12	CAS No.: 121-44-8	Substance: Triethylamine

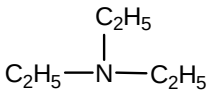
Chemical Substances Control Law Reference No.: 2-141

PRTR Law Cabinet Order No.:

Molecular Formula: $C_6H_{15}N$

Molecular Weight: 101.19

Structural Formula:



1. General information

The aqueous solubility of this substance is 7.37 x 10^4 mg/1,000g (25°C) and the partition coefficient (1-octanol / water) (log Kow) is 1.48 (pH = 13). The vapor pressure is 57.1 mmHg (= 7.61 x 10^3 Pa) (25°C). Degradability (aerobic degradation) in terms of BOD-based degradation percentage is estimated to be 28.3% (on average). This substance is determinated to be non or not highly bioaccumulative.

It is mainly used for pharmaceutical products, intermediates for dyes, rubber chemicals, agricultural chemicals, surfactants, paints, extraction solvents of pharmaceutical products, and foundry resin hardeners. The totals of production (shipment) and imports in FY 2001 and FY 2004 were both 1,000 to less than 10,000 tons/yr.

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2. Exposure assessment

As triethylamine 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 soil and water.

No predicted maximum exposure concentration for inhalation exposure to human beings could be established because data for both ambient air and indoor air could not be obtained. The highest estimated oral exposure was calculated to be approximately 0.02 μg/kg/day based on previous data regarding freshwater bodies. The risk of exposure to this substance through food in environmental media is considered to be low.

The previous predicted environmental concentration (PEC), which indicated exposure to aquatic organisms, was estimated to be approximately 0.5 μg/L for freshwater and approximately less than 0.2 μg/L for seawater in public water bodies.

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3. Initial assessment of health risk

The substance is corrosive to the eyes, the skin and the respiratory tract. It is corrosive on ingestion as well. Inhalation of the substance may cause lung oedema. The substance may cause effects on the central nervous system. Contact with eyes and skin may cause their redness, pain and burns, and, in the case of eyes, blurred vision and temporary loss of vision. By ingestion, it may cause abdominal pain, burning sensation, shock or collapse. By inhalation, it may cause cough, sore throat, shortness of breath, laboured breathing, headache, dizziness and nausea.

There was insufficient information regarding the carcinogenicity of the substance. For this reason, an initial assessment of the substance was conducted based on information of non-carcinogenic effects.

For oral exposure, the 'Non-toxic level*' could not be estimated. A no observed adverse effect level (NOAEL) for the inhalation of 103 mg/m^3 (effects on the eyes and the respiratory system) was obtained from the medium- and long-term toxicity testing for rats. The NOAEL was adjusted to 18 mg/m^3 taking into account the exposure situations. The value was divided by 10, because of the experimental period being short, and a value of 1.8 mg/m^3 was derived as the 'Non-toxic level*'.

For oral exposure, because its 'Non-toxic level*' could not be determined, its health risk could not be identified. So,

a ‘non-toxic level’ for inhalation exposure was converted to a ‘non-toxic level’ for oral exposure, and subsequently, a reference value for MOE was estimated. As an endpoint for conversion between ‘non-toxic levels’ for various exposure pathways, systemic effects would be appropriate than local effects. When systemic effects are assumed to be an endpoint, NOAEL for rats for inhalation exposure would be 1,022 mg/m^3, which was obtained from mid-term and long-term toxicity tests. This NOAEL was adjusted for actual exposure and then divided by 10 due to the short test periods, and a provisional ‘non-toxic level’ of 18 mg/m^3 was obtained. If the absorption rate of 100% is assumed, its conversion for oral exposure would produce 5.4 mg/kg/day, and a reference value of MOE of 27,000 would be obtained from 5.4 mg/kg/day and the predicted maximum exposure of approximately 0.02 μg/kg/day.

As the exposure to this substance through food intakes was estimated minor, even when the exposure through freshwater and food are combined, it would not greatly affect the MOE values. Accordingly, further action for assessment of its health risk from oral exposure to this substance would not be required at present.

For the inhalation exposure, because the exposure concentrations have not been estimated, its health risk can not be identified. The half- life of this substance in the atmosphere was estimated to be 0.69-6.9 hrs, and its vapor pressure is relatively high. When this substance is released to the atmosphere, it is estimated to distribute mostly into the atmosphere. Additionally, its production volume was relatively high. The released quantity of this substance to the environment has not been surveyed. Accordingly, it would be required to collect information on inhalation exposure to this substance in the ambient air for its health risk assessment.

Information of toxicity				Exposure assessment		Result of risk assessment			Judgmen
Exposure Path	Criteria for risk assessment	Animal	Criteria for diagnoses (endpoint)	Exposure medium	Predicted maximum exposure quantity and concentration				
Oral	‘Non-toxic level’* — mg/kg/day	—	—	Drinking water	— μg/kg/day	MOE	—	×	(○)
				freshwater	0.02 μg/kg/day	MOE	—	×	
Inhalation	‘Non-toxic level’* 1.8 mg/m^3	Rats	effects on the eyes and the respiratory system	Ambient air	— 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, reliable information of a 72-hour median effective concentration (EC_{50}) growth inhibition value of 7,970 μg/L was found for the algae *Pseudokirchneriella subcapitata*, a 48-hour EC_{50} immobilization value of 34,000 μg/L was found for the crustacea *Daphnia magna* (water flea), and a 96-hour median lethal concentration (LC_{50}) value of 24,000 μg/L was found for the fish *Oryzias latipes* (medaka). Accordingly, an assessment factor of 100 was used, and a predicted no effect concentration (PNEC) of 80 μg/L was obtained based on the acute toxicity values. With regard to chronic toxicity, reliable information giving a 72-hour no observed effect concentration (NOEC) growth inhibition value of 1,100 μg/L was found for the algae *P. subcapitata*, a 21-day NOEC reproduction value of 10,700 μg/L was found for the crustacea *D.magna*, and a 60-day NOEC growth inhibition value of less than 3,200 μg/L was found for the fish *Oncorhynchus mykiss* (rainbow trout). Accordingly, an assessment factor of 10 was used, and a PNEC value of 110 μg/L was obtained based on the chronic toxicity values. As the PNEC for the substance, a value of 80 μg/L obtained from the acute toxicity for the algae was used.

The PEC/PNEC ratio was 0.006 for freshwater bodies and less than 0.003 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)		
Algae (green algae)	Acute	EC_{50} growth inhibition	100	80	Freshwater	0.5	0.006	○
					Seawater	<0.2	<0.003	

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5. Conclusions

	Conclusions		Judgment
Health risk	Oral exposure	Risk cannot be identified. However, there would be little necessity of collecting information.	(○)
	Inhalation exposure	Risk assessment for the ambient air is not feasible, but collection of information is required.	(▲)
Ecological risk	No need forfurther 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.