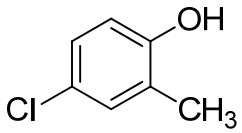
3	CAS No.: 1570-64-5	Substance: 4-Chloro-2-methylphenol

Chemical Substances Control Law Reference No.: 3-900 (monomethyl-monochlorophenol)

PRTR Law Cabinet Order No.:

Molecular Formula: C_7H_7ClO Structural Formula:

Molecular Weight: 142.58



1. General information

The aqueous solubility of this substance is 6.8×10^3 mg/1,000 g (25°C), the partition coefficient (1-octanol/water) (log K_{ow}) is 2.78, and the vapor pressure is 2.40×10^{-3} mmHg (0.320 Pa) (25°C). Biodegradability (aerobic degradation) is characterized by a BOD degradation rate of 0%, and bioaccumulation is judged to be non-existent or low. The substance does not have any hydrolyzable groups.

The main use of this substance is as an intermediate for agricultural chemicals. The production and import quantity of monomethyl-monochlorophenol in fiscal 2013 was less than 1,000 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 proportion distributed to soil would be largest.

The maximum expected concentration of exposure to humans via inhalation could not be obtained. The maximum expected oral exposure was estimated to be less than around 0.00013 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 less than around 0.0032 μg/L for both public freshwater bodies and seawater.

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3. Initial assessment of health risk

This substance is corrosive to the eyes, skin and respiratory tract, and corrosive when ingested as well.

Inhalation of the substance causes coughs, labored breathing, shortness of breath, sore throat and burning sensation, and may cause lung edema. Oral exposure to the substance causes abdominal pain, burning sensation, shock or collapse and sore throat. Contact with skin may cause skin burns, pain and redness, and contact with the eyes may cause pain, redness and severe deep burns.

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 60 mg/kg/day for oral exposure (based on epithelial hyperplasia of the urinary bladder mucosa, squamous hyperplasia of the forestomach mucosa, 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 6.0 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 ‘non-toxic level*’ for inhalation exposure could not be identified.

With regard to oral exposure, assuming that the substance is absorbed via public freshwater bodies, the

predicted maximum exposure level was less than 0.00013 μg/kg/day, approximately. The MOE (margin of exposure) would be over 4,600,000, when calculated from the predicted maximum exposure level and the 'non-toxic level*'of 6.0 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, owing to lack of identified 'non-toxic level*' and exposure levels, the health risk could not be assessed. Since it is expected that the substance emitted to ambient air is hardly dispersed into ambient air, collection of further information would not be required 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*' 6.0 mg/kg/day	Rat	Epithelial hyperplasia of the urinary bladder mucosa, squamous hyperplasia of the forestomach mucosa, etc.	Drinking water	— μg/kg/day	MOE	—	×	○
				public fresh water bodies	<0.00013 μg/kg/day	MOE	>4,600,000	○	
Inhalation	'Non-toxic level*' — mg/m^3	—	—	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 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 26,900 μg/L for growth inhibition in the green algae *Desmodesmus subspicatus*, a 48-h LC_{50} of 290 μg/L for the crustacean *Daphnia magna*, and a 120-h LC_{50} of 12,100 μg/L for the African clawed frog *Xenopus laevis*. Accordingly, based on these acute toxicity values and an assessment factor of 1,000, a predicted no effect concentration (PNEC) of 0.29 μg/L was obtained.

With regard to chronic toxicity, the following reliable data was obtained: a 21-d NOEC of more than 560 μg/L for reproductive inhibition in the crustacean *D. magna*. Accordingly, based on this chronic toxicity value and an assessment factor of 100, a PNEC of more than 5.6 μg/L was obtained.

The value of 0.29 μg/L obtained from the acute toxicity to the crustacean was used as the PNEC for this substance.

The PEC/PNEC ratio is less than 0.01 for both freshwater bodies and seawater; accordingly, further work is considered unnecessary at this time. However, adopting the acute toxicity towards fish species predicted using a quantitative structure-activity relationship (QSAR) gives a PEC to PNEC reference ratio of less than 0.001.

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)			
Crustacean *Daphnia magna*	Acute	LC_{50} mortality	1,000	0.29	Freshwater	<0.0032	<0.01	○	○
					Seawater	<0.0032	<0.01		

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5. Conclusions

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

［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.