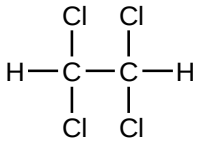
9	CAS No.: 79-34-5	Substance: 1,1,2,2-Tetrachloroethane

Chemical Substances Control Law Reference No.: 2-56 (tetrachloroethane)
PRTR Law Cabinet Order No.*: 2-60

Molecular Formula: $C_2H_2Cl_4$
Molecular Weight: 167.85

Structural formula:



*Note: No. in Revised Cabinet Order enacted on October 1, 2009

1. General information

The aqueous solubility of this substance is 2.83×10^3 mg/1000 g (25°C), the partition coefficient (1-octanol/water) (log K_{ow}) is 2.39, and the vapor pressure is 4.62 mmHg (=616 Pa) (25°C). BOD measurement in degradation experiments has not been carried out, but it was 0% based on TOC and 10% based on GC. Bioaccumulation is thought to be nonexistent or low. Furthermore, its half-life for hydrolysis is 1,056 hours (25°C, pH=7).

This substance is designated as a Type II Monitoring Chemical Substance under the Law Concerning the Examination and Regulation of Manufacture, etc. of Chemical Substances. This substance is classified as a Class 2 Designated Chemical Substance under the Law Concerning Reporting, etc. of Releases to the Environment of Specific Chemical Substances and Promoting Improvements in Their Management (PRTR Law). The main use is as an intermediate for the manufacture of other chlorinated hydrocarbons. This substance is also found in the byproducts of polyvinyl chloride, allyl chloride, and epichlorohydrin. The production and import category under the PRTR Law is 1 t.

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2. Exposure assessment

Because this substance is not a Class 1 Designated Chemical Substance under the Law Concerning Reporting, etc. of Releases to the Environment of Specific Chemical Substances and Promoting Improvements in Their Management (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 proportion distributed to soil would be greater.

The predicted maximum exposure to humans via inhalation, based on general environmental atmospheric data, was around 0.073 μg/m^3. The predicted maximum oral exposure was estimated to be 0.0008 μg/kg/day based on calculations from groundwater data and 0.052 μg/kg/day based on calculations from public freshwater body data. A predicted maximum oral exposure estimated to be 0.052 μg/kg/day was adopted for this substance.

The predicted environmental concentration (PEC), which indicates exposure to aquatic organisms, was 1.3 μg/L for public freshwater bodies and less than around 0.01 μg/L for seawater.

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3. Initial assessment of health risk

This substance is irritating to eyes, skin and respiratory tracts. It has effects on the central nervous system, liver and kidney. It may reduce or interfere with functions of the central nervous system. It may produce loss of consciousness, and it can cause death. When taken into eyes, they will turn red and suffer from pain. When inhaled, it will cause stomachache, coughing, pharyngalgia, headache, nausea, vomiting, dizziness, lethargy, muddle, thrill or twitch. When orally taken, it will cause stomachache, nausea or vomiting. When attached to skin, it will turn red and dry, and its absorption through skin may cause symptoms such as stomachache and coughing.

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.

As for its oral exposure, its LOAEL of 20 mg/kg/day (for hepatocyte vacuolation) obtained from mid-term and long-term toxicity tests for rats was divided by 10 as is always the case with LOAEL, and divided by 10 again due to their short test periods, to provide 0.2 mg/kg/day as its 'non-toxic level*'.

As for its inhalation exposure, its LOAEL of 13.3 mg/m^3 (for suppressed body-weight increase, increased white blood cell counts) was obtained from its mid-term and long-term toxicity tests for rats. It was then adjusted against exposure conditions to provide 1.6 mg/m^3. This was divided by 10 as is always the case with LOAEL, and divided by 10 again due to their short test periods, to provide 0.016 mg/m^3 as its 'non-toxic level*'.

As for its oral exposure, its maximum exposure was estimated to be 0.052 μg/kg/day, when intakes of freshwater from public water supply were assumed. Its margin of exposure (MOE) would be 380, when calculated from its 'non-toxic level*' of 0.2 mg/kg/day and its estimated maximum exposure, and then divided by 10 due to the fact that the 'non-toxic level*' was obtained from animal experiments. Even if its oral exposure through intakes of fish is presumed and calculated on the basis of data on public seawater, MOE would be still large enough. No further action will be required at the moment to assess health risk from oral exposure to this substance.

As for its inhalation exposure, its maximum exposure concentration was estimated to be around 0.073 μg/m^3, when its concentrations in the ambient air were considered. Its MOE is 22, when calculated from its 'non-toxic level*' of 0.016 mg/m^3 and its estimated maximum exposure concentration, and then divided by 10 due to the fact that 'non-toxic level*' was obtained from animal experiments. Collection of information would be required to assess health risk from inhalation exposure to this substance in the ambient air.

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*' 0.2 mg/kg/day	Rats	hepatocyte vacuolation	Drinking water	— μg/kg/day	MOE	—	×	○
				Freshwater	0.052 μg/kg/day	MOE	380	○	
Inhalation	'Non-toxic level*' 0.016 mg/m^3	Rats	suppressed body-weight increase, increased white blood cell counts	Ambient air	0.073 μg/m^3	MOE	22	▲	▲
				Indoor air	— 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 for the short-term exposure is available, 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 26,000 μg/L for growth inhibition in the green algae *Desmodesmus subspicatus*; a 48-h median lethal concentration (LC_{50}) of 9,300 μg/L for the crustacean *Daphnia magna*; and a 96-h LC_{50} of 18,500 μg/L for the Cyprinodontidae fish species *Jordanella floridae*. Accordingly, based on these acute toxicity values and an assessment factor of 100, a predicted no effect concentration (PNEC) of 93 μg/L was obtained.

With regard to chronic toxicity, the following reliable data were obtained: a 28-d no observed effect concentration (NOEC) of 6,900 μg/L for reproductive inhibition in the crustacean *D. magna*; and a 32-d NOEC of 1,400 μg/L for growth inhibition in the fish species *Pimephales promelas* (fathead minnow). Accordingly, based on these chronic toxicity values and an assessment factor of 100, a predicted no effect concentration (PNEC) of 14 μg/L was obtained. The value of 14 μg/L obtained from the chronic toxicity to the fish species was used as the PNEC for this substance.

The PEC/PNEC ratio was 0.09 for freshwater bodies and less than 0.0007 for seawater. Accordingly, further work is

thought to be unnecessary at this time.

Hazard assessment (basis for PNEC)			Assessment factor	Predicted no effect concentration PNEC (μg/L)	Exposure assessment		PEC/PNEC ratio	Assessment result
Species	Acute/ chronic	Endpoint			Water body	Predicted environmental concentration PEC (μg/L)		
Fish species Fathead minnow	Chronic	NOEC Growth inhibition	100	14	Freshwater	1.3	0.09	○
					Seawater	<0.01	<0.0007	

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5. Conclusions

	Conclusions		Judgment
Health risk	Oral exposure	No further action required.	○
	Inhalation exposure	Collection of information required on health risk associated with inhalation exposure in the ambient air.	▲
Ecological risk	No need of further work at present.		○

［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.