for assessment	
Flag 26.10.2001	: Critical study for SIDS endpoint	(97)
Type	: Bacillus subtilis recombination assay	
System of testing	: Bacillus subtilis/microsome REC-assay for the detection of DNA damaging substances. Strains H17 and M45	
Test concentration	: no data	
Cycotoxic concentr.	: no data	
Metabolic activation	: with and without	
Result	: negative	
Method	: other	
Year	: 1989	
GLP	: no data	
Test substance	: as prescribed by 1.1 - 1.4	
Source	: ATOFINA Paris la Defense, France EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)	
Reliability	: (2) valid with restrictions study well documented, meets generally accepted scientific principles, acceptable for assessment	
Flag 09.05.2001	: Critical study for SIDS endpoint	(99)

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Type : Mitotic recombination in *Saccharomyces cerevisiae*
System of testing : *Saccharomyces cerevisiae*, strain D4 and D7
Test concentration : 3.1 to 7.3 mM
Cycotoxic concentr. : 5,2 mM
Metabolic activation : without
Result : positive
Method : other
Year : 1980
GLP : no data
Test substance : as prescribed by 1.1 - 1.4

Remark : Genetic activity of the test material was assessed through the *ilv1* locus reversion frequency, the *ade2* locus alteration frequency and the *trp5* locus conversion frequency.

Result : Positive result found only at cytotoxic levels. Genetic effect was marginal when D4 and D7 strains were treated only during 4 h but was significant when treated during 1 h.

Source : ATOFINA Paris la Defense, France
 EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)

Reliability : (2) valid with restrictions
 study well documented, meets generally accepted scientific principles, acceptable for assessment

Flag : Critical study for SIDS endpoint

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(100)

Type : Yeast Cytogenetic assay
System of testing : *Aspergillus nidulans* (strain P1). induction of chromosome malsegregation
Test concentration : 0.01 to 0.04 %v/v
Cycotoxic concentr. : 0.04 %
Metabolic activation : without
Result : positive
Method : other: not specified
Year : 1988
GLP : no data
Test substance : as prescribed by 1.1 - 1.4

Remark : Increased incidence of colonies producing euploid whole chromosome segregant was observed. However conclusive evidence for induction of aneuploidy as the primary genetic event was not provided in that study.

Source : ATOFINA Paris la Defense, France
 EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)

Reliability : (2) valid with restrictions
 study well documented, meets generally accepted scientific principles, acceptable for assessment

Flag : Critical study for SIDS endpoint

09.05.2001

(101)

Type : Yeast gene mutation assay
System of testing : *Saccharomyces cerevisiae*, strains D7 (gene conversion) and XV185-14C (reversion)
Test concentration : 50 µl/ ml
Cycotoxic concentr. : no data
Metabolic activation : without
Result : negative
Method : other
Year : 1983
GLP : no data
Test substance : as prescribed by 1.1 - 1.4

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Remark	:	Exposure preincubation time was 24 hours at 30°C	
Source	:	ATOFINA Paris la Defense, France EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)	
Reliability	:	(2) valid with restrictions study well documented, meets generally accepted scientific principles, acceptable for assessment	
Flag 26.10.2001	:	Critical study for SIDS endpoint	(102)
Type	:	Chromosomal aberration test	
System of testing	:	Cloned Chinese Hamster Ovary cells (CHO-W-B1)	
Test concentration	:	without S9 : 453-653 µl/ml with S9 : 503-653 µl/ml	
Cycotoxic concentr.	:	no data	
Metabolic activation	:	with and without	
Result	:	negative	
Method	:	other	
Year	:	1987	
GLP	:	no data	
Test substance	:	as prescribed by 1.1 - 1.4	
Source	:	ATOFINA Paris la Defense, France EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)	
Test condition	:	Cells were harvested after 19.5 to 26 hours incubation with the test material. The test material precipitated from the culture medium at concentration higher than 653 µl/ml. Slides were stained with Giemsa and coded. One hundred cells were scored from each concentration group having sufficient metaphases. Positive control and control solvent were used.	
Reliability	:	(2) valid with restrictions Test procedure in accordance with national standard methods with acceptable restrictions	
Flag 09.05.2001	:	Critical study for SIDS endpoint	(103)
Type	:	Sister chromatid exchange assay	
System of testing	:	Cloned Chinese Hamster Ovary cells (CHO-W-B1)	
Test concentration	:	Without S9 : 16 to 168 µl/ml ; With S9 : 451-558 µl/ml	
Cycotoxic concentr.	:	no data	
Metabolic activation	:	with and without	
Result	:	positive	
Method	:	other	
Year	:	1987	
GLP	:	no data	
Test substance	:	as prescribed by 1.1 - 1.4	
Result	:	positive with and without metabolic activation	
Source	:	ATOFINA Paris la Defense, France EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)	
Test condition	:	Cells were harvested after 28.5 to 37.3 hours in BrdUrd without S9. It was 2h with S9. The test material precipitated from the culture medium at concentration higher than 558 µl/ml. Slides were stained with dilute Hoechst 33258 and examined by fluorescence microscopy. Fifty cells per dose were scored from each concentration group having sufficient M2 cells available. Positive control (MMC and CP) and control solvent were used.	
Reliability	:	(2) valid with restrictions Test procedure in accordance with national standard methods with acceptable restrictions	

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Flag : Critical study for SIDS endpoint
12.06.2001 (103)

Type : other: SOS chromotest
System of testing : Escherichia Coli PQ 37
Test concentration : up to 500 ml/l
Cycotoxic concentr. : not specified
Metabolic activation : with and without
Result : negative
Method : other
Year : 1989
GLP : no data
Test substance : as prescribed by 1.1 - 1.4

Remark : Metabolic Activation: Arochlor induced rat liver microsomes.
Source : ATOFINA Paris la Defense,France
EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)

Reliability : (2) valid with restrictions
study well documented, meets generally accepted scientific principles, acceptable for assessment

Flag : Critical study for SIDS endpoint
11.05.2001 (104)

Type : DNA damage and repair assay
System of testing : Escherichia Coli
Test concentration : no data
Cycotoxic concentr. : no data
Metabolic activation : no data
Result : positive
Method : other: not specified
Year : 1984
GLP : no data
Test substance : as prescribed by 1.1 - 1.4

Remark : No detail available in the paper; result only appears in a table.
Data coming from Brusik et al, 1980

Source : ATOFINA Paris la Defense,France
EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)

Reliability : (4) not assignable
data from secondary source

11.05.2001 (105)

Type : DNA damage and repair assay
System of testing : Unscheduled DNA synthesis (UDS) in rat hepatocyte primary culture
Test concentration : 9.5 x 10⁻⁵ M
Cycotoxic concentr. : not specified
Metabolic activation : without
Result : negative
Method : other: not specified
Year : 1989
GLP : no data
Test substance : as prescribed by 1.1 - 1.4

Source : ATOFINA Paris la Defense,France
EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)

Test condition : Osborne-Mendel rats were used to provide the hepatocytes
Monolayer cultures were simultaneously exposed to the test material and to 10 µCi [3H]thymidine. Incubation time was 18-20h.
Several concentrations were tested. However only a single

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	figure is presented in the paper which corresponds to the highest nontoxic concentration.	
Reliability	: (2) valid with restrictions study well documented, meets generally accepted scientific principles, acceptable for assessment	
Flag 11.05.2001	: Critical study for SIDS endpoint	(106)
Type	: DNA damage and repair assay	
System of testing	: Microscreen prophage-induction assay in Escherichia coli (prophage lambda lysogen WP2s)	
Test concentration	: 7.4 to 472.6 mM	
Cycotoxic concentr.	: 236.3 mM (-S9) ; 472.6 mM (+S9)	
Metabolic activation	: with and without	
Result	: positive	
Method	: other	
Year	: 1992	
GLP	: no data	
Test substance	: as prescribed by 1.1 - 1.4	
Result	: Positive with S9 metabolic activation. Negative without S9 metabolic activation.	
Source	: ATOFINA Paris la Defense, France EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)	
Test condition	: Overnight incubation at 37°C in microsuspension in well microtiter plates. Scoring by turbidimetry.	
Reliability	: (2) valid with restrictions study well documented, meets generally accepted scientific principles, acceptable for assessment	
Flag 26.10.2001	: Critical study for SIDS endpoint	(107)
Type	: Unscheduled DNA synthesis	
System of testing	: rat hepatocyte primary culture	
Test concentration	: from 10 ⁻⁷ % up to 1 % test material in DMSO	
Cycotoxic concentr.	: 10 ⁻² % to 1%	
Metabolic activation	: without	
Result	: negative	
Method	: other: not specified	
Year	: 1983	
GLP	: no data	
Test substance	: as prescribed by 1.1 - 1.4	
Source	: ATOFINA Paris la Defense, France EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)	
Test condition	: HPC/DNA repair Assay in liquid phase. 18 h contact of the test material with the rat hepatocyte primary culture	
Reliability	: (2) valid with restrictions study well documented, meets generally accepted scientific principles, acceptable for assessment	
Flag 13.06.2001	: Critical study for SIDS endpoint	(108)
Type	: DNA damage and repair assay	
System of testing	: Unscheduled DNA synthesis on rat and mouse hepatocytes primary cultures	
Test concentration	: not stated	
Cycotoxic concentr.	: not stated	
Metabolic activation	: without	
Result	: negative	
Method	: other	

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Year	:	1988	
GLP	:	no data	
Test substance	:	as prescribed by 1.1 - 1.4	
Result	:	The test material was completely inactive both in rats and in mice hepatocyte primary cultures.	
Source	:	ATOFINA Paris la Defense,France EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)	
Test condition	:	Osborne-Mendel rats and B6C3F1 mice were used to prepare the hepatocyte cultures.	
Reliability	:	(2) valid with restrictions Test procedure in accordance with national standard methods with acceptable restrictions	
Flag 26.10.2001	:	Critical study for SIDS endpoint	(92)
Type	:	Unscheduled DNA synthesis	
System of testing	:	mouse hepato cyte primary culture (B6C3F1)	
Test concentration	:	from 10 ⁻⁷ % to 1 %	
Cycotoxic concentr.	:	10 ⁻¹ % to 1 %	
Metabolic activation	:	without	
Result	:	negative	
Method	:	other: not specified	
Year	:	1983	
GLP	:	no data	
Test substance	:	as prescribed by 1.1 - 1.4	
Source	:	ATOFINA Paris la Defense, France EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)	
Test condition	:	HPC/DNA repair Assay in liquid phase. 18 h contact of the test material with the rat hepatocyte primary culture	
Reliability	:	(2) valid with restrictions study well documented, meets generally accepted scientific principles, acceptable for assessment	
Flag 21.06.2001	:	Critical study for SIDS endpoint	(109)
Type	:	other: in vitro DNA binding	
System of testing	:	Covalent binding to macromolecules of rats and mouse cells from various organs	
Test concentration	:	not stated	
Cycotoxic concentr.	:	not stated	
Metabolic activation	:	with	
Result	:	positive	
Method	:	other	
Year	:	1987	
GLP	:	no data	
Test substance	:	as prescribed by 1.1 - 1.4	
Result	:	Only microsomal enzymes from rat and mouse liver and from mouse lung were efficient to mediate binding to DNA, to microsomal RNA and to microsomal proteins. Cytosolic fractions from all assayed organs of mouse and from liver and lung of rat induced binding to macromolecules.	
Source	:	ATOFINA Paris la Defense,France EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)	
Test condition	:	(U- 14C)-1,1,2,2-tetrachloroethane was used. Cell-free systems (calf thymus DNA, microsomal proteins, cytosolic proteins) were used to look for binding of the test material to exogenous DNA and the sub-cellular	

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	constituents of enzymatic fractions. The binding were studied after the test material was bioactivated by MFO and GSH-T from microsomal and cytosolic fractions of male rat and mouse liver, kidney, stomach and lung.	
Reliability	: (2) valid with restrictions study well documented, meets generally accepted scientific principles, acceptable for assessment	
26.10.2001		(110)
Type	: other: cell transformation assay	
System of testing	: BALB/c 3T3 cells	
Test concentration	: from 1 to 250 µg/ml	
Cycotoxic concentr.	: LC50 = 3 mM	
Metabolic activation	: without	
Result	: negative	
Method	: other: not specified	
Year	: 1983	
GLP	: no data	
Test substance	: as prescribed by 1.1 - 1.4	
Remark	: 72 h exposure; positive control : 3-methylcholanthrene.	
Source	: ATOFINA Paris la Defense, France EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)	
Reliability	: (2) valid with restrictions study well documented, meets generally accepted scientific principles, acceptable for assessment	
Flag	: Critical study for SIDS endpoint	
13.06.2001		(111) (112)
Type	: other: cell transformation assay	
System of testing	: BALB/c-3T3 neoplastic cell transformation assay	
Test concentration	: not stated	
Cycotoxic concentr.	: not stated	
Metabolic activation	: without	
Result	: negative	
Method	: other	
Year	: 1988	
GLP	: no data	
Test substance	: as prescribed by 1.1 - 1.4	
Source	: ATOFINA Paris la Defense, France EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)	
Test condition	: Incubation in glass chambers due to volatility. Only type III foci were scored.	
Reliability	: (2) valid with restrictions Test procedure in accordance with national standard methods with acceptable restrictions	
Flag	: Critical study for SIDS endpoint	
26.10.2001		(92)
Type	: other: cell transformation assay	
System of testing	: BALB/c3T3 cells, clone A-31, using an amplification (level II) transformation assay	
Test concentration	: 10 to 1000 µg/ml	
Cycotoxic concentr.	: 1000 µg/ml	
Metabolic activation	: with and without	
Result	: positive	
Method	: other: no data	
Year	: 1990	
GLP	: no data	
Test substance	: as prescribed by 1.1 - 1.4	

Remark	: Rat liver microsomial S9 fraction Arochlor induced was used as metabolic activator. Amplification of the transformation was achieved by reseeding confluent cells from each treatment and allowing additional rounds of cell replication.	
Result	: The test material was not active without or with metabolic activation under the standard testing conditions (level I) Howether it was shown to be capable of inducing in vitro transformation of the cells either in the presence or in the absence of S9 activation, using an amplification-transformation assay (level II) by reseeding confluent cells from each treatment and allowing additional rounds of cell replication. In the absence of metabolic activation 1000 µg/ml was the only transforming dose. In the presence of metabolic activation lower doses were active.	
Source	: ATOFINA Paris la Defense, France EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)	
Reliability	: (2) valid with restrictions study well documented, meets generally accepted scientific principles, acceptable for assessment	
Flag 09.05.2001	: Critical study for SIDS endpoint	(113)
Type	: other: cell transformation assay	
System of testing	: BALB/c3T3 cells, clone A-31, using an amplification-transformation (level II) assay.	
Test concentration	: 31.25 to 500 µg/ml	
Cycotoxic concentr.	: 500 µg/ml	
Metabolic activation	: without	
Result	: positive	
Method	: other: no data	
Year	: 1992	
GLP	: no data	
Test substance	: as prescribed by 1.1 - 1.4	
Remark	: The objective of the study was to look for the mechanism of action of the test material in view of establishing whether it has an initiating potential to transform the BALB-c3T3 cells. Cells were treated with sub-effective or transforming concentrations of 1,1,2,2-tetrachloroethane in the presence of an S9 metabolic activating system, followed by tetradecanoyl-phorbol acetate promoting treatment. The transforming potential of the test material which was already established by the same authors in a previous study (See Colacci et al 1990) only when using amplification (level II) conditions, was confirmed in the present study.	
Result	: The transforming activity of the test material is evident only by reseding confluent cells and allowing additional rounds of cell replications in the amplification test. Under standard conditions (level I assay) there was no evidence of transforming activity.	
Source	: ATOFINA Paris la Defense, France EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)	
Reliability	: (2) valid with restrictions study well documented, meets generally accepted scientific principles, acceptable for assessment	
09.05.2001		(114)

5. TOXICITY

ID: 79-34-5

DATE: 09.08.2002

Type : other: cell transformation assay
System of testing : BALB/c 3T3 cells, using an amplification (level II) transformation assay
Test concentration : 2.9 and 5.9 mM
Cycotoxic concentr. : no data
Metabolic activation : with and without
Result : positive
Method : other: not specified
Year : 1993
GLP : no data
Test substance : as prescribed by 1.1 - 1.4

Remark : Type: Cell Transformation Assay
 When transformed by 1,1,2,2-Tetrachloroethane the cells acquired a malignant phenotype shown by IV injection of the transformed BALB/c 3T3 cells in nude mice(athymic mice): appearing of pulmonary nodules .
Result : During this experiment the positive effect which was described previously by the same team (see Colacci et al, 1990) is confirmed in the amplification-level II test.
Source : ATOFINA Paris la Defense, France
 EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)
Reliability : (2) valid with restrictions
 study well documented, meets generally accepted scientific principles, acceptable for assessment

21.06.2001

(115)

5.6 GENETIC TOXICITY 'IN VIVO'

Type : Drosophila SLRL test
Species : Drosophila melanogaster
Sex : no data
Strain :
Route of admin. : other
Exposure period : no data
Doses : injection of 800 ppm; feeding of 1500 ppm
Result : negative
Method : other: not specified
Year : 1985
GLP : no data
Test substance : as prescribed by 1.1 - 1.4

Remark : Route of administration: injection and feeding
Result : negative by feeding and injection
Source : ATOFINA Paris la Defense, France
 EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)
Reliability : (2) valid with restrictions
 study well documented, meets generally accepted scientific principles, acceptable for assessment

Flag : Critical study for SIDS endpoint

09.05.2001

(116)

Type : Unscheduled DNA synthesis
Species : mouse
Sex : male/female
Strain : B6C3F1
Route of admin. : gavage
Exposure period : single treatment
Doses : 50, 200, 600, 1000 mg/kg
Result : negative
Method : other

5. TOXICITY

ID: 79-34-5

DATE: 09.08.2002

Year	:	1989	
GLP	:	no data	
Test substance	:	as prescribed by 1.1 - 1.4	
Source	:	ATOFINA Paris la Defense, France EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)	
Test condition	:	Groups of 3 male and 3 female mice were treated orally. Hepatocytes were taken for primary culture 2 and 12 hours after gavage. Cultures were incubated with 3H-methylthymidine and UDS was quantified by autoradiography. Three slides were scored for each animal of all dose-groups for a total of 150 cells per animal.	
Reliability	:	(2) valid with restrictions study well documented, meets generally accepted scientific principles, acceptable for assessment	
Flag	:	Critical study for SIDS endpoint	(117)
09.05.2001			
Type	:	Cytogenetic assay	
Species	:	rat	
Sex	:		
Strain	:		
Route of admin.	:	inhalation	
Exposure period	:	5 days	
Doses	:	349 mg/m3	
Result	:	ambiguous	
Method	:	other	
Year	:	1980	
GLP	:		
Test substance	:	as prescribed by 1.1 - 1.4	
Source	:	ATOFINA Paris la Defense,France EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)	
Test condition	:	bone marrow assay; the single exposure concentration used in the test did not induce cytotoxicity.	
Reliability	:	(4) not assignable Secondary literature	
18.06.2001			(118)
Type	:	Dominant lethal assay	
Species	:	rat	
Sex	:		
Strain	:		
Route of admin.	:	inhalation	
Exposure period	:	5 days	
Doses	:	349 mg/m3	
Result	:	negative	
Method	:	other	
Year	:	1980	
GLP	:		
Test substance	:	as prescribed by 1.1 - 1.4	
Source	:	ATOFINA Paris la Defense,France EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)	
Reliability	:	(4) not assignable Secondary literature	
18.06.2001			(119)
Type	:	Drosophila SLRL test	
Species	:	Drosophila melanogaster	
Sex	:		

5. TOXICITY

ID: 79-34-5

DATE: 09.08.2002

Strain	:	
Route of admin.	:	
Exposure period	:	
Doses	:	
Result	:	negative
Method	:	
Year	:	1980
GLP	:	no data
Test substance	:	as prescribed by 1.1 - 1.4
Source	:	ATOFINA Paris la Defense,France EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)
Reliability	:	(4) not assignable Secondary literature
13.06.2001		(119)
Type	:	other: Rat liver Foci Assay
Species	:	rat
Sex	:	male
Strain	:	Osborne-Mendel
Route of admin.	:	gavage
Exposure period	:	single exposure (initiation study) ; 5d/wks, 7 wks (promotion study)
Doses	:	200 mg/kg
Result	:	positive
Method	:	other
Year	:	1988
GLP	:	no data
Test substance	:	as prescribed by 1.1 - 1.4
Result	:	When administered in the promotion protocol after initiation with DEN, the test material induced significant increase in GGT+ foci above control levels. The test material also induced significant increase in GGT+ foci when administered in the promotion protocol without DEN initiation. The test material however was inactive as an initiator when administered in the initiation protocol.
Source	:	ATOFINA Paris la Defense,France EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)
Test condition	:	INITIATION Protocol : 10 rats per group were given 2/3 partial hepatectomies and 24 h later received the test material at the MTD. Six days after partial hepatectomies, the animals began to receive in the diet pentobarbitone (0.05% w/w) for 7 weeks, then one week untreated, after which they were killed and the liver examined histologically. DEN (30 mg/kg ip) served as positive initiator control. PROMOTING Protocol : Ten rats per group were initiated with DEN ip (30 mg/kg) 24 h before being 2/3 partially hepatectomized. Six days later they began to receive by gavage the test material at MTD during 7 weeks and held for one more week without treatment, after which they were killed and the liver examined histologically. Gammaglutamyltranspeptidase was used as a putative preneoplastic indicator. GGT+ foci were quantified using light microscopy.
Reliability	:	(2) valid with restrictions study well documented, meets generally accepted scientific

5. TOXICITY

ID: 79-34-5

DATE: 09.08.2002

	principles, acceptable for assessment	
30.05.2001		(92)
Type	: other: eye mosaic (w/w+) assay / interchromosomal mitotic recombination	
Species	: Drosophila melanogaster	
Sex	: male/female	
Strain	: other: Leiden Standard	
Route of admin.	: other: treatment of larvae by inhalation	
Exposure period	: 17 hours	
Doses	: 500 and 1000 ppm	
Result	: negative	
Method	: other	
Year	: 1993	
GLP	: no data	
Test substance	: as prescribed by 1.1 - 1.4	
Method	: number of eyes examined : 1062 in controls , 1316 in the 500 ppm group. Inhalation exposure of 28-52 old larvae in a closed bottle maintained at 25°C during 17h. Then the larvae were removed, washed and placed in bottle with standard food.	
Result	: 500 ppm was inactive in the w/w+ bioassay (4.05 per 100 eyes in control versus 4.03 in treated flies per 100 eyes). 1000 ppm was lethal to the larvae.	
Source	: ATOFINA Paris la Defense, France EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)	
Reliability	: (2) valid with restrictions study well documented, meets generally accepted scientific principles, acceptable for assessment	
Flag	: Critical study for SIDS endpoint	
20.07.2001		(120)
Type	: other: in vivo DNA binding	
Species	: rodent	
Sex	: no data	
Strain	: other: Wistar rats and BALB/c mouse	
Route of admin.	: i.p.	
Exposure period	: single injection	
Doses	: 127 µCi/kg	
Result	: positive	
Method	: other	
Year	: 1987	
GLP	: no data	
Test substance	: as prescribed by 1.1 - 1.4	
Result	: The test material bound with DNA, RNA and proteins of all organs of both species. The covalent binding index with liver DNA was about 500 ; it is comparable to the indices of carcinogens classified as moderate initiators.	
Source	: ATOFINA Paris la Defense, France EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)	
Test condition	: Six rats (250 g) and 12 mice (28 g) were killed 22 h after the injection of the C14 radiolabelled test material. Their liver, kidney, lung and stomach were removed , pooled and the DNA RNA and proteins were obtained. Radioactivity was the measured by liquid scintillation.	
Reliability	: (2) valid with restrictions study well documented, meets generally accepted scientific principles, acceptable for assessment	
13.06.2001		(110)

5.7 CARCINOGENICITY

Species : rat
Sex : male/female
Strain : Osborne-Mendel
Route of admin. : gavage
Exposure period : 78 weeks
Frequency of treatm. : 5 d/week
Post exposure period : 32 weeks
Doses : time-weighted average doses: 62 and 108 mg/kg/day (males); 43 and 76 mg/kg/day (females)
Result : negative
Control group : yes
Method : other
Year : 1978
GLP : no data
Test substance : as prescribed by 1.1 - 1.4

Method : Conventional NCI carcinogenicity protocol as used during the seventies in rats.
Result : NOAEL : >= 108 mg/kg/d (males) and 76 mg/kg/d (females)

TOXIC RESPONSE/EFFECTS BY DOSE LEVELS :

- Mortality-Time to death : increase mortality at higher dose ; survival at 105 weeks : 50% of high and low dosed males; 40% and 58% of high and low dose females respectively.
 - Clinical signs : no data
 - Bodyweight gain : reversible dose-related decrease
 - Histopathology : No increase of incidence of non-neoplastic lesions ; No statistically significant incidence of neoplastic lesions was observed although 2 hepatocellular carcinomas and 1 neoplastic nodule were observed in the high dose group out of 49 males compared with 0/20 in vehicle controls.

Source : ATOFINA Paris la Defense, France
 EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)
Test condition : TEST ORGANISM :
 - Age : 7 weeks
 - Number of animals : 2 groups of 50 males and 50 females ; control groups : 40 males and 40 females

ADMINISTRATION/EXPOSURE :

- Doses : High dose animals received 100 mg/kg/d ; in males this was increased after 14 weeks to 130 mg/kg/d for 18 weeks followed by 9 cycles of 4 weeks at this dose and 1 week treatment three for 45 weeks (total 78 weeks) ; in females, the dose was reduced after 25 weeks to 80 mg/kg/d for 7 weeks followed by the cyclic treatment at this dose for 45 weeks.

Low dose males received 50 mg/kg/d for 14 weeks and 65 mg/kg/d for 64 weeks ; females received 50 mg/kg/d for 25 weeks and 40 mg/kg/d for 53 weeks.

Half of the control groups received corn oil (match controls) ; the second half was not treated (untreated controls)

CLINICAL OBSERVATIONS and FREQUENCY:

- Clinical signs : yes

- Mortality : yes
- Bodyweight : yes
- Food and water consumption : not specified
- Biochemistry : no
- Urinalysis : no

ORGANS EXAMINED ATNECRPSY

- Macroscopic and Microscopic : all main organs and tissues

STATISTICAL METHOD

Reliability : (2) valid with restrictions
study well documented, meets generally accepted scientific principles, acceptable for assessment

Flag : Critical study for SIDS endpoint

11.05.2001

(81)

Species : mouse
Sex : male/female
Strain : B6C3F1
Route of admin. : gavage
Exposure period : 78 weeks
Frequency of treatm. : 5 d/week
Post exposure period : 12 weeks
Doses : time-weighted average doses: 142 and 284 mg/kg/day
Result : positive
Control group : yes
Method : other
Year : 1978
GLP : no data
Test substance : as prescribed by 1.1 - 1.4

Method : Conventional NCI carcinogenicity protocol as used during the seventies in rats.
NOAEL : >= 108 mg/kg/d (males) and 76 mg/kg/d (females)

TOXIC RESPONSE/EFFECTS BY DOSE LEVELS :

- Mortality-Time to death : increase mortality at higher dose ; survival at 105 weeks : 50% of high and low dosed males; 40% and 58% of high and low dose females respectively.
- Clinical signs : no data
- Bodyweight gain : reversible dose-related decrease
- Histopathology : No increase of incidence of non-neoplastic lesions ; No statistically dignificant incidence of neoplastic lesions was observed although 2 hepatocellular carcinomas and 1 neoplastic nodule were observed in the high dose group out of 49 males compared with 0/20 in vehicle controls.

Result : NOAEL : < 142 mg/kg/d (males and females)

TOXIC RESPONSE/EFFECTS BY DOSE LEVELS :

- Mortality-Time to death : dose related increased mortality
- Clinical signs : no data
- Bodyweight gain : slight dose related decrease
- Histopathology : No increase of incidence of non-neoplastic lesions ; statistically significant excess of hepatocellular carcinomas were found in males (6%, 26% and 90% in control, low and high dose group respectively) and in females (0%, 63% and 91% in control, low and high dose group respectively). These tumours appeared earlier in mice

	administred the higher dose.	
Source	: ATOFINA Paris la Defense,France	
	: EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)	
Test condition	: TEST ORGANISM :	
	- Age : 5 weeks	
	- Number of animals :2 groups of 50 males and 50 females;	
	control groups : 40 males and 40 females	
	ADMINISTRATION/EXPOSURE :	
	- Doses : Initially high dose and low dose animals received 200 mg/kg/d and 100 mg/kg/d respectively; these doses were increased after 18 weeks to 300 mg/kg/d and 150 mg/kg respectively during 3 weeks. These doses were further increased to 400 and 200 mg/kg during 5 weeks but returned to 300 and 150 mg/kg/d respectively during the following 52 weeks (total 78 weeks).	
	Half of the control groups received corn oil (match controls) ; the second half was not treated (untreated controls)	
	CLINICAL OBSERVATIONS and FREQUENCY:	
	- Clinical signs : yes	
	- Mortality : yes	
	- Bodyweight : yes	
	- Food and water consumption : not specified	
	- Biochemistry : no	
	- Urinalysis : no	
	ORGANS EXAMINED AT NECROPSY	
	- Macroscopic and Microscopic : all main organs and tissues	
	STATISTICAL METHOD	
	: (2) valid with restrictions	
	: Critical study for SIDS endpoint	
Reliability Flag		(81)
17.05.2001		
Species	: mouse	
Sex	: male	
Strain	: Strain A	
Route of admin.	: i.p.	
Exposure period	: 3 to 9 weeks	
Frequency of treatm.	: 2/week	
Post exposure period	: 15 to 21 weeks	
Doses	: 80 mg/kg (5 inj.); 200 mg/kg (18 inj.) and 400 mg/kg (16 inj.)	
Result	: negative	
Control group	: yes	
Method	: other: Pulmonary Tumor Response Bioassay	
Year	: 1977	
GLP	: no data	
Test substance	: as prescribed by 1.1 - 1.4	
Method	: Strain: A/St Route of Administration: intra-peritoneal injections of the test material ; vehicle : tricapyrin	
Result	: LUNG TUMOR FREQUENCY : Lung tumor incidences were increased in treated groups versus control the differences were not statistically significant. Although the highest dose group reached nearly statistical significance (p = 0.059), the biological significance of this result is limited due to poor survival (5/20 versus 15/20 in controls).	

5. TOXICITY

ID: 79-34-5

DATE: 09.08.2002

Source : ATOFINA Paris la Defense, France
EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)

Test condition : TEST ORGANISM :
- Age : 6-8 weeks
- Number of animals : 20/group

ADMINISTRATION/EXPOSURE :
- Vehicle : tricapyrin

CLINICAL OBSERVATIONS : None

ORGANS EXAMINED :
- Lungs : examined under dissecting microscope and the number of surface adenomas was counted. A few surface nodules were examined histologically to confirm the typical morphological appearance of the adenoma.

STATISTICAL METHODS :
- Standard Student t test : the frequency of lung adenomas in each treated group was compared with that in the control group.

Reliability : (2) valid with restrictions
study well documented, meets generally accepted scientific principles, acceptable for assessment

11.05.2001

(121)

5.8.1 TOXICITY TO FERTILITY

Type : One generation study

Species : rat

Sex : male

Strain : no data

Route of admin. : inhalation

Exposure period : 9 months

Frequency of treatm. : 4h/d, 5d/wk

Premating exposure period

Male : 9 months

Female : none

Duration of test : up to sexual maturation of F1

No. of generation studies :

Doses : 13.3 mg/m³ (1.94 ppm)

Control group : yes

NOAEL parental : < 13.3 mg/m³

NOAEL F1 offspring : > 13.3 mg/m³

Method : other

Year : 1972

GLP : no data

Test substance : as prescribed by 1.1 - 1.4

Method : Only male were exposed . There fertility was checked by mating them with untreated females that were allowed to produce a F1 generation.

Result : TOXIC RESPONSE/EFFECTS BY DOSE LEVEL :

- Systemic toxicity data on male parents :
NOAEL < 13.3 mg/m³
- Mortality : no significant difference between treated and control animals.
- Clinical signs : none described

- Bodyweight gain : At the end of 110 days, the exposed rats weighed significantly less than control (415 versus 435 g) but the difference was no longer present after 265 days due to wide individual variations).

- Hematology : leucocytes were 90% higher than the controls after 110 days. No data on WBC were mentioned thereafter.

- Clinical biochemistry : serum globuline were increased after 110 days and at the end of the study in treated rats; fat content of the liver was increased in treated animals after 265 days (34%); the ACTH activity in hypophyse was decreased at interim and final sacrifices (65 % to 13 %).

- Organ weights : No data reported

- Histopathology : No data reported

- FERTILITY AND GESTATIONAL DATA :

- NOAEL : > 13.3 mg/m³

- There was no statistical difference between females sired by exposed males and females sired by control males on number of gravid females and any of the gestational parameters measured

- DATA ON OFFSPRINGS:

- NOAEL : > 13.3 mg/m³

- There was no statistically significant difference between results of offsprings from the exposed father group and offsprings from the control father group on any of the measured parameter.

- There was no gross malformations.

Source

: ATOFINA Paris la Defense, France
EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)

Test condition

: PROTOCOLE:
One week before the end of the 9th month of inhalation exposure, the male rats were mated with untreated virgin females.

TEST ORGANISM:

- Number : 7 control and 7 exposed male rats were mated each one with 5 virgin females

- Weight at start of mating : females : 250-300 g

PARAMETERS ASSESSED DURING STUDY P AND F1:

- Clinical observations : no data

- Estrous cycle : not appropriate

- Sperm examination : no

PARAMETERS ASSESSED DURING STUDY F1:

- Number and % pregnant females

- Number of offsprings delivered

- Number of offsprings per litter

OFFSPRING :

- Mean neo-natal offspring weight per litter

- survival at days 1, 2 7 14 21 and 84 after birth

- Weight and sex/ratio at day 84

- gross external malformations

ORGANS EXAMINED AT NECROPSY : none

STATISTICAL METHOD :

- Standard Student t-Test

5. TOXICITY

ID: 79-34-5

DATE: 09.08.2002

Reliability	:	(2) valid with restrictions significant methodological deficiencies Study limited due to non examination of sperm and no histological data on testes of males of parent generation.	
Flag 09.08.2002	:	Critical study for SIDS endpoint	(85)
Type	:	other: examination of male fertility	
Species	:	rat	
Sex	:	male	
Strain	:	no data	
Route of admin.	:	inhalation	
Exposure period	:	5 days	
Frequency of treatm.	:	dominant lethal assay	
Premating exposure period	:		
Male	:	5 days	
Female	:		
Duration of test	:		
No. of generation studies	:		
Doses	:	349 mg/m3	
Control group	:		
Method	:	other	
Year	:	1980	
GLP	:	no data	
Test substance	:	as prescribed by 1.1 - 1.4	
Remark	:	Abstract only available from the CICAD document. We did not have access to the original NTP report.	
Result	:	WHO, CICAD, 1998 reported the following : Small but statistically significant, increase in one type of sperm abnormality were observed in rats exposed to 349 mg/m3 for 5 days, although the authors considered this effect to be of questionable biological significance.	
Source	:	Atofina Paris la Defense EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)	
Reliability 18.06.2001	:	(4) not as signable Secondary literature	(119)
Type	:	other: examination of sexual organs during a sub-chronic toxicity study	
Species	:	rat	
Sex	:	male	
Strain	:		
Route of admin.	:	gavage	
Exposure period	:	120 days (82 times)	
Frequency of treatm.	:	5d/wk	
Premating exposure period	:		
Male	:		
Female	:		
Duration of test	:		
No. of generation studies	:		
Doses	:		
Control group	:		
NOAEL parental	:	< 3.2 mg/kg bw	
Method	:	other	
Year	:	1977	
GLP	:	no data	
Test substance	:	as prescribed by 1.1 - 1.4	

5. TOXICITY

ID: 79-34-5

DATE: 09.08.2002

Result	:	- High incidence of interstitial edema in the testes Clumped sperm Epithelial cells present in the tubular lumen Partial necrosis and totally atrophied tubules , giant cells two-row germinal epithelial cells Disturbed spermatogenesis Some of these changes persisted during the follow-up observation period. - In parallel at the highest doses there were damages in liver, kidney and thyroid gland. These damages in thyroid after the 2-week reversibility period in high dose groups. Minor liver changes occurred at 3.2 mg/kg. - NOAEL for testicular effects : 3.2 mg/kg	
Source	:	Atofina Paris la Defense EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)	
Reliability	:	(3) invalid significant methodological deficiencies	
		19.06.2001	(122)
Type	:	other: sexual organ examination during a chronic toxicity study	
Species	:	monkey	
Sex	:	male	
Strain	:		
Route of admin.	:	inhalation	
Exposure period	:	9 months	
Frequency of treatm.	:	2h/d, 6d/wk (190 exposures)	
Premating exposure period	:		
Male	:		
Female	:		
Duration of test	:		
No. of generation studies	:		
Doses	:	1000-4000 ppm	
Control group	:		
NOAEL parental	:	> 1000 - 4000 ppm	
Method	:	other	
Year	:	1962	
GLP	:	no data	
Test substance	:	as prescribed by 1.1 - 1.4	
Result	:	Exposure of one male monkey (macaca cynomolga Linné) for 9 months to 1000-4000 ppm (= 13740-27480 mg/m ³) produced no pathology in the testes.	
Source	:	ATOFINA Paris la Defense,France EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)	
Reliability	:	(3) invalid significant methodological deficiencies	
		09.08.2002	(123)
Type	:	other: sexual organ examination during sub-chronic toxicity study	
Species	:	rat	
Sex	:	female	
Strain	:	Sprague-Dawley	
Route of admin.	:	inhalation	
Exposure period	:	15 weeks (78 exposures)	
Frequency of treatm.	:	5-6 h/d ; 5d/wk	
Premating exposure period	:		
Male	:		
Female	:		
Duration of test	:		

5. TOXICITY

ID: 79-34-5

DATE: 09.08.2002

No. of generation studies	:	
Doses	:	560 ppm (3850 mg/m ³)
Control group	:	yes
NOAEL parental	:	> 560 ppm
Method	:	other
Year	:	1977
GLP	:	no data
Test substance	:	as prescribed by 1.1 - 1.4
Method	:	Sub-chronic toxicity study on female rats including necropsies and histopathological analysis of ovaries and uterus.
Result	:	<p>Toxic response/effect : general systemic effects</p> <ul style="list-style-type: none"> - Mortality : not specified - Clinical signs : transient CNS depressing effects during first exposures. - Bodyweight gain : decreased during the last weeks of exposure - Hematology : slight decrease of hematocrit, red and white cells - Organ weights : increased liver weight in each interim and final sacrifice - Histopathology : Liver hyperplasia and hepatocellular histological lesions seen during the first weeks regressed after 19 exposure and disappeared after 39 exposures. - Other examinations : increased DNA biosynthesis appeared after 4 exposures (313% versus controls). That effect disappeared when measured during the following weeks. <p>EFFECTS ON REPRODUCTIVE ORGANS :</p> <ul style="list-style-type: none"> - ovaries and uterus : histological examinations did not show any abnormalities on all animals necropsied at interim intervals or at final sacrifice. - NOAEL for female reproductive organs : >560 ppm
Source	:	<p>ATOFINA Paris la Defense, France EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)</p>
Test condition	:	<p>TEST ORGANISM :</p> <ul style="list-style-type: none"> - Age : adult - Weight at study initiation : not stated - Number of animals : 165 female Sprague Dawley rats were divided into one control group and 2 treated groups. <p>ADMINISTRATION/EXPOSURE:</p> <ul style="list-style-type: none"> - Type of exposure : Animals were exposed whole body by inhalation in chambers with atmospheric renewal of 2m³/hour. - Doses : One group was exposed to vapours of 1,1,1-trichloroethane and the other to 1,1,2,2-tetrachloroethane at nominal concentration of 1100 and 560 ppm respectively. A third unexposed group served as control. Some animals (unspecified number) were sacrificed after 2, 4, 9, 19, 39 and 63 exposures. <p>CLINICAL OBSERVATIONS:</p> <ul style="list-style-type: none"> - Clinical signs : yes - Mortality : yes - Bodyweight : yes , followed all along the 15 week exposure - Food and water consumption : not specified - Haematology : yes, blood cytology followed

- Urinalysis : not specified

ORGANS EXAMINED AT NECROPSY:

- Macroscopic and microscopic : liver, kidney, adrenals, ovaries, uterus.

OTHER EXAMINATIONS:

- Hepatic DNA neosynthesis was determined 4 h after injection of 3H Thymidine.

STATISTICAL METHOD: not specified

Reliability

: (2) valid with restrictions
study well documented, meets generally accepted scientific principles, acceptable for assessment

Flag

26.10.2001

: Critical study for SIDS endpoint

(83)

Type

: other: sexual organs examination during a chronic toxicity study

Species

: rat

Sex

: male/female

Strain

: Osborne-Mendel

Route of admin.

: oral feed

Exposure period

: 78 weeks

Frequency of treatm.

:

Premating exposure period

Male

:

Female

:

Duration of test

:

No. of generation studies

:

Doses

: time-weighted average doses: 62 and 108 mg/kg/day (males); 43 and 76 mg/kg/day (females)

Control group

:

NOAEL parental

: > 108 mg/kg bw

Method

: other

Year

: 1978

GLP

: no data

Test substance

: as prescribed by 1.1 - 1.4

Result

:

TOXIC RESPONSE/EFFECTS BY DOSE LEVELS :

NOAEL : \geq 108 mg/kg/d (males) and 76 mg/kg/d (females)

- Mortality-Time to death : increase mortality at higher dose ; survival at 105 weeks : 50% of high and low dosed males; 40% and 58% of high and low dose females respectively.

- Clinical signs : no data

- Bodyweight gain : reversible dose-related decrease

- Histopathology : No increase of incidence of non-neoplastic lesions ; No statistically significant incidence of neoplastic lesions was observed although 2 hepatocellular carcinomas and 1 neoplastic nodule were observed in the high dose group out of 49 males compared with 0/20 in vehicle controls.

- HISTOPATHOLOGY OF SEXUAL ORGANS :

NOAEL : >108 mg/kg/d (males) and 76 mg/kg/d (females)
no changes in male and in female organs examined on animals dead during the exposure period or at final necrops

5. TOXICITY

ID: 79-34-5

DATE: 09.08.2002

Source : ATOFINA Paris la Defense, France
EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)

Test condition : TEST ORGANISM :
- Age : 7 weeks
- Number of animals : 2 groups of 50 males and 50 females;
control groups : 40 males and 40 females

ADMINISTRATION/EXPOSURE :
- Doses : High dose animals received 100 mg/kg/d ; in males this was increased after 14 weeks to 130 mg/kg/d for 18 weeks followed by 9 cycles of 4 weeks at this dose and 1 week treatment three for 45 weeks (total 78 weeks) ; in females, the dose was reduced after 25 weeks to 80 mg/kg/d for 7 weeks followed by the cyclic treatment at this dose for 45 weeks.
Low dose males received 50 mg/kg/d for 14 weeks and 65 mg/kg/d for 64 weeks ; females received 50 mg/kg/d for 25 weeks and 40 mg/kg/d for 53 weeks.
Half of the control groups received corn oil (match controls) ; the second half was not treated (untreated controls)

CLINICAL OBSERVATIONS and FREQUENCY:
- Clinical signs : yes
- Mortality : yes
- Bodyweight : yes
- Food and water consumption : not specified
- Biochemistry : no
- Urinalysis : no

ORGANS EXAMINED AT NECRPSY
- Macroscopic and Microscopic : all main organs and tissues

STATISTICAL METHOD
Reliability : (2) valid with restrictions
Test procedure in accordance with national standard methods with acceptable restrictions

Flag : Critical study for SIDS endpoint
18.06.2001

Type : other: sexual organs examination during a chronic toxicity study
Species : mouse
Sex : male/female
Strain : B6C3F1
Route of admin. : oral feed
Exposure period : 78 weeks
Frequency of treatm. :
Premating exposure period :
Male :
Female :
Duration of test :
No. of generation studies :
Doses : time-weighted average doses: 142 and 284 mg/kg/day
Control group :
NOAEL parental : > 284 mg/kg bw
Method : other
Year : 1978
GLP : no data
Test substance : as prescribed by 1.1 - 1.4

(81)

Result : TOXIC RESPONSE/EFFECTS BY DOSE LEVELS
NOAEL : < 142 mg/kg/d (males and females)

- Mortality-Time to death : dose related increased mortality
- Clinical signs : no data
- Bodyweight gain : slight dose related decrease
- Histopathology : No increase of incidence of non-neoplastic lesions ; statistically significant excess of hepatocellular carcinomas were found in males (6%, 26% and 90% in control, low and high dose group respectively) and in females (0%, 63% and 91% in control, low and high dose group respectively).

Source : ATOFINA Paris la Defense,France
EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)

Test condition : TEST ORGANISM :

- Age : 5 weeks
- Number of animals :2 groups of 50 males and 50 females; control groups : 40 males and 40 females

ADMINISTRATION/EXPOSURE :

- Doses : Initially high dose and low dose animals received 200 mg/kg/d and 100 mg/kg/d respectively; these doses were increased after 18 weeks to 300 mg/kg/d and 150 mg/kg respectively during 3 weeks. These doses were further increased to 400 and 200 mg/kg during 5 weeks but returned to 300 and 150 mg/kg/d respectively during the following 52 weeks (total 78 weeks).

Half of the control groups received corn oil (match controls) ; the second half was not treated (untreated controls)

CLINICAL OBSERVATIONS and FREQUENCY:

- Clinical signs : yes
- Mortality : yes
- Bodyweight : yes
- Food and water consumption : not specified
- Biochemistry : no
- Urinalysis : no

ORGANS EXAMINED AT NECROPSY

- Macroscopic and Microscopic : all main organs and tissues

STATISTICAL METHOD

Reliability : (2) valid with restrictions
Test procedure in accordance with national standard methods with acceptable restrictions

Flag : Critical study for SIDS endpoint
18.06.2001

Type : other: sexual organs examined during a sub-acute toxicity study

Species : rat

Sex : male

Strain :

Route of admin. : inhalation

Exposure period : 4-10 days

(81)

5. TOXICITY

ID: 79-34-5

DATE: 09.08.2002

Frequency of treatm.	:	
Premating exposure period	:	
Male	:	
Female	:	
Duration of test	:	
No. of generation studies	:	
Doses	:	2 ppm
Control group	:	yes
NOAEL parental	:	< 2 ppm
Method	:	other
Year	:	1972
GLP	:	no data
Test substance	:	as prescribed by 1.1 - 1.4
Result	:	Seminal vesicles and sperm production :
		due to inconsitent results the validity of the data is questionable :
		- 4-day treatment : some atrophy of seminal vesicles and decreased spermatogenesis on 5/7 rats
		- 10-day treatment : no damage to seminal vesicles or sperm production.
Source	:	Atofina Paris la Defense EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)
Reliability	:	(3) invalid significant methodological deficiencies
06.02.2002		(124)
Type	:	other: sperm motility and vaginal cytology evaluation
Species	:	rat
Sex	:	male/female
Strain	:	Fischer 344
Route of admin.	:	other: oral feed (microencapsulated)
Exposure period	:	13 weeks
Frequency of treatm.	:	ad libitum
Premating exposure period	:	
Male	:	
Female	:	
Duration of test	:	
No. of generation studies	:	
Doses	:	37, 75, 150 mg/kg feed
Control group	:	yes, concurrent vehicle
other: NOAEL male rats	:	< 37 ppm
other: NOAEL female rats	:	= 37 ppm
Method	:	other: NTP, sperm motility and vaginal cytology evaluation
Year	:	
GLP	:	yes
Test substance	:	as prescribed by 1.1 - 1.4
Method	:	In a subchronic study, F344 rats were exposed to 1,1,2,2-tetrachloroethane via dosed feed. This study describes the "Sperm Motility Vaginal Cytology Evaluation" (SMVCE) portion of the subchronic study. For male rats, the reproductive endpoints evaluated are caudal, epididymal, and testicular weights, sperm motility, sperm count per 'g' caudal tissue, and testicular spermatid head count. For female rats, the parameters evaluated are terminal body weight, relative frequency of different estrous phases and the estrous cycle length.

STATISTICAL ANALYSIS: For male and female terminal body weights and male reproductive parameters, the significance of differences between control and dosed group response is assessed using the parametric multiple comparisons procedures of Williams and Dunnett. Jonckheere's test was used to assess the significance of dose-response trends. Trend sensitive tests were used when Jonckheere's test was significant at $p < 0.01$. If the p -value from Jonckheere's test for a dose-related trend is greater than or equal to 0.10, Dunn's test is used. If the p -value is less than 0.10, Shirley's test is more appropriate.

The outlier test of Dixon and Massey was employed to detect extreme values. Implausible values, extreme values from animals that were suspected of being sick due to causes other than treatment and values that were indicated to be inadequate due to measurement problems were eliminated from analysis.

Treatment effects on vaginal cytology data are investigated by applying a multivariate analysis of variance (using Wilk's Criterion as the test statistic) to test for the simultaneous equality of measurements across dose levels. Since the data are proportions (the proportion of the observation period that an animal was in a given estrous phase), an arcsine transformation was used to bring the data into closer conformance with the normality assumptions required for the multivariate analysis of variance.

Remark

: The decrease of the reproductive organ weights was secondary to the body weight decrease as demonstrated by the absence of effect on the organ to body weight ratio.

Result

: MALE RATS: There was a dose-related decrease in terminal body weights and the differences were significant at the 75 and 150 mg/kg dose levels. There was a significant decrease in left caudal absolute weights at the 150 mg/kg dose level and in left epididymal absolute weights at the 75 and 150 mg/kg dose levels. Epididymal sperm motility was significantly decreased for all three dose levels tested ($p < 0.01$). Left testicular weights, epididymal sperm count per 'g' caudal tissue, total spermatid heads per testis and total spermatid heads per 'g' testis were not affected ($p > 0.05$).

FEMALE RATS: There was a dose-related decrease in terminal body weights and the differences were significant at the 75 and 150 mg/kg dose levels ($p < 0.01$). There was a significant difference with respect to the amount of time spent in estrous phases between controls and rats treated with 150 mg/kg 1,1,2,2-tetrachloroethane. This appeared to be primarily an increase in time spent in the diestrus phase. The average estrous cycle length was not affected ($p > 0.05$).

Source

: Atofina, Paris-la-Défense, France.

Conclusion

: For male and female rats, terminal body weights were significantly decreased at the 75 and 150 mg/kg dose levels. There was a significant decrease in left caudal absolute weights at the 150 mg/kg level, in left epididymal absolute weights at the 75 and 150 mg/kg levels and in epididymal sperm motility at the 37, 75 and 150 mg/kg levels. For female rats, there was a significant difference with respect to the amount of time spent in estrous stages at the 150 mg/kg dose level when compared to the controls.

Reliability

: (2) valid with restrictions
: Critical study for SIDS endpoint

Flag

06.02.2002

(125)

Type

: other: sperm motility and vaginal cytology evaluation

Species

: mouse

Sex

: male/female

Strain

: B6C3F1

Route of admin.

: other: oral feed (microencapsulated)

Exposure period

: 13 weeks

5. TOXICITY

ID: 79-34-5

DATE: 09.08.2002

Frequency of treatm. : ad libitum
Premating exposure period
 Male :
 Female :
Duration of test :
No. of generation studies :
Doses : 175, 700, 1400 mg/kg feed
Control group : yes, concurrent vehicle
NOAEL parental : = 175 ppm
Method : other: NTP, sperm motility and vaginal cytology evaluation
Year :
GLP :
Test substance :

Method : In a subchronic study, B6C3F1 mice were exposed to 1,1,2,2-tetrachloroethane via dosed feed. This report describes the "Sperm Motility Vaginal Cytology Evaluation" (SMVCE) portion of the subchronic study. For male mice, the reproductive endpoints evaluated are caudal, epididymal, and testicular weights, sperm motility, sperm count per 'g' caudal tissue, and testicular spermatid head count. For female mice, the parameters evaluated are terminal body weight, relative frequency of different estrous phases and the estrous cycle length.

STATISTICAL ANALYSIS: For male and female terminal body weights and male reproductive parameters, the significance of differences between control and dosed group response is assessed using the parametric multiple comparisons procedures of Williams and Dunnett. Jonckheere's test was used to assess the significance of dose-response trends. Trend sensitive tests were used when Jonckheere's test was significant at $p < 0.01$. If the p -value from Jonckheere's test for a dose-related trend is greater than or equal to 0.10, Dunn's test is used. If the p -value is less than 0.10, Shirley's test is more appropriate.

The outlier test of Dixon and Massey was employed to detect extreme values. Implausible values, extreme values from animals that were suspected of being sick due to causes other than treatment and values that were indicated to be inadequate due to measurement problems were eliminated from analysis.

Treatment effects on vaginal cytology data are investigated by applying a multivariate analysis of variance (using Wilk's Criterion as the test statistic) to test for the simultaneous equality of measurements across dose levels. Since the data are proportions (the proportion of the observation period that an animal was in a given estrous phase), an arcsine transformation was used to bring the data into closer conformance with the normality assumptions required for the multivariate analysis of variance.

Remark : The decrease of the reproductive organ weights was secondary to the body weight decrease as demonstrated by the absence of effect on the organ to body weight ratio.

Result : MALE MICE: Terminal body weights were significantly decreased at the 700 and 1400 mg/kg dose levels ($p < 0.01$). Left caudal and epididymal absolute weights were significantly decreased at the 1400 mg/kg dose level while left testicular absolute weights were significantly decreased at the 700 mg/kg dose level ($p < 0.05$). The mean value for left testicular absolute weights at the 1400 mg/kg dose level was also decreased but was not statistically significant. Epididymal sperm motility was slightly decreased compared to controls and other dosed animals but this difference was found significantly different at the 1400 mg/kg dose level ($p < 0.05$). Epididymal sperm count per 'g' caudal tissue was decreased in a dose-related manner for treated animals but these differences were not

statistically significant. Total spermatid heads per testis and total spermatid heads per 'g' testis were not affected ($p > 0.05$).

FEMALE MICE: Terminal body weights were significantly decreased at the 700 and 1400 mg/kg dose levels ($p < 0.01$: Table 3). While the average estrous cycle length was significantly increased at the 1400 mg/kg dose level ($p < 0.05$), estrual cyclicity was not affected ($p > 0.05$).

Source : Atofina, Paris-la-Défense, France.
Conclusion : Terminal body weights were significantly decreased for both male and female mice at the 700 and 1400 mg/kg dose levels. Left caudal and epididymal absolute weights and epididymal sperm motility were significantly decreased at the 1400 mg/kg level and left testicular absolute weights were significantly decreased at the 700 mg/kg level. For female mice, the average estrous cycle length was significantly increased at the 1400 mg/kg dose level.

Reliability Flag : (2) valid with restrictions
 : Critical study for SIDS endpoint

06.02.2002

(125)

5.8.2 DEVELOPMENTAL TOXICITY/TERATOGENICITY

Species : rat
Sex : female
Strain : Sprague-Dawley
Route of admin. : oral feed
Exposure period : from gestation day 6 to 15
Frequency of treatm. : ad libitum
Duration of test : Sacrifice on gestation day 20
Doses : 0.045, 0.135, 0.270, 0.405 and 0.540% (equivalent to a daily intake of 34, 98, 180, 278 and 330 mg/kg bw/d, respectively)
Control group : yes, concurrent vehicle
NOAEL maternal tox. : < 34 mg/kg bw
NOAEL Fetotoxicity : = 34 mg/kg bw
Method : other: range finding developmental toxicity study
Year :
GLP : yes
Test substance : other TS: 1,1,2,2-tetrachloroethane, 98% purity

Method : Formulation

The microencapsulated test chemical was formulated according to procedures specified in the "Microencapsulation Report" of August 1989 by NIEHS for the 1,2-dichloroethylene feed studies. Meal feed was formulated at 105% of the desired dose levels due to a predicted loss of chemical when mixed. The microcapsules were 54% TCE which was taken into account during dosing formulations

Reference Analyses of Dosing Samples:

Dose group	Theoretical Concentration (percent)	Found Concentration (percent)	Percent of Theoretical
Control	0.0	0.0	---
0.0473%	0.473	0.473	100
0.142%	1.420	1.480	104
0.284%	2.840	2.880	101
0.425%	4.250	4.290	101
0.567%	5.670	5.770	102

Analyses were performed via a packed column gas chromatographic

method by Research Triangle Institute, Research Triangle Park, NC.

Observations:

A. In-life

- bw on gd 4, 6, 9, 11, 14, and 16
- feed consumption gd 6-11 and gd 11-16
- overt signs of toxicity or mortality, twice daily

B. At Cesarean Section

- terminal body weight (gd 20)
- number of implantation sites
- number of resorptions
- number of dead fetuses
- number of live fetuses
- gravid uterine weight

Statistical Analysis:

Data were analyzed using nonparametric statistical methods to identify dose response trends among treatment groups, and differences between control and treated groups. Whenever possible the data are presented as mean \pm standard error. Kruskal-Wallis one-way analysis of variance by ranks was used to test for differences among dose groups for all parameters except gd 4 to gd 20 body weights and consumption data. Whenever the result of a Kruskal-Wallis test was significant ($p < 0.05$), the Mann-Whitney Wilcoxon U test was used to make individual comparisons between control and treated groups for the measure: a one-tailed test was used for all parameters except that maternal and fetal body weight parameters were examined in a two-tailed test. Jonckheere's test for k independent samples was employed to identify significant dose-response trends for gd 4 to gd 20 body weight data and consumption data. If no trend was found, Dunn's test was used for differences among dose groups. If a trend was detected, Shirley's test was applied.

Body weight data from non-pregnant animals were not included. Rats that were visibly pregnant only by ammonium sulfide staining were included only in the body weight and consumption data calculations.

Result

: A. Maternal Toxicity

Signs of systemic toxicity were noted in the 0.540% and 0.405% dose groups. Maternal body weights were decreased in an almost dose-related manner beginning gd 9 and the differences were significant at 0.135% and higher levels ($p < 0.05$). In the 0.045% group, the average body weight on gd 16 was significantly lower than the control group ($p < 0.05$).

Maternal weight gain expressed as weight gain during treatment, and corrected weight gain decreased significantly ($p < 0.05$) in all dose groups except the 0.045% group. Maternal weight gain during gestation decreased ($p < 0.05$) in all dose groups with the exception of the 0.135% group.

Daily consumption values were significantly lower ($p < 0.05$) in all dose groups. The reduced intake of feed in the 0.135% and higher dose groups ($p < 0.05$), particularly for days 6-11, may have contributed to the decrease in body weights in these groups.

B. Developmental Toxicity

At scheduled sacrifice on gd 20, average fetal weight in all dose groups except the 0.045% group was decreased significantly relative to the control

group ($p < 0.05$). Gravid uterus weight was adversely affected ($p < 0.05$) in the 0.540% dose group. One out of nine animals in the 0.135% group and four out of nine in the 0.540% group completely resorbed their litters.

Source : Atofina, Paris-la-Défense, France.

Conclusion : TCE treatment caused maternal toxicity at almost all dose levels tested. Maternal body weights were adversely affected in an almost dose-related manner beginning gd 9. Developmental toxicity in the form of decreased average fetal weight was noted at all dose levels except the 0.045% group. Also, an increase in totally resorbed litters was noted at the 0.54% dose level.

Reliability : (2) valid with restrictions

Flag : Critical study for SIDS endpoint

06.02.2002

(126)

Species : mouse

Sex : female

Strain : Swiss

Route of admin. : oral feed

Exposure period : from gestation day 6 to 15

Frequency of treatm. : ab libitum

Duration of test : Sacrifice on gestation day 20

Doses : First study: 4.0, 7.5 and 10.0%
Second study: 0.5, 1.0, 1.5, 2.0, 3.0% (equivalent to a daily intake of 987, 2120, 2216 and 4575 mg/kg bw/d, respectively)

Control group : yes, concurrent vehicle

NOAEL maternal tox. : = 987 mg/kg bw

NOAEL Fetotoxicity : = 987 mg/kg bw

Method : other: range finding developmental toxicity study

Year : 1991

GLP : no data

Test substance : other TS: 1,1,2,2-tetrachloroethane, 98% purity

Method : Dose Selection/Formulation

In an earlier study, TCE was tested at 0.0125, 0.05, 0.10, 0.20, and 0.30% levels. Due to a low rate of pregnancy (63% of experimental animals were not pregnant) and the lack of signs of maternal and/or developmental toxicity, TCE was retested. Dose levels selected for the repeat study were 1.5, 5.0 and 10.0%. The dosed feed was mistakenly formulated at levels of 4.0, 7.5, and 10.0% and the study initiated prior to detection of this error. All animals in these three groups died by gd 13. Based on these data, dose levels for the second repeat study were 0.5, 1.0, 1.5, 2.0, and 3.0%. Results of both repeat studies are described in this report.

The microencapsulated test chemical was formulated according to procedures specified in the "Microencapsulation Report" of August 1989 by NIEHS for the 1,2-dichloroethylene feed studies. Meal feed was formulated at 105% of the desired dose levels due to a predicted loss of chemical when mixed. The microcapsules were 54% TCE which was taken into account during dosing formulations.

REFERENCE ANALYSES OF DOSING SAMPLES:

Dose Group	Theoretical Concentration (mg/g)	Found Concentration (mg/g)	Percent of Theoretical
Control	0.0	0.0	---
0.50 %	5.00	5.45	109
1.00 %	10.00	11.30	113
1.50 %	15.00	18.10	121

2.00 %	20.00	23.60	118
3.00 %	30.00	36.90	123

Analyses were performed by a packed column gas chromatographic method by Research Triangle Institute, Research Triangle Park, NC.

OBSERVATIONS:

A. In-life

- bw on gd 4, 6, 9, 11, 14, and 16
- feed consumption gd 6-11 and gd 11-16
- overt signs of toxicity or mortality, twice daily

B. At Cesarean Section

- terminal body weight (gd 17)
- number of implantation sites
- number of resorptions
- number of dead fetuses
- number of live fetuses
- gravid uterine weight

STATISTICAL ANALYSIS:

Data were analyzed using nonparametric statistical methods to identify dose response trends among treatment groups, and differences between control and treated groups. Whenever possible the data are presented as mean ± standard error. Kruskal-Wallis one-way analysis of variance by ranks was used to test for differences among dose groups for all parameters except gd 4 to gd 17 body weights and consumption data. Whenever the result of a Kruskal-Wallis test was significant (p<0.05), the Mann-Whitney Wilcoxon U test was used to make individual comparisons between control and treated groups for the measure: a one-tailed test was used for all parameters except that maternal and fetal body weight parameters were examined in a two-tailed test. Jonckheere's test for k independent samples was employed to identify significant dose-response trends for gd 4 to gd 17 body weight data and consumption data. If no trend was found, Dunn's test was used for differences among dose groups. If a trend was detected, Shirley's test was applied. Data were analyzed, using the methods noted above, separately for each study. For example, the data for the animals in the 4.0, 7.5, and 10.0% groups were analyzed using the control animals from the same batch only.

Body weight data from non-pregnant animals were not included. Mice that were visibly pregnant by ammonium sulfide staining were included in the body weight calculations.

Result

: A. Maternal Toxicity

All animals in the 4.0, 7.5, and 10.0% groups were found dead or were sacrificed for humane reasons by gd 13.

As previously mentioned, TCE was retested at 0.5 to 3.0% levels. Signs of systemic toxicity were noted in some animals in the 1.0% group and all animals in the 1.5% and higher groups during the twice daily health surveillances. At necropsy, abnormal livers were noted in females from the 0.5, 1.0, and 1.5% groups.

Maternal body weights at 0.5% and higher levels were decreased beginning gd 9 in a generally dose-related manner. Body weights were significantly decreased (p<0.05) in the 1.0% group gd 9 to 16, in the 1.5% groups on gd 11 and 14 and in the 2.0% group from gd 9 to gd 16. Two out

of ten animals were sacrificed for humane reasons in the 1.0% group. Four out of five animals in the 1.5% group and five out of seven animals in the 2.0% group were found dead or were sacrificed for humane reasons. All nine animals in the 3.0% group were sacrificed for humane reasons by gd 12.

Maternal weight gain expressed as weight gain during gestation, weight gain during treatment, and corrected weight gain were statistically decreased ($p < 0.05$) at the 1.0% level. Weight gain during treatment also decreased ($p < 0.05$) at the 2.0% dose level. The presence of only one animal at necropsy at the 1.5% level precluded statistical analysis.

B. Developmental Toxicity

As previously mentioned, all experimental animals in the 4.0, 7.5, and 10.0% groups died prior to the scheduled necropsy on gd 17.

At scheduled necropsy in the second repeat study, one out of eleven animals in the control group, two out of eight animals in the 1.0% group, the only pregnant animal in the 1.5% dose group and one out of the two animals in the 2.0% dose group had completely resorbed their litters. The other animal in the 2.0% group had fewer live fetuses per litter, and increased resorptions and non-live implants per litter when compared to the control values. However, these parameters were not statistically analyzed due to the presence of the one animal. All other endpoints were similar to control values.

C. Feed Consumption

The average daily feed consumption was adversely affected ($p < 0.05$) in almost all dose groups except the 0.5% level.

Source Conclusion

- : Atofina, Paris-la-Défense, France.
- : TCE treatment caused significant maternal toxicity in the form of maternal deaths and decreased ($p < 0.05$) body weights at all levels 1.0% and higher. Indeed an MTD for TCE could not be reached due to the decreased feed consumption which compromised the study. Mortality was 100% at the 3.0% and higher levels. Developmental toxicity was evident in the form of completely resorbed litters at the 1.0% and 2.0% levels.

Reliability Flag

- : (2) valid with restrictions
- : Critical study for SIDS endpoint

06.02.2002

(127)

Species
Sex
Strain
Route of admin.
Exposure period
Frequency of treatm.
Duration of test
Doses
Control group
NOAEL teratogen.
Method
Year
GLP
Test substance

- : mouse
- : female
- : other: AB -Jena and DBA
- : i.p.
- : 1-14 days of gestation
- : single daily injections on day 1-14 or day 7-14 or day 9 of gestation
- : mouse gestation period
- : 300, 400 and 700 mg/kg/day
- : yes
- : ≥ 300 mg/kg bw
- : other: not specified
- : 1976
- : no data
- : as prescribed by 1.1 - 1.4

Remark

- : The study suffers from several important limitations :
 - Maternal effects were not described, allowing no judgment on potential maternal toxicity interference on the developmental toxic findings while high doses were used;

Result

- Data on foetuses were poorly reported (only bodyweight given); no details on malformations observed in each group (only number and % shown in tabular form.
 - There is no statistical evaluation ;
 - Non-pertinent route of administration was used ;
 - Dose-relationship cannot be established as each dose was allocated to a different timing of treatment during pregnancy: 300 mg/kg on day 1-14 ; 400 mg/kg on day 7-14 ; and 700 mg/kg on day 9.
- : NOAEL maternal toxicity : there was no maternal data
 NOAEL embryofetal toxicity : 300 mg/kg
 NOAEL teratogenicity : 300 mg/kg

Some embryotoxic effects (increased postimplantation lost versus controls) was found in the AB -Jena strain in the 400 and 700 mg/kg groups ; no effects were seen in the DBA strain.
 Fetal bodyweight were similar in control and all treatment groups.

Teratogenic data were as follows :

STRAIN AB-Jena :

Days of gestation	ip dose(mg/kg/day)	% malformations
-	Controls	0.67
1-14	Placebo-controls	2.40
1-14	300	0.50
7-14	400	1.72
9	700	9.39

STRAIN DBA :

Days of gestation	ip dose(mg/kg/day)	% malformations
-	Controls	0.47
1-14	Placebo-controls	2.20
1-14	300	3.25
7-14	400	4.82
9	700	2.59

Based on these data the authors concluded that the test material is a "faintly teratogenic compound".

Source

- : ATOFINA Paris la Defense,France
 EUROPEAN COMMISSION- European Chemicals Bureau Ispra (VA)

Test condition

- : TEST ORGANISM :
 - Age : 10-12 weeks virgin females
 - Number of animals : 25-30 females/treatment groups ; 37-78 / control groups

ADMINISTRATION/EXPOSURE :

- Vehicle : olive oil

MATING PROCEDURE :

- Vaginal proof method

PARAMETERS ASSESSED DURING STUDY :

- Bodyweight/ Clinical signs/ food consumption: no data
- Examination of uterine content : number of implantations ; pre and post implantation lost ; early, medium and late resorption

	- Examination of fetuses : bodyweight ; gross and skeletal malformations	
	ORGANS EXAMINED AT NECROPSY : none	
	STATISTICAL METHOD : none	
Reliability	: (3) invalid	
	significant methodological deficiencies	
Flag	: Critical study for SIDS endpoint	
19.06.2001		(128)
Species	: rat	
Sex	: male	
Strain	: no data	
Route of admin.	: inhalation	
Exposure period	: 9 months before mating	
Frequency of treatm.	: 4h/d ; 5d/wk	
Duration of test	:	
Doses	: 13.3 mg/m ³ (1.94 ppm)	
Control group	: yes	
NOAEL teratogen.	: > 13.3 mg/m ³	
Method	: other	
Year	: 1972	
GLP	: no data	
Test substance	: as prescribed by 1.1 - 1.4	
Method	: Males exposed during 9 months were mated with untreated females. Gravid females were allowed to deliver and F1 offsprings were followed up to sexual maturation.	
Result	: NOAEL : > 13.3 mg/m ³	
	- Maternal data :	
	There was no statistical difference between females sired by exposed males and females sired by control males on number of gravid females and any of the gestational parameters measured	
	-Offspring data :	
	There was no statistically significant difference between results of offsprings from the exposed father group and offsprings from the control father group on any of the measured parameter.	
	There was no gross malformations.	
Source	: ATOFINA Paris la Defense, France	
	EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)	
Test condition	: PROTOCOLE:	
	One week before the end of the 9th month of inhalation exposure, the male rats were mated with untreated virgin females.	
	TEST ORGANISM:	
	- Number : 7 control and 7 exposed male rats were mated each one with 5 virgin females	
	- Weight at start of mating : females : 250-300 g	
	PARAMETERS ASSESSED DURING STUDY:	
	- Number and % pregnant females	
	- Number of offsprings delivered	
	- Number of offsprings per litter	
	- Mean neo-natal offspring weight per litter	
	- survival at days 1, 2 7 14 21 and 84 after birth	
	- Weight and sex/ration at day 84	

- gross external malformations

ORGANS EXAMINED AT NECROPSY : none

STATISTICAL METHOD :

- Standard Student t-Test

Reliability

: (3) invalid
significant methodological deficiencies (dams no treated during pregnancy)

Flag

: Critical study for SIDS endpoint

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5.8.3 TOXICITY TO REPRODUCTION, OTHER STUDIES

5.9 SPECIFIC INVESTIGATIONS

5.10 EXPOSURE EXPERIENCE

Remark

: Experience in human was reported from numerous cases of suicidal or accidental poisonings mainly by oral and inhalation exposures, and from cases of chronic intoxications in workers or studies on volunteers exposed by inhalation and dermal contacts. Limited epidemiological surveys in workers are available. Many reviews of this large human experience on 1,1,2,2-tetrachloroethane are available (BUA, 1989 ; Lauweris, 1990 ; ACGIH, 1991 ; ATSDR, 1995 ; INRS, 1997 ; IARC, 1999). They can be summarised as following :

ACUTE/SUB-ACUTE INTOXICATION :

Acute intoxication by 1,1,2,2-tetrachloroethane may combine the following :

- Signs of mucosae irritation : digestive signs if ingested ; respiratory and ocular signs if inhaled.
- Signs of depression of the central nervous system: confusion, loss of equilibrium, drowsiness, then coma, sometimes with convulsions..
- Liver cytolysis with, occasionally, renal tubular damages.
- Contacts with skin induces orthoergic irritation.

CHRONIC TOXICITY :

The initial phase may include : fatigue, sweating, anorexia, digestive troubles.

After a latency period of several days/weeks the following damages occur :

- liver : hepatitis, often icteric and initially apyretic, cirrhosis.
- kidney : nephritis
- nervous system (less frequently): central effects (tremor, headache, asthenia, mood troubles) and peripheral effects (tip polynevritis, cranial nerves damages)
- hematological effects (less frequently and sometimes late): hyperleucocytosis, mononucleosis, lymphocytosis, thrombocytosis, anemia.

EPIDEMIOLOGY :

No excess of cardiovascular lesions were observed in a study on 75 workers exposed in a plant production (mean exposure : 2.5 to 22 mg/m³ ; peaks of 275 mg/m³). Neurological signs (mainly tremor) and epigastric symptoms but not jaundice were seen in a survey of 380 workers exposed to 1,1,2,2-tetrachloroethane in pearl manufacturing plants (exposures from 63 to 686 mg/m³). There was no significant excess of cancer mortality in a cohort of 3859 army personnel exposed to 1,1,2,2-tetrachloroethane (exposure not measured) used as a clothing impregnation solvent during World war II. Due to confounding factors the small excess of genital cancer and leukemia could not be confidently associated with the use of 1,1,2,2-tetrachloroethane.

QUANTITATIVE DATA :

Oral : fatalities from 285 to 6000 mg/kg ; LOAEL : 100 mg/kg

Inhalation : odor detected at 20 mg/m³ ; NOAEL /10 minutes :

90 mg/m³ ; LOAEL /30 minutes : 1000 mg/m³

ACUTE, SUB-ACUTE, CHRONIC TOXICITY, EPIDEMIOLOGY,

QUANTITATIVE DATA

Source : Atofina Paris la Defense
EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)
20.06.2001 (129) (130) (131) (86)

5.11 ADDITIONAL REMARKS

Type : adsorption

Remark : 1,1,2,2-Tetrachloroethane is readily adsorbed by all routes of exposure: inhalation, dermal and oral

Source : ATOFINA Paris la Defense,France
EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)
21.06.2001 (132) (133) (86) (134)

Type : Excretion

Remark : Respiration is the route of excretion for non-transformed 1,1,2,2-tetrachloroethane, volatile metabolites and terminal metabolite CO₂. Most of the metabolites are excreted by the urinary route. In mice, urinary metabolites represent about 1/3 of the absorbed dose.

Source : ATOFINA Paris la Defense,France
EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)
21.06.2001 (135) (132) (133) (86)

Type : Metabolism

Remark : Minute amount of tri- and tetrachloroethylen are formed. Trichloroethanol, trichloroacetic and dichloroacetic acids are the next step metabolites. Then oxalic and glyoxilic acids are the last step before urea and CO₂. Part of metabolism occurs in liver via cytochrome P450 enzymatic processes.

Source : ATOFINA Paris la Defense,France
EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)
21.06.2001 (136) (137) (138) (86)

Type : Neurotoxicity

- Remark** : Humans exposed to high levels of 1,1,2,2 -tetrachloroethane vapours or who have accidentally ingested it get effects including : tremors, headache, numbness, drowsiness,dizziness or even loss of consciousness. Specific exposure levels and length of exposure were not measured, but air concentrations were measured between 9 and 98 ppm (60 to 700 mg/m3). Inhalation or oral exposure of animals has resulted similarly in effects including narcosis, decrease of motor activity or ataxia, and learning ability inhibition.
- Source** : ATOFINA Paris la Defense,France
EUROPEAN COMMISSION - European Chemicals Bureau Ispra (VA)

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