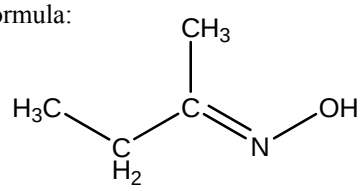
11	CAS No.: 96-29-7	Substance: Butan-2-one oxime

Chemical Substances Control Law Reference No.: 2-546 (Methyl ethyl (C2–4) ketoxime)

PRTR Law Cabinet Order No.:

Molecular Formula: C_4H_9NO Structural Formula:

Molecular Weight: 87.12



1. General information

The aqueous solubility of this substance is 1.0×10^5 mg/L, the partition coefficient (1-octanol/water) (log K_{ow}) is 0.63, and the vapor pressure is 1.2 mmHg (157 Pa) (calculated value). Biodegradability (aerobic degradation) is characterized by a BOD degradation rate of 24.7% and bioaccumulation is judged to be non-existent or low. Furthermore, the degradation rate by hydrolysis is 14% (4 d, pH 7).

The main uses of this substance are in alkyd resin varnishes for oil-based ready-mixed paints, rust-inhibiting paints, synthetic resin coating, and enamels, and as an antiskinning agent in ready-mixed paints and rust-inhibiting paints. It is also used as a curing agent for silicone rubbers. Furthermore, the production and import quantity as methyl alkyl (C2–4) ketoximes in fiscal 2013 was 5,000 t.

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2. Exposure assessment

Because this substance is not classified as a Class 1 Designated Chemical Substance under the 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 largest.

The maximum expected concentration of exposure to humans via inhalation, based on general environmental atmospheric data, was around less than 0.013 μg/m^3. The maximum expected oral exposure was estimated to be around 0.0036 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 its low bioaccumulation.

The predicted environmental concentration (PEC), which indicates exposure to aquatic organisms, was reported to be around 0.089 μg/L for public freshwater bodies and around 0.49 μg/L for seawater.

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3. Initial assessment of health risk

No information on acute symptoms in humans was available. The observed symptoms in rats caused by this substance were lethargy, prostration and ruffled fur.

As sufficient information on the carcinogenicity of the substance was not available, the initial assessment was conducted on the basis of information on its non-carcinogenic effects.

The NOAEL of 4 mg/kg/day for oral exposure (based on reduction of the number of erythrocytes, increase of the number of reticulocytes, enhancement of splenic extramedullary hematopoiesis, etc.), determined from medium-term and long-term toxicity tests in rats, was divided by a factor of 10 to account for extrapolation from sub-acute to chronic exposure. The obtained value of 0.40 mg/kg/day was deemed to be the lowest reliable dose and was identified as the ‘non-toxic level*’of the substance for oral exposure.

The NOAEL of 3 ppm for inhalation exposure (based on degeneration of the olfactory epithelium), determined from medium-term and long-term toxicity tests in mice, was adjusted for exposure conditions to obtain 0.54 ppm (1.9 mg/m^3), and subsequently divided by a factor of 10 to account for extrapolation from

sub-chronic to chronic exposure. The obtained value of 0.19 mg/m^3 was deemed to be the lowest reliable concentration and was identified as the 'non-toxic level*' of the substance for inhalation exposure.

With regard to oral exposure, assuming the substance is absorbed via public freshwater bodies, the predicted maximum exposure level was approximately 0.0036 μg/kg/day. The MOE (Margin of Exposure) would be 11,000, when calculated from the predicted maximum exposure level and the 'non-toxic level*'of 0.40 mg/kg/day, and subsequently divided by a factor of 10 to account for extrapolation from animals to humans. Since exposure to the substance in environmental media via food is presumed to be limited, its inclusion in the calculation would not change the MOE significantly. Therefore, no further work would be required at present to assess the health risk of this substance via oral exposure.

With regard to inhalation exposure, the predicted maximum exposure concentration was less than 0.013 μg/m^3, approximately in ambient air. The MOE would be over 1,500, when calculated from the predicted maximum exposure concentration and the 'non-toxic level*'of 0.19 mg/m^3, and subsequently divided by a factor of 10 to account for extrapolation from animals to humans. Therefore, no further work would be required at present to assess the health risk of this substance via inhalation in 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*' 0.40 mg/kg/day	Rat	Decreased erythrocytes, increased reticulocytes, increased splenic extramedullary hematopoiesis, etc.	Drinking water	— μg/kg/day	MOE	—	×	○
				Public Freshwater bodies	0.0036 μg/kg/day	MOE	11,000	○	
Inhalation	'Non-toxic level*' 0.19 mg/m^3	Mouse	Degeneration of the olfactory epithelium	Ambient air	<0.013 μg/m^3	MOE	>1,500	○	○
				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, the following reliable data were obtained: a 72-h EC_{50} of 15,900 μg/L for growth inhibition in the green algae *Pseudokirchneriella subcapitata*, a 48-h EC_{50} of 201,000 μg/L for swimming inhibition in the crustacean *Daphnia magna*, a 96-h LC_{50} exceeding 100,000 μg/L for the fish species *Oryzias latipes* (medaka), and a 40-h IGC_{50} of 1,023,000 μg/L for reproductive inhibition in the ciliate protozoan *Tetrahymena pyriformis*. Accordingly, based on these toxicity values and an assessment factor of 100, a predicted no effect concentration (PNEC) of 159 μg/L was obtained.

With regard to chronic toxicity, the following reliable data were obtained: a 72-h NOEC of 2,560 μg/L for growth inhibition in the green algae *P. subcapitata*, and a 21-d NOEC of 100,000 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 25 μg/L was obtained.

The value of 25 μg/L obtained from the chronic toxicity to the alga was used as the PNEC for this substance.

The PEC/PNEC ratio is 0.004 for freshwater bodies and 0.02 for seawater; accordingly, further work is considered unnecessary at this time.

Hazard Assessment（Basis for PNEC）			Assessment Coefficient	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)			
Green algae	Chronic	NOEC Growth Inhibition	100	25	Freshwater	0.089	0.004	○	○
					Seawater	0.49	0.02		

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5. Conclusions

	Conclusions		Judgment
Health risk	Oral exposure	No need for further work at present.	○
	Inhalation exposure	No need for further work at present.	○
Ecological risk	No need for further work at present.		○

［Risk judgments］ ○: No need for further work ▲: Requiring information collection

■: Candidates for further work ×: Impossibility of risk characterization

（○）: Although risk to human health could not be confirmed, collection of further information would not be required.

（▲）: Further information collection would be required for risk characterization.