2	CAS No.: 141-78-6	Substance: Ethyl acetate

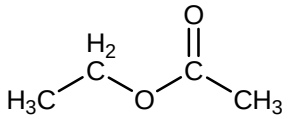
Chemical Substances Control Law Reference No.: 2-726

PRTR Law Cabinet Order No.:

Molecular Formula: $C_4H_8O_2$

Molecular Weight: 88.11

Structural formula:



1. General information

The water solubility of this substance is 8.08×10^4 mg/1,000g (25°C), the partition coefficient (1-octanol/water) (log K_{ow}) is 0.73, and the vapor pressure is 93.7-94.5 mmHg (=1.25×10^4-1.26×10^4 Pa) (25°C). This substance is judged to be readily biodegradability (aerobic degradation). The hydrolysis half-life is 2.02 years (pH7, 20°C).

The main uses are as a raw material or solvent for paints, printing inks, leather, adhesives, pearls, and pharmaceuticals. In 2010, the production quantity was 112,007 t, the import quantity 105,205 t, and the export quantity 1,600 t.

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2. Exposure assessment

Estimated emissions to the atmosphere in FY 2009 based on the volatile organic compounds (VOCs) emission inventory were 65,554 t. Predictions of distribution by medium 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 predicted maximum exposure to humans via inhalation, based on general environmental atmospheric data, was around 26 μg/m^3. In addition, the predicted maximum exposure for indoor air was around 200 μg/m^3. The predicted maximum oral exposure was estimated to be around less than 0.015 μg/kg/day based on data from public freshwater bodies. The risk of exposure to this substance by intake from an environmental medium via food is considered slight based on estimates of oral exposure using estimated concentrations in fish.

The predicted environmental concentration (PEC), which indicates exposure to aquatic organisms, was around less than 0.38 μg/L for both public freshwater bodies and seawater.

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3. Initial assessment of health risk

This substance is irritating to eyes and respiratory tract, and it may affect the central nervous system. Inhalation of the substance causes coughing, dizziness, drowsiness, headache, nausea, sore throat, loss of consciousness and weakness. Contact of skin to the substance makes it dry, and contact of eyes to it makes them red and causes pain to them. Exposure above its tolerable concentration (400 ppm) may result in death.

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

As for oral exposure to the substance, a NOAEL of 900 mg/kg/day (for suppressed body weight increase and organ weight increase) obtained from mid- and long-term toxicity tests on rats was divided by 10 due to their rather short test periods. Its outcome of 90 mg/kg/day was deemed to be the lowest reliable dose without any effect, and this was identified as its ‘non-toxic level*’. As for inhalation exposure to the substance, a LOAEL of 350 ppm (for suppressed body weight increase and the degeneration of olfactory epithelium) was obtained from mid- and long-term toxicity tests on rats. It was then adjusted to 63 ppm (225 mg/m^3) against exposure conditions and divided by 10 as is always the case with LOAELs. It was further divided by 10 due to their short test periods. Final outcome of 0.63 mg/m^3 (2.3 mg/m^3) was deemed to be the lowest reliable concentration without any effect, and this was identified as its ‘non-toxic level*’.

As for its oral exposure, both its mean exposure and its predicted maximum exposure were estimated to be less than

around 0.015 μg/kg/day when its intakes through freshwater from public water bodies were assumed. The MOE would be more than 600,000 when calculated from the 'non-toxic level*' of 90 mg/kg/day and the predicted maximum exposure, and divided by 10 for conversion of the 'non-toxic level*' from animal experiments to an equivalent dose for humans. Since exposure to this substance in environmental media through intakes of food is considered to be limited, significant changes in the MOE is not likely, even when this exposure is combined. Therefore, further actions would not be required to assess health risk from oral exposure to this substance at present.

As for its inhalation exposure, its mean exposure concentration was around 2.3 μg/m^3 and its predicted maximum exposure concentration was approximately 26 μg/m^3, when its concentrations in the ambient air were considered. The MOE would be 8.8 when calculated from the 'non-toxic level*' of 2.3 mg/m^3 and the predicted maximum exposure concentration, and divided by 10 for conversion of the 'non-toxic level*' from animal experiments to an equivalent dose for humans. Meanwhile, for indoor air, its mean exposure concentration was 14 μg/m^3, and its predicted maximum exposure concentration 200 μg/m^3. The MOE would be 1.2 when calculated from the 'non-toxic level*' of 2.3 mg/m^3 and the predicted maximum exposure, and divided by 10 for conversion of the 'non-toxic level*' from animal experiments to an equivalent dose for humans. Therefore, detailed assessment would be required for health risk of inhalation exposure to this substance in the ambient and indoor 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 * ' 90 mg/kg/day	Rats	Suppressed body weight increase and organ weight increase	Drinking water	—	μg/kg/day	MOE	—	×	○
				Freshwater	< 0.015	μg/kg/day	MOE	> 600,000	○	
Inhalation	Non-toxic level * ' 2.3 mg/m^3	Rats	Suppressed body weight increase, degeneration of olfactory epithelium	Ambient air	26	μg/m^3	MOE	8.8	■	■
				Indoor air	200	μg/m^3	MOE	1.2	■	

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.

4.Initial assessment of ecological risk

With regard to acute toxicity, the following reliable data were obtained: a 48-h LC_{50} of 262,000 μg/L for the crustacean *Daphnia pulex* and a 96-h LC_{50} exceeding 75,600 μg/L for the fish *Pimephales promelas* (fathead minnow). Accordingly, based on these acute toxicity values and an assessment factor of 100, a predicted no effect concentration (PNEC) exceeding 760 μg/L was obtained.

With regard to chronic toxicity, the following reliable data were obtained: a 72-h NOEC exceeding 100,000 μg/L for growth inhibition in the green algae *Desmodesmus subspicatus*; a 21-d of NOEC 2,400 μg/L for reproductive inhibition in the crustacean *Daphnia magna*; and a 32-d NOEC of less than 9,650 μg/L for growth inhibition in the fish species *P. promelas* (fathead minnow). Accordingly, based on these chronic toxicity values and an assessment factor of 10, a predicted no effect concentration (PNEC) of 240 μg/L was obtained μg/L. This 240 μg/L obtained from the crustacean chronic toxicity was used as the PNEC for this substance.

The PEC/PNEC ratio was less than 0.002 for both freshwater bodies and seawater. Accordingly, further work is thought to be unnecessary at this time. Further, considering the implementation of more chronic toxicity tests as required in the future is thought to be necessary because definitive values for chronic toxicity to fish could not be obtained.

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	10	240	Freshwater	<0.38	<0.002	○	○
					Seawater	<0.38	<0.002		

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5. Conclusions

	Conclusions		Judgment
Health risk	Oral exposure	No need for further work.	○
	Inhalation exposure	Candidates for further work.	■
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.