15	CAS No.: 108-70-3	Substance: 1,3,5-Trichlorobenzene

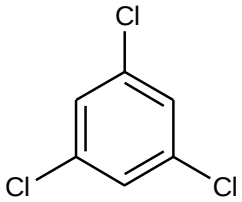
Chemical Substances Control Law Reference No.: 3-74 (Trichlorobenzene)

PRTR Law Cabinet Order No.: － (Cabinet Order No. after revision*: 1-290 (Trichlorobenzene))

Structural Formula:

Molecular Formula: $C_6H_3Cl_3$

Molecular Weight: 181.45



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

1. General information

The aqueous solubility of this substance is 8 mg/1000 g (25°C), the partition coefficient (1-octanol/water) (log K_{ow}) is 4.02, and the vapor pressure is 0.528 mmHg (=70.4 Pa) (25°C, extrapolated value). Biodegradability (aerobic degradation) is not thought to be good, and bioaccumulation is thought to be medium level. The substance does not have any hydrolyzable groups in the environment.

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), trichlorobenzene was newly designated as a Class 1 Designated Chemical Substance. The main applications of trichlorobenzene are as dyestuff and pigment intermediates, transformer oil, and lubricants. The production (shipments) and import quantity as trichlorobenzene in fiscal 2004 was 100 to <1,000 t.

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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 proportion distributed to soil would be higher.

The predicted maximum exposure to humans via inhalation, based on general environmental atmospheric data, was approximately 0.0011 μg/m^3. The predicted maximum oral exposure was estimated to be less than around 0.0004 μg/kg/day based on calculations from data for groundwater. The risk of exposure to this substance by intake from an environmental medium via food is considered slight.

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

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3. Initial assessment of health risk

This substance is irritating to the eyes and respiratory tract. Inhalation exposure to this substance causes sore throat. Redness and painful irritation in the eyes is caused by contact with this substance.

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 no-observed-adverse-effect-level (NOAEL) of 7.6 mg/kg/day for degeneration of livers, thyroids and kidneys obtained from its mid-term and long-term toxicity tests for rats was divided by 10, due to their short test periods, to produce 0.76 mg/kg/day as its 'non-toxic level*'.

As for its inhalation exposure, its no-observed-adverse-effect-level (NOAEL) of 97 mg/m^3 for degeneration of respiratory epithelia of nasal cavity was obtained for inhalation exposure from its repeated toxicity tests for rats. It was

then adjusted for exposure conditions to provide 17 mg/m^3. This was divided by 10 due to their short test periods to produce 1.7 mg/m^3 as its 'non-toxic level*'.

As for its oral exposure, the predicted maximum exposure was estimated to be less than around 0.0004 μg/kg/day, when intakes of groundwater were assumed. Its margin of exposure (MOE) would be more than 190,000 when calculated from its 'non-toxic level*' of 0.76 mg/kg/day and the predicted maximum exposure, and then divided by 10 due to the fact that 'non-toxic level*' was obtained from animal experiments. Since risk associated with exposure to this substance through food intakes from the environment is presumed to be minimal, this exposure will not increase MOE significantly, and no further action will be required at the moment to assess health risk from oral exposure to this substance.

As for its inhalation exposure, the predicted maximum exposure was estimated to be around 0.0011 μg/m^3, when its concentrations in the ambient air were considered. Its margin of exposure (MOE) would be 150,000, when calculated from its 'non-toxic level*' of 1.7 mg/m^3 and the predicted maximum exposure, and then divided by 10 due to the fact that 'non-toxic level*' was obtained from animal experiments. No further action, therefore, will be required at the moment 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*' 0.76 mg/kg/day	Rats	Degeneration of the liver, thyroid gland, kidneys, etc.	Drinking water	– μg/kg/day	MOE	–	×	○
				Groundwater	< 0.0004 μg/kg/day	MOE	> 190,000	○	
Inhalation	'Non-toxic level*' 1.7 mg/m^3	Rats	Degeneration of respiratory epithelium of the nasal cavity	Ambient air	0.0011 μg/m^3	MOE	150,000	○	○
				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 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 more than 4,750 μg/L for growth inhibition in the green algae *Pseudokirchneriella subcapitata;* a 48-h EC_{50} of 2,870 μg/L for swimming inhibition in the crustacean *Daphnia magna*; and a 96-hour median lethal concentration (LC_{50}) of 3,200 μg/L 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 29 μg/L was obtained. With regard to chronic toxicity, the following reliable data were obtained: a 72-h no observed effect concentration (NOEC) of 590 μg/L for growth inhibition in the green algae *P. subcapitata*, and a 21-d NOEC of 319 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 3.2 μg/L was obtained. The value of 3.2 μg/L obtained from the chronic toxicity to the crustacean was used as the PNEC for this substance.

The PEC/PNEC ratio was less than 0.003 for both freshwater bodies and 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	Result of assessment
Species	Acute/ chronic	Endpoint			Water body	Predicted environmental concentration PEC (μg/L)		
Crustacean (water flea)	Chronic	NOEC Reproductive inhibition	100	3.2	Freshwater	<0.01	<0.003	○
					Seawater	<0.01	<0.003	

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5. Conclusions

	Conclusions		Judgment
Health risk	Oral exposure	No need for further work.	○
	Inhalation exposure	No need for further work.	○
Ecological risk	No need for further work.		○

［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.