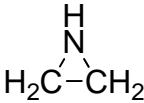


1	CAS No.: 151-56-4	Substance: Ethylenimine
<p>Chemical Substances Control Law Reference No.: 5-2 PRTR Law Cabinet Order No.: 1-55 Molecular Formula: C₂H₅N Structural Formula: Molecular Weight: 43.07</p> <div style="text-align: center;">  </div>		
<p>1. General information</p> <p>This substance is freely miscible with water, the partition coefficient (1-octanol/water) (log K_{ow}) is -0.36, and the vapor pressure is 217 mmHg (=2.89×10⁴ Pa) (25°C). Biodegradability (aerobic degradation) is characterized by a BOD degradation rate of less than 20%. Its half-life for hydrolysis is 154 d.</p> <p>This substance 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). It is mainly used as a raw material for agricultural chemicals and polyethyleneimine. Polyethyleneimine is used in various fields including paper making and converting, adhesives, textiles, and water purification, where it is used as a flocculant, anti-static agent, and chelating agent. The production and import quantity in fiscal 2011 was not disclosed because the number of reporting businesses was not more than two. The production and import category under the PRTR Law is more than 100 t.</p> <hr/> <p>2. Exposure assessment</p> <p>Total release to the environment in fiscal 2011 under the PRTR Law was 0 t. Quantities of release and transfer to sewage under the PRTR Law 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 water bodies and soil were greater.</p> <p>The maximum expected concentration of exposure to humans via inhalation, based on general environmental atmospheric data, was around less than 0.0027 µg/m³. The maximum expected oral exposure was estimated to be generally less than 0.00016 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, based on this substance's physicochemical properties.</p> <p>The predicted environmental concentration (PEC), which indicates exposure to aquatic organisms, was generally less than 0.004 µg/L for both public freshwater bodies and seawater.</p> <hr/> <p>3. Initial assessment of health risk</p> <p>This substance is corrosive and may affect the central nervous system, kidney and liver. Inhalation exposure to the substance may cause coughing, dizziness, headache, labored breathing, nausea and vomiting, and may possibly cause pulmonary edema, while oral ingestion may cause, in addition to these symptoms, abdominal pain, burning sensation, vomiting, shock or collapse. Contact of the substance with skin may cause redness, skin burns and blisters, while contact with eyes may cause redness, pain and severe burns.</p> <p>As sufficient information was not available to evaluate potential hazards of the substance, its potential health risk could not be assessed, and the hazard index for its oral exposure nor inhalation exposure could not be determined.</p> <p>In addition, the excess incidence rate for tumor, for the predicted maximum exposure concentration (below about 0.00016 µg/kg/day), was calculated to be below 1.4×10⁻⁷ from a slope factor of 8.9×10⁻¹ (mg/kg/day)⁻¹ obtained from the oral exposure experiments on B6C3F₁ mice to the substance. As exposure to the substance in the environment</p>		

through food intakes would be limited, the excess incidence rate would not change significantly even when this exposure is included. Therefore, collection of information would not be required to assess health risk from oral exposure to the substance.

Additionally, if 100 % absorption were assumed, the predicted maximum exposure level for inhalation exposure to the substance would be converted to 0.00081 µg/kg/day for oral exposure. The excess incidence rate for tumor would be below 7×10^{-7} from the predicted maximum exposure level and the slope factor. Therefore, collection of further information would not be required at this moment to assess health risk from inhalation exposure to the substance in the ambient air.

Exposure Path	Toxicity			Exposure assessment		Result of risk assessment			Judgment
	Criteria for risk assessment	Animal	Criteria for diagnoses (endpoint)	Exposure medium	Predicted maximum exposure dose and concentration				
Oral	'Non-toxic level*' - mg/kg/day	-	-	Drinking water	- µg/kg/day	MOE	-	×	()
				Freshwater	<0.00016 µg/kg/day	MOE	-	×	
Inhalation	'Non-toxic level*' - mg/m ³	-	-	Ambient air	<0.0027 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 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 24-h EC₅₀ of 14,000 µg/L for immobilization in the crustacean *Daphnia magna*. Accordingly, based on this acute toxicity value and an assessment factor of 1,000, a predicted no effect concentration (PNEC) of 14 µg/L was obtained.

The value of 14 µg/L obtained from the acute toxicity to the crustacean was used as the PNEC for this substance because reliable chronic toxicity data could not be obtained.

The PEC/PNEC ratio was less than 0.0003 for both freshwater bodies and seawater. Accordingly, further work is considered unnecessary at this time.

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 <i>Daphnia magna</i>	Acute	EC ₅₀ immobilization	1,000	14	Freshwater	<0.004	<0.0003		
					Seawater	<0.004	<0.0003		

5. Conclusions

	Conclusions		Judgment
Health risk	Oral exposure	Although risk to human health could not be confirmed, collection of further information would not be required.	()
	Inhalation exposure	Although risk to human health could not be confirmed, collection of further information would not be required.	()
Ecological risk	No need of further work at present.		

[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.