Summary of Initial Risk Assessment Report

Chloroethane CAS No : 75-00-3

PRTR No of Japan: 74

This substance is assessed based on Guideline for Initial Risk Assessment Version 1.0

1. General Information

1.1 Physico-chemical properties

Appearance	Colorless gas, colorless liquid (liquefied gas)
Melting point	-138.7 degC
Boiling point	12.3 degC
Water solubility	6.71 g/L (25 degC)
Henry's constant	$1.12*10^3$Pa*m^3/mol (0.0111 atm*m^3/mol) (25degC, estimated)
Octanol/water partition coefficient (log Kow)	1.43(measured), 1.39(measured), 1.58 (estimated)
Soil adsorption coefficient	Koc = 24 (estimated)

1.2 Environmental fate

Bioaccumulation	Exhibits little to no bioaccumulation Bioconcentration factor (BCF) : 7 and 5 (estimated)
Biodegradation	Non-biodegradable Chloroethane may be biodegradable under specific aerobic conditions. It may also be biodegradable in certain anaerobic conditions.
Stability in the environment	(In air) Reaction with OH radical: Reaction rate constant is $4.11*10^{-13}$ cm^3/molecule-sec (25 degC, measured). The half-life is 20-40 days, given OH radical concentration of $5*10^5$-$1*10^6$ molecule/cm^3. Reaction with ozone: No data Reaction with nitrate radical: No data (In water) Chloroethane is not hydrolyzed.
Environmental fate	If released into water, chloroethane is expected to be removed mainly by volatilization to air.

2. Sources of release to the environment

2.1 Annual production, import, export and domestic supply in 2001 (ton/year)

Production	Import	Export	Domestic supply	Remarks
3,900	121	78	3,943	

2.2 Uses

Raw material for ethyl cellulose (55%), foaming auxiliary agent for polystyrene (45%).

Other uses are raw material for olefin polymerization catalysts, raw materials for organometallic compounds, ethylating agent, and agricultural chemical intermediate.

2.3 Release from the industries within the scope of PRTR system (in 2001)

Release sources		Air (ton)	Waters (ton)	Soil (ton)	Remarks
Listed industries	Reported release	1,379	< 0.5	0	Release to river: 0
	Release outside notification	--	--	--	
Release outside notification from non listed industry		--	--	--	
Households		--	--	--	
Mobile sources		--	--	--	
Total		1,379	< 0.5	0	

2.4 Releases from other sources

No information about the substance is available.

2.5 Main release route

Chloroethane is expected to be released into the environment mainly during use of chloroethane or the products containing it.

3. Exposure Assessment

3.1 Measured environmental concentration

Media	No. of points detected / No. of points measured	No. of samples detected / No. of samples measured	Detection range	95th percentile	Detection limit	Year of investigation, Institution
Air (microg/m^3)	16/16	46/48	nd-0.54	0.27	0.006	2001 Ministry of the Environment
River water (microg/L)	41/89	--	nd-0.060	0.026	--	--
Seawater (microg/L)	5/17	--	nd-0.50	0.19	--	1999 Ministry of the Environment
Drinking water (microg/L)(as ground water)	14/23	--	nd-0.03	0.029	--	1999 Ministry of the Environment
Food	--	--	--	--	--	--

nd: Not detected

For calculation of the 95th percentile, data less than the detection limit are replaced with a value equal to 1/2 of the detection limit.

3.2 Estimated environmental concentration

Media	Estimated concentration	Description
Air (microg/m^3)	5.7	Calculated by mathematical model / Atmospheric Dispersion Model for Exposure and Risk Assessment ver.1.0 (AIST-ADMER)
River water (microg/L)	--	Concentration in river water is not estimated, since chloroethane is not released into river.

3.3 Estimated environmental concentration in water (EEC)

EEC(microg/L)	0.026
	Measured concentrations surveyed by the Ministry of the Environment were used[1)].

3.4 Estimated human intake

Intake route		Concentration used for estimation of intake	Estimated intake (microg/ person/ day)	Estimated intake (microg/ kg-Bodyweight (BW)/ day)
Inhalation	Air	0.27 (microg/m^3)	5.4	0.11
		The ninety-fifth percentile of measured concentrations in air surveyed by the Ministry of the Environment was used.		
Oral	Drinking water	0.029 (microg/L)	0.058	0.0012
		Measured concentrations in ground water surveyed by the Ministry of the Environment were used, since measured concentrations in tap water were not available.		
	Food	0.00133 (microg/g)	0.16	0.0032
		Concentration in fish was calculated as product of a concentration in seawater and a BCF. The ninety-fifth percentile of measured concentrations in sea water surveyed by the Ministry of the Environment (0.19 microg/L) was used for the risk assessment.		
	Subtotal	--	0.22	0.0044
Total route		--	5.6	0.11

1) This substance is assessed based on the Guideline for Initial Risk Assessment Version1.0. If adequate measured concentrations are available, they are given priority and used as values for risk assessment. If they are not available, an estimated value calculated using a mathematical model is used.

4. Hazard assessment

4.1 Effects on organisms in the environment

	Acute or Chronic	Species	Endpoint	Concentration
Algae	Chronic	*Scenedesmus subspicatus*	72 hours EC_{10} Growth inhibition (biomass)	2.7 (mg/L)
Crustacea	Acute	*Daphnia magna*	48 hours EC_{50} Immobilization	58 (mg/L)
Fish	No adequate data for the risk assessment was available			
Key study	Data of algae (*Scenedesmus subspicatus*) was chosen for the key study because effects were observed at the lowest concentration.			

4.2 Human health toxicity

Toxicity	Exposure route	Species	Duration / Dose method	Toxic effects (Key study is underlined)	NOAEL or LOAEL
Repeated dose toxicity	Inhalation	Rat	13 weeks	<u>Increased relative weight of liver</u>	NOAEL: 10,000 ppm (26,800 mg/m^3) (equivalent to 3,600 mg/kg/day)
	Oral	--	--	--	--
	Dermal	--	--	--	--
Reproductive and developmental toxicity	Inhalation	Mouse	Inhalation exposure on the 6-15th day of pregnancy	Delayed ossification of the skulls of fetuses	NOAEL: 1,500 ppm (4,020 mg/m^3) (equivalent to 1,700 mg/kg/day)
Carcinogenicity	Evaluation by IARC : Group 3 (not classifiable as to its carcinogenicity to humans)				
Genotoxicity	Considered to be genotoxic.				

5. Risk Assessment

5.1 Environmental organisms

	EEC (microg/L)	NOEC * (mg/L)	MOE (NOEC * /EEC)	Product of uncertainty factors	Conclusion
Risk characterization	0.026	EC_{10}: 2.7	100,000	100	No immediate concern
	Product of uncertainty factors (UF): Extrapolation from laboratory test (10) * Chronic toxicity data on one nutritional stage (10) = 100				
Recommendation : The substance is considered to be of no immediate concern for the moment, and low priority for further work.					

NOEC* means NOEC, LOEC, EC_{50}, etc.

5.2 Human health

5.2.1 Repeated dose toxicity

Exposure route	Intake (microg/kgBW/)	NOAEL (mg/kgBW/day)	Risk characterization		
			MOE	Product of uncertainty factors	Conclusion
Inhalation	0.11	3,600	33,000,000	500	No immediate concern
Oral	0.0044	No adequate data	Not calculated	Not calculated	-
Total	--	--	--	--	--
Product of uncertainty factors (UF): Interspecies (10) * Intraspecies (10) * Duration of test (5) = 500					

5.2.2 Reproductive and developmental toxicity

Exposure route	Intake (microg/kgBW/)	NOAEL (mg/kgBW/day)	Risk characterization		
			MOE	Product of uncertainty factors	Conclusion
Inhalation	0.11	1,700	15,000,000	100	No immediate concern
Product of uncertainty factors (UF): Interspecies (10) * Intraspecies (10) = 100					

5.2.3 Carcinogenicity

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5.2.4. Recommendation for Human Health

In terms of inhalation exposure, the substance is considered to be of no immediate concern and a low priority for further work. As for oral exposure, a risk assessment was not conducted because there is no adequate toxicity data available.

6. Supplement

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