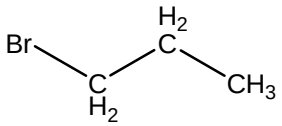
10	CAS No.: 106-94-5	Substance: 1-Bromopropane

Chemical Substances Control Law Reference No.: 2-73（1-Bromopropane）

PRTR Law Cabinet Order No.: 1-384

Molecular Formula: C_3H_7Br Structural Formula:

Molecular Weight: 122.99



1. General information

The aqueous solubility of this substance is 2.34×10^3 mg/1,000 g (25°C), the partition coefficient (1-octanol/water) (log K_{ow}) is 2.1, and the vapor pressure is 140 mmHg (=1.86×10^4 Pa) (25°C). Biodegradability (aerobic degradation) is judged to be difficult, and bioaccumulation is thought to be low. Its half-life for hydrolysis is 26 d.

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). The main uses of this substance are as an industrial detergent, a synthetic fiber auxiliary, and in dyestuffs, flavorings (for food), seasonings, flower-like fragrances, pharmaceuticals, and synthesis of benzoic acid and other organic compounds. The production and import quantity in fiscal 2011 was 5,000 t. The production and import category under the PRTR Law is more than 100 t.

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2. Exposure assessment

Total release to the environment in fiscal 2011 under the PRTR Law was approximately 1,300 t, of which approximately 1,100 t or 87% of overall releases were reported. The major destination of reported releases was the atmosphere. In addition, approximately 160 t was transferred to waste materials, and 0.23 t was transferred to sewage. Industry types with large reported releases were the industries for transportation equipment and machinery manufacturing, electrical machinery manufacturing, metal products manufacturing, precision instruments and machinery manufacturing, non-ferrous metals manufacturing, and special controlled industrial waste disposal for the atmosphere, and the chemical industry alone for public water bodies. The largest release among releases to the environment including those unreported was to the atmosphere. A multi-media model used to predict the proportions distributed to individual media in the environment indicated that in regions where the largest quantities were estimated to have been released to the environment overall or to the atmosphere in particular, the predicted proportion distributed to the atmosphere was 99.0%. In regions where the largest estimated releases were to public water bodies, the predicted proportion distributed to the atmosphere was 93.7%.

The maximum expected concentration of exposure to humans via inhalation, based on general environmental atmospheric data, was around 0.17 μg/m^3. The mean annual value for atmospheric concentration in fiscal 2011 was calculated by using a plume-puff model on the basis of releases to the atmosphere reported according to the PRTR Law; this model predicted a maximum level of 39 μg/m^3. The maximum expected oral exposure was estimated to be around 0.00011 μg/kg/day on the basis of calculations from data for public freshwater bodies. When releases to public freshwater bodies in fiscal 2011 reported according to the PRTR Law were divided by the ordinary water discharge of the national river channel structure database, estimating the concentration in rivers by taking into consideration only dilution gave a maximum value of 9.1 μg/L. Using this estimated concentration for rivers to calculate oral exposure gave 0.36 μg/kg/day. 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 0.0027 μg/L for public freshwater bodies and around 0.0073 μg/L for seawater. When releases to public freshwater bodies in fiscal 2011 reported according to the PRTR Law were divided by the ordinary water discharge of the national river channel structure database, estimating the concentration in rivers by taking into consideration only dilution gave a maximum value of 9.1 μg/L.

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3. Initial assessment of health risk

This substance may cause irritation to eyes and respiratory tract, and it may possibly affect the central nervous system to result in loss of consciousness. When inhaled, coughing, sore throat and lethargy may occur. Contact of the substance with eyes may cause redness and pain.

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, its 'non-toxic level*' could not be identified. However, a LOAEL of 1.28 ppm (1.3 mg/m^3) (for higher thresholds to perceive vibrations and the lower red blood cell counts) obtained from its effects on humans was adjusted for their durations to provide 0.26 ppm for its intermittent to continuous exposure, and divided by a factor of 100 due to conservative use of the LOAEL. Outcome of 0.13 mg/m^3 was identified to be the reliable lowest dose of the substance and its 'non-toxic level*'.

As for oral exposure to the substance, its health risk could not be assessed as its 'non-toxic level*' could not be identified. However, if 100 % absorption were assumed, the 'non-toxic level*' for its inhalation exposure would be converted to the 'non-toxic level*' of 0.039 mg/kg/day for its oral exposure. The MOE (Margin of Exposure) would be 350,000 when calculated from this level and its predicted maximum exposure level of approximately 0.00011 μg/m^3. In addition, its maximum exposure was calculated to be 0.36 μg/kg/day from its concentrations in river water with effluents from operators discharging it in high concentrations reported in FY 2011 under the PRTR Law. The MOE would be 110 when calculated from this maximum exposure concentration. 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, collection of further information would not be required to assess health risk from its oral exposure.

As for inhalation exposure to the substance in the ambient air, its mean exposure concentration was about 0.032 μg/m^3 while its maximum exposure concentration was predicted to be about 0.17 μg/m^3. The MOE would be 760 when calculated from its predicted maximum exposure concentration and its 'non-toxic level*' of 0.13 mg/m^3. Meanwhile, its maximum (annual mean) concentration in the ambient air near the operators discharging the substance in high concentrations was calculated to be 39 μg/m^3 from its emissions reported in FY 2011 under the PRTR Law. The MOE would be 3 when calculated from this for reference. Therefore, collection of further information 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*' — mg/kg/day	—	—	Drinking water	— μg/kg/day	MOE	—	×	(○)
				Freshwater	0.00011 μg/kg/day	MOE	—	×	
Inhalation	'Non-toxic level*' 0.13 mg/m^3	Human	Higher vibration perception thresholds and lower red blood cell counts	Ambient air	0.17 μg/m^3	MOE	760	○	(▲)
				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.

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4. Initial assessment of ecological risk

With regard to acute toxicity, a 96-h LC_{50} of 67,300 µg/L for the fish species *Pimephales promelas* (fathead minnow) was obtained as a reliable data. Accordingly, based on this acute toxicity value and an assessment coefficient of 1,000, a predicted no effect concentration (PNEC) of 67 µg/L was obtained.

The value of 67 µg/L obtained from the acute toxicity to the fathead minnow was used as the PNEC for this substance because reliable chronic toxicity data could not be obtained.

The PEC/PNEC ratio was 0.00004 for freshwater bodies and 0.0001 for seawater. In addition, the river concentration estimated by using releases reported according to the PRTR Law and taking only dilution into consideration gives 9.1 µg/L, resulting in a ratio to PNEC that only slightly exceeds 0.1. Accordingly, further work regarding this substance 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)			
Fish (fathead minnow)	Acute	LC_{50} mortality	1,000	67	Freshwater	0.0027	0.00004	○	○
					Seawater	0.0073	0.0001		

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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	Collection of further information would 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.