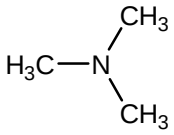
7	CAS No.: 75-50-3	Substance: Trimethylamine

Chemical Substances Control Law Reference No.: 2-140

PRTR Law Cabinet Order No.:

Molecular Formula: C_3H_9N Structural Formula:

Molecular Weight: 59.11



1. General information

The aqueous solubility of this substance is 8.90×10^5 mg/L (30°C), the partition coefficient (1-octanol/water) (log K_{ow}) is 0.16 (pH=2.7), and the vapor pressure is 1.61×10^3 mmHg (=2.15×10^5 Pa) (25°C). Biodegradability (aerobic degradation) is judged to be good. The substance does not have any hydrolyzable groups.

The main uses of this substance are as a raw material for choline chloride, textile oils, inverted soaps, and ion exchange resins, as well as a pharmaceutical ingredient. The production and import quantity in fiscal 2011 was 3,000 t.

---

2. Exposure assessment

Because this substance is not classified 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), release and transfer quantities could not be obtained. Predictions of proportions distributed to individual media by 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 soil and water bodies would be greater.

The maximum expected concentration of exposure to humans via inhalation, based on general environmental atmospheric data, was around 0.011 μg/m^3. The maximum expected oral exposure was estimated to be less than 0.68 μg/kg/day on the basis of 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, given the low bioaccumulation of the substance expected on the basis of its physicochemical properties.

The predicted environmental concentration (PEC), which indicates exposure to aquatic organisms, was around 17 μg/L for public freshwater bodies and generally 1.2 μg/L for seawater.

---

3. Initial assessment of health risk

This substance may cause severe irritation to eyes and respiratory tract. Pulmonary edema may occur when exposed to its vapor in high concentrations. In contact with skin, frostbites may occur when its liquid rapidly vaporizes. Its aqueous solution may cause corrosion to eyes and skin. Its inhalation exposure may cause burning sensation, coughing, headache, sore throat, labored breathing and shortness of breath, while its contact with eyes may cause redness, pain and blurred vision. Corrosion, abdominal pain, burning sensation, shock or collapse may occur when the substance is orally ingested.

As sufficient information was not available to evaluate 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 40 mg/kg/day (for degeneration of forestomach) obtained from its mid-term and long-term toxicity tests on rats was divided by a factor of 10 due to their short test periods. Outcome of 4 mg/kg/day was identified to be the reliable lowest dose and its ‘non-toxic level*’. As for its inhalation exposure, a LOAEL of 75 ppm (for degenerated nasal tissue) obtained from its mid-term and

long-term toxicity tests on rats and mice was adjusted for their durations to provide 13 ppm (31 mg/m^3) for its intermittent to continuous exposure, and divided by a factor of 10 for their short test periods and further divided by a factor of 10 for conservative use of the LOAEL. Outcome of 0.31 mg/m^3 was identified to be the reliable lowest dose and its 'non-toxic level*'.

As for oral exposure to the substance, its mean exposure level was estimated to be below about 0.036 μg/kg/day while its maximum exposure level was predicted to be about 0.68μg/kg/day when its intakes through freshwater from public water bodies were assumed. The MOE (Margin of Exposure) would be 590 when calculated from its 'non-toxic level*' of 4 mg/kg/day and its maximum exposure level predicted from animal experiments and divided by a factor of 10 to convert animal data to human data. As exposure to the substance in the environment through food intakes would be limited, the MOE would not change significantly even when this exposure was included. Therefore, no further action would be required at this moment to assess health risk from its inhalation exposure.

With regard to inhalation exposure to the substance, its mean exposure concentration in the ambient air was estimated to be below about 0.007 μg/m^3 while its maximum exposure concentration was predicted to be about 0.011 μg/m^3. The MOE would be 2,800 when calculated from its 'non-toxic level*' of 0.31 mg/m^3 and its maximum exposure concentration predicted from animal experiments and divided by a factor of 10 to convert animal data to human data. Therefore, no further action would be required to assess health risk from its inhalation exposure in the ambient air.

Toxicity				Exposure assessment		Result of risk assessment			Judgment
Exposure Path	Criteria for risk assessment	Animal	Criteria for diagnoses (endpoint)	Exposure medium	Predicted maximum exposure dose and concentration				
Oral	'Non-toxic level*' 4 mg/kg/day	Rat	Degeneration of forestomach	Drinking water	— μg/kg/day	MOE	—	×	○
				Freshwater	0.68 μg/kg/day	MOE	590	○	
Inhalation	'Non-toxic level*' 0.31 mg/m^3	Rat	Degenerated nasal tissue	Ambient air	0.011 μg/m^3	MOE	2,800	○	○
				Indoor air	— μg/m^3	MOE	—	×	×

Non-toxic level *

- When a LOAEL is available, it is divided by 10 to obtain a NOAEL-equivalent level.
- 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.

---

4. Initial assessment of ecological risk

With regard to acute toxicity, the following reliable data were obtained: a 72-h EC_{50} of more than 100,000 μg/L for growth inhibition in the green alga *Pseudokirchneriella subcapitata*, a 48-h EC_{50} of 28,000 μg/L for immobilization in the crustacean *Daphnia magna*, and a 96-h LC_{50} of more than 100,000 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 280 μg/L was obtained.

With regard to chronic toxicity, the following reliable data were obtained: a 72-h NOEC of 56,000 μg/L for growth inhibition in the green alga *P. subcapitata* and a 21-d NOEC of 8,000 μg/L for reproductive inhibition in the crustacean *D. magna*. Accordingly, based on these chronic toxicity values and an assessment factor of 100, a PNEC of 80 μg/L was obtained.

The value of 80 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 0.2 for freshwater bodies and 0.02 for seawater. Accordingly, efforts to collect data on this substance are needed. Regarding this substance, efforts are needed to understand

environmental concentrations that take into account production quantity and release sources, as well as chronic toxicity towards fish species.

Hazard assessment (basis for PNEC)			Assessment factor	Predicted no effect concentration PNEC (μg/L)	Exposure assessment		PEC/PNEC ratio	Judgment based on PEC/PNEC ratio	Assessment result
Species	Acute/ chronic	Endpoint			Water body	Predicted environmental concentration PEC (μg/L)			
Crustacean *Daphnia magna*	Chronic	NOEC reproductive inhibition	100	80	Freshwater	17	0.2	▲	▲
					Seawater	1.2	0.02		

---

5. Conclusions

	Conclusions		Judgment
Health risk	Oral exposure	No need of further work at present.	○
	Inhalation exposure	No need of further work at present.	○
Ecological risk	Requiring information collection.		▲

［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.