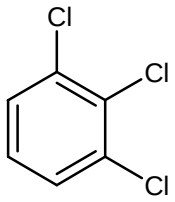
10	CAS No.: 87-61-6	Substance: 1,2,3-Trichlorobenzene

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

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

Molecular Formula: $C_6H_3Cl_3$ Structural formula:

Molecular Weight: 181.45



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

1. General information

The aqueous solubility of this substance is 21 mg/1,000 g (25°C), the partition coefficient (1-octanol/water) (log K_{ow}) is 4.04, and the vapor pressure is 0.21 mmHg (=28 Pa) (25°C). As trichlorobenzene the biodegradability (aerobic degradation) is not considered good, and bioaccumulation is thought to be at a medium level. Furthermore, the substance does not have any hydrolyzable groups.

This substance is designated as a Type II and Type III Monitoring Chemical Substance under the Law Concerning the Examination and Regulation of Manufacture, etc. of Chemical Substances. Trichlorobenzene is designated as 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). The main uses of trichlorobenzene are as a dyestuff and pigment intermediate, transformer oil and lubricant. The production (shipments) and import quantity of trichlorobenzene in fiscal 2007 was 100 to <1,000 t/y, The production and import category under the PRTR Law was ≥100 t.

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2. Exposure assessment

Because this substance was not designated a Class 1 Designated Chemical Substance under the PRTR Law prior to its revision, 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 0.0011 μg/m^3.

The predicted maximum oral exposure was estimated to be around 0.12 μg/kg/day based on calculations from data for public freshwater bodies. The risk of exposure to this substance by intake from an environmental medium via food is considered slight based on estimates of oral exposure using estimated concentrations in fish species.

The predicted environmental concentration (PEC), which indicates exposure to aquatic organisms, was about 3 μg/L for freshwater bodies and less than around 0.03 μg/L for seawater.

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3. Initial assessment of health risk

This substance is irritable to the eyes and respiratory tract. Symptoms of poisoning via the inhalation route include , cough and sore throat, while those via the oral route include abdominal pain, diarrhea, nausea and vomiting. Contact with the substance can cause redness and pain in the eyes.

As sufficient information was not available on the carcinogenicity of the substance, an initial assessment was conducted on the basis of information on its non-carcinogenic effects.

With regard to oral exposure to the substance, a NOAEL of 7.7 mg/kg/day (for suppressed body weight increase, increased relative liver and kidney weights and incidence of lesions in liver and thyroid gland) obtained from mid-term and long-term toxicity tests in rats was divided by 10 due to the short test periods. 0.77 mg/kg/day derived was deemed as a plausible value for the lowest dose of the substance and was identified as the 'non-toxic level*' of the substance. As for inhalation exposure, its 'non-toxic level*' could not be identified.

As to oral exposure to the substance, when intakes of freshwater were assumed, the predicted maximum exposure derived was approximately 0.12 μg/kg/day. The MOE was 640 when calculated from the 'non-toxic level*' of 0.77 mg/kg/day and the predicted maximum exposure divided by 10 due to the need to convert the 'non-toxic level*' obtained from the animal experiments to a human equivalent dose. As for exposure to this substance through food intakes was estimated minor, even when the exposure through groundwater and food were combined, remarkable changes in the MOE would not be likely. Therefore, further action to assess health risk from oral exposure to this substance would not be required at present.

With regard to inhalation exposure to the substance, the absence of information available on 'non-toxic levels*' and exposure concentrations did not allow for a health risk assessment. For reference, however, the 'non-toxic level*' for its oral exposure, if 100% absorption was assumed, would be equivalent to the 'non-toxic level*' of 2.6 mg/m^3 for its inhalation exposure. When combined with the predicted maximum concentration of 0.0011 μg/m^3 in the ambient air, the MOE derived would be 240,000. Therefore, collection of information would not be required to assess health risk from inhalation exposure to this substance in the ambient air.

Information of toxicity				Exposure assessment		Result of risk Exposure 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 * ' 0.77 mg/kg/day	Rats	Suppressed body weight increase, increase in relative liver and kidney weight, pathological changes of liver and thyroid gland	Drinking water	— μg/kg/day	MOE	—	×	○
				Freshwater	0.12 μg/kg/day	MOE	640	○	
Inhalation	'Non-toxic level * ' — mg/m^3	—	—	Ambient air	0.0011 μg/m^3	MOE	—	×	(○)
				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 48-h EC_{50} of 1,490 μg/L for growth inhibition in the green algae *Pseudokirchneriella subcapitata*, a 48-h EC_{50} of 458 μg/L for swimming inhibition in the crustacean *Daphnia magna*, a 96-h LC_{50} of 348 μg/L for the fish species *Poecilia reticulata* (guppy), and a 48-h LC_{50} of 1,700 μg/L for the midge species *Chironomus riparius*. Accordingly, based on these acute toxicity values and an assessment coefficient of 100, a predicted no effect concentration (PNEC) of 3.5 μg/L was obtained.

With regard to chronic toxicity, the following reliable data were obtained: a 72-h NOEC of 225 μg/L for growth inhibition in the green algae *P. subcapitata*, a 21-d NOEC of 167 μg/L for reproductive inhibition in the crustacean *D. magna*, and a 28-d NOEC of 250 μg/L for growth, hatching, and mortality in the fish species *Danio rerio* (zebrafish). Accordingly, based on these chronic toxicity values and an assessment coefficient of 10, a predicted no effect concentration (PNEC) of 17 μg/L was obtained. The value of 3.5 μg/L obtained from the acute toxicity to the fish species was used as the PNEC for this substance.

The PEC/PNEC ratio was 0.9 for freshwater bodies and less than 0.009 for seawater. Accordingly, there is a need to

collect more data regarding this substance, and taking into consideration PRTR data, environmental concentration data needs to be augmented.

Hazard assessment (basis for PNEC)			Assessment coefficient	Predicted no effect concentration PNEC (μg/L)	Exposure assessment		PEC/ PNEC ratio	Judgment based on PEC/PNEC ratio	Assessment result
Species	Acute/ chronic	End point			Water body	Predicted environmental concentration PEC (μg/L)			
Fish species (guppy)	Acute	LC_{50} mortality	100	3.5	Freshwater	3	0.9	▲	▲
					Seawater	<0.03	<0.009		

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5. Conclusions

	Conclusions		Judgment
Health risk	Oral exposure	No need for further work	○
	Inhalation exposure	Though a risk characterization cannot be determined, there would be little necessity of collecting information.	(○)
Ecological risk	Data collection considered required.		▲

［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.