5	CAS No.: 124-48-1	Substance: Dibromochloromethane

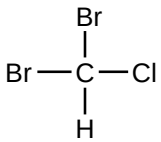
Chemical Substances Control Law Reference No.:

PRTR Law Cabinet Order No.: － (Cabinet Order No. after revision*: 1-209)

Structural Formula:

Molecular Formula: $CHBr_2Cl$

Molecular Mass: 208.28



*Note: No. according to revised order enacted on October 1, 2009.

1. General information

The aqueous solubility of this substance is 2.7×10^3 mg/L (20°C), the partition coefficient (1-octanol/water) (log K_{ow}) is 2.16, and the vapor pressure is 76 mmHg (=1.0×10^4 Pa)(20°C). The mean biodegradability (aerobic degradation) as determined by BOD, TOC, and GC is 35% (test substance concentration of 5 mg/L) and 34% (test substance concentration of 10 mg/L). Its half-life for hydrolysis is 27.4 to 274 years (calculated assuming pH=8–7).

A drinking water standard has been set for this substance. Based on a revision of substances regulated by the Law Concerning Reporting, etc. of Releases to the Environment of Specific Chemical Substances and Promoting Improvements in Their Management (PRTR Law) (enacted on October 1, 2009), this substance was newly designated as a Class 1 Designated Chemical Substance. This substance is a component of trihalomethane, which is formed during the process of water purification by the aqueous reaction of organic substances such as humins with the chlorine in disinfectants. It is unintentionally formed in the wastewater and cooling water chlorination processes.

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2. Exposure assessment

Because this substance was not classified as a Class 1 Designated Chemical Substance prior to revision of substances regulated by the PRTR Law, release and transfer quantities could not be obtained. Predictions of distribution by medium using a Mackay-type level III fugacity model indicated that if equal quantities were released to the atmosphere, water bodies, and soil, the proportions distributed to water bodies and the atmosphere would be higher.

Data for setting the predicted maximum exposure to humans via inhalation could not be obtained, but based on data from a limited area (Yamaguchi Prefecture), the predicted maximum exposure was around 0.49 μg/m^3. In addition, the predicted maximum exposure for indoor air was around 3.8 μg/m^3. The predicted maximum oral exposure was estimated to be 4 μg/kg/day based on calculations from data for potable water, and around 0.0004 μg/kg/day based on calculations from data for groundwater.

The predicted environmental concentration (PEC), which indicates exposure to aquatic organisms, was 0.41 μg/L for public freshwater bodies and about 0.04 μg/L for seawater.

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3. Initial assessment of health risk

No information could be obtained on acute symptoms in humans. However, piloerection, sedation, muscular relaxation, ataxia and exhaustion were observed in rats while sedation and paralysis lasting for approximately four hours were observed in mice within 30 minutes after administering 500 mg/kg, lasting for approximately 4 hours.

Sufficient information could not be obtained on its carcinogenicity, and its initial assessment was conducted on the basis of data on its non-carcinogenic effects.

Its no-observed-adverse-effect-level (NOAEL) of 30 mg/kg/day for the hepatocyte degeneration was obtained for oral exposure from its mid-term and long-term toxicity tests for rats. It was then adjusted for exposure conditions to

provide 21 mg/kg/day. This was divided by 10 to produce 2.1 mg/kg/day as its 'non-toxic level.*' As for inhalation exposure to this substance, 'non-toxic level*' could not be identified.

As for its oral exposure, its maximum exposure was estimated to be 4 μg/kg/day, when intakes of drinking water were assumed. Its margin of exposure (MOE) would be 53 when calculated from its 'non-toxic level*' of 2.1 mg/kg/day and its estimated maximum exposure, and then divided by 10 due to the fact that 'non-toxic level*' was obtained from animal experiments. When intakes of groundwater are assumed, its maximum exposure will be around 0.0004 μg/kg/day, and this will provide MOE of 530,000. As for its exposure through food intakes, its maximum exposure is estimated to be 0.034 μg/kg/day from the measurement at some location. When its intakes from food and drinking water are assumed, its maximum exposure is estimated to be 4 μg/kg/day, and this will provide MOE of 53. When its intakes from food and groundwater are assumed, its maximum exposure is estimated to be 0.034 μg/kg/day, and this will provide MOE of 6,200. These suggest that collection of information is required on health risk associated with oral exposure to this substance. There is a quality standard for this substance in drinking water.

As for its inhalation exposure, its 'non-toxic level *' could not be identified, and its health risk could not be assessed. The 'non-toxic level' for its oral exposure, if 100% absorption is assumed for it, turns to be the 'non-toxic level' of 7 mg/m^3 for its inhalation exposure. When combined with its maximum concentration of around 0.49 μg/m^3 in the ambient air estimated from data reported for some location, MOE will be calculated to be 1,400. On the other hand, its maximum concentration for exposure in the indoor air is estimated to be 3.8 μg/m^3, and MOE will be 180.

This substance is designated as a potential hazardous air pollutant. Its half-life in the atmosphere is as long as 93 to 930 days, and nearly all of this substance is expected to remain in the atmosphere after it is released there. Collection of information on its inhalation exposure would be required to assess health risk associated with its inhalation exposure in the ambient air. As for its inhalation exposure in the indoor air, this would not be required.

Information of toxicity				Exposure assessment			Result of risk assessment			Judgment
Exposure Path	Criteria for risk assessment	Animal	Criteria for diagnoses (endpoint)	Exposure medium	Predicted maximum exposure quantity and concentration					
Oral	'Non-toxic level*' 2.1 mg/kg/day	Rats	Hepatocyte degeneration	Drinking water	4 μg/kg/day		MOE	53	▲	▲
				Groundwater	0.0004 μg/kg/day		MOE	530,000	○	
Inhalation	'Non-toxic level*' – mg/m^3	–	–	Ambient air	– μg/m^3		MOE	–	×	(▲)
				Indoor air	3.8 μg/m^3		MOE	–	×	(○)

Non-toxic level *

- When a LOAEL is available, it is divided by 10 to obtain a level equivalent to NOAEL.
- When an adverse effect level is available for the short-term exposure, it is divided by 10 to obtain a level equivalent to an adverse effect level for the long-term exposure.

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4. Initial assessment of ecological risk

With regard to acute toxicity, the following reliable data were obtained: a 72-h median effective concentration (EC_{50}) of 9,610 μg/L for growth inhibition in the green algae *Pseudokirchneriella subcapitata*; a 48-h EC_{50} of 26,500 μg/L for swimming inhibition in the crustacean *Daphnia magna*; and a 96-h median lethal concentration (LC_{50}) of 79,300 μg/L was obtained for the fish species *Oryzias latipes* (medaka). Accordingly, based on these acute toxicity values and an assessment factor of 100, a predicted no effect concentration (PNEC) of 96 μg/L was obtained. With regard to chronic toxicity, the following reliable data were obtained: a 72-h no observed effect concentration (NOEC) of 4,500 μg/L for growth inhibition in the green algae *P. subcapitata*, and a 21-d NOEC of 63.2 μg/L for reproductive inhibition in the crustacean *D. magna*. Accordingly, based on these chronic toxicity values and an assessment factor of 100, a predicted no effect concentration (PNEC) of 0.63 μg/L was obtained. The value of 0.63 μg/L obtained from the chronic toxicity to the crustacean was used as the PNEC for this substance.

The PEC/PNEC ratio was 0.7 for freshwater bodies and 0.06 for seawater. Accordingly, data collection is considered required. This substance is an unintentional product, and carrying out chronic toxicity testing for fish species is considered necessary on account of the possibility of chronic exposure to aquatic organisms.

Hazard assessment (basis for PNEC)			Assessment factor	Predicted no effect concentration PNEC (μg/L)	Exposure assessment		PEC/ PNEC ratio	Result of assessment
Species	Acute/ chronic	Endpoint			Water body	Predicted environmental concentration PEC (μg/L)		
Crustacean (water flea)	Chronic	NOEC Reproductive inhibition	100	0.63	Freshwater	0.41	0.7	▲
					Seawater	0.04	0.06	

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5. Conclusions

	Conclusions		Judgment
Health risk	Oral exposure	Collection of information required on health risk associated with oral exposure in the ambient and indoor air.	▲
	Inhalation exposure	Further information collection would be required for risk characterization.	（▲）
Ecological risk	Data collection considered required. This substance is an unintentional product, and carrying out chronic toxicity testing for fish species is considered necessary on account of the possibility of chronic exposure to aquatic organisms.		▲

［Risk judgments］ ○: No need for further work ▲: Requiring information collection

■: Candidates for further work ×: Impossibility of risk characterization

（○）: Though a risk characterization cannot be determined, there would be little necessity of collecting information.

（▲）: Further information collection would be required for risk characterization.