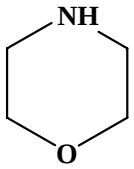
8	CAS No.: 110-91-8	Substance: Tetrahydro-1,4-oxazine

Chemical Substances Control Law Reference No.: 5-859

PRTR Law Cabinet Order No.:

Molecular Formula: C_4H_9NO Structural Formula:

Molecular Weight: 87.12



1. General information

According to information obtained, the aqueous solubility of this substance is freely miscible, and the partition coefficient (1-octanol / water) (log Kow) is -0.86 while vapor pressure is 10.1 mmHg (= 1.35 x 10^3 Pa) (25°C). The biodegradability of the substance is 0% by BOD degradation rate, and the accumulation factor is thought to be zero or very low.

This substance is used primarily as a solvent (for rubber, coatings, resins, wax, ceramics, etc.), as an emulsifying agent raw material (for polishes [vehicle, floor, leather], cosmetic creams, shampoo, paper coatings, paints, insecticides, herbicides, etc.), as a soluble oil raw material (for machine tool lubricants and cooling agents), as a rust-proofing agent (for steam boilers, heating equipment, etc.) and as a catalyst (for polyurethane foam). Domestic production in 2003 was estimated at 1,000 - 1,500 tons.

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2. Exposure assessment

As 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), no information on release and transfer quantities could be obtained. When predictions of distribution ratios by medium were made using the Mackay-Type Level III Fugacity Model, in the event of equal release to the atmosphere, water and soil, the distribution ratio was highest for water and soil.

The predicted maximum exposure concentration for inhalation exposure to human beings was estimated at less than 0.02 μg/m^3. The predicted maximum oral exposure was estimated to be approximately 0.088 μg/kg/day. As bioaccumulation of the substance is judged to be zero or very low, exposure from environmental media via the food chain is thought to be low.

The predicted environmental concentration (PEC) that indicates exposure to aquatic organisms was estimated to be 2.2 μg/L for freshwater and 0.52 μg/L for seawater public water bodies.

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3. Initial assessment of health risk

This substance is corrosive to the eyes, skin and respiratory tract. If inhaled, even for a brief period of time, it may cause a burning sensation, coughing, laboured breathing and shortness of breath. A few hours later, pulmonary edema may result. Contact with the skin may cause redness, pain, burning and blistering. Contact with the eyes may result in redness, pain, blurred vision and severe burns. If taken orally, the substance has a caustic effect and may cause stomach pain, a burning sensation, coughing, diarrhea, nausea, shock or collapse, and vomiting.

There is insufficient information regarding the carcinogenicity of the substance, and it is not possible to make a judgment as to whether it causes cancer in humans. For this reason, an initial assessment of the substance was conducted based on information of non-carcinogenic effects.

As the ‘Non-toxic level’ was observed, used to estimate the margin of exposure (MOE), a lowest observed adverse effect level (LOAEL) of 90 mg/kg/day (prevention of weight increase), obtained from mouse medium- and long-term toxicity testings, was obtained for oral exposure. As this was a LOAEL value, the value was divided by 10

to establish a value of 9 mg/kg/day. For inhalation exposure, a no observed adverse effect level (NOAEL) of 36 mg/m^3 (turbinate necrosis) was obtained from rat medium- and long-term toxicity testings, and this value was corrected to match the exposure circumstances to establish a value of 6.4 mg/m^3.

With regard to oral exposure, when intake of freshwater from public water bodies was postulated, the maximum predicted exposure was estimated to be 0.088 μg/kg/day. As the 'Non-toxic level' of 9 mg/kg/day and the maximum predicted exposure were established by means of animal testing, the value was divided by 10 to derive an MOE of 10,000. The exposure originating in the environment through the food chain is estimated to be minor, and it is thought that adding this exposure would not greatly affect the MOE. Accordingly, assessment of the health risk from oral exposure to this substance is thought to be unnecessary at this time.

With regard to inhalation exposure, the predicted maximum exposure concentration in ambient air was estimated at less than 0.02 $\mu g/m^3$. Judging from the 'Non-toxic level' of 6.4 mg/m^3 and the predicted maximum exposure concentration, the MOE derived in the same manner exceeded 32,000. Accordingly, there is thought to be no need at this time for assessment of the health risk with regard to inhalation exposure to the substance in the ambient air.

Knowledge of toxicity				Exposure assessment			Result of risk assessment			Judgment
Exposure path	Guidelines for risk assessment	Animal	Impact assessment guideline (endpoint)	Exposure medium	Predicted maximum exposure quantity and concentration					
Oral	No observed adverse effect level 9 mg/kg/day	Mouse	Prevention of weight increase	Drinking water	–	μg/kg/day	MOE	–	×	○
				Fresh water	0.088	μg/kg/day	MOE	10,000	○	
Inhalation	No observed adverse effect level 6.4 mg/m^3	Rat	Turbinate necrosis	Ambient air	< 0.02	$\mu g/m^3$	MOE	> 32,000	○	○
				Indoor air	–	$\mu g/m^3$	MOE	–	×	×

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4. Initial assessment of ecological risk

With regard to acute toxicity, reliable information of a 96-hour EC_{50} growth inhibition value of 28,000 μg/L was found for the algae *Pseudokirchneriella subcapitata*, a 48-hour EC_{50} immobilization value of 44,500 μg/L was found for the crustacea *Daphnia magna* (water flea), a 96-hour LC_{50} value exceeding 100,000 μg/L was found for the fish *Oryzias latipes* (medaka), and a 24-hour LC_{50} value of 75,440 μg/L was found for *Rana ridibunda* (Ranidae). Accordingly, an assessment factor of 100 was used, and a predicted no effect concentration (PNEC) of 280 μg/L was obtained based on the acute toxicity values. With regard to chronic toxicity, reliable information of a 72-hour no observed effect concentration (NOEC) growth inhibition value of 30,900 μg/L was found for the algae *P. subcapitata*, and a 21-day NOEC reproduction value of 5,000 μg/L was found for the crustacea *D. magna*. Accordingly, an assessment factor of 100 was used, and a PNEC value of 50 μg/L was obtained based on the chronic toxicity values. As the PNEC for the substance, a value of 50 μg/L obtained from the chronic toxicity for the crustacean was used.

The PEC/PNEC ratio was 0.04 for freshwater bodies and 0.01 for seawater bodies. 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)		
Crustacea	Chronic	NOEC reproduction	100	50	Freshwater	2.2	0.04	○
					Seawater	0.52	0.01	

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5. Conclusions

	Conclusions		Judgment
Health risk	Oral exposure	Assessment is thought to be unnecessary at this time.	○
	Inhalation exposure	Assessment with regard to the ambient air is thought to be unnecessary at this time.	○
Ecological risk	No need of further work.		○

［Risk judgments］ ○: No need of further work ▲: Requiring information collection
■: Candidates for further work ×: Impossible of risk characterization