

13	CAS No.: 111-82-0	Substance: Methyl dodecanoate
<p>Chemical Substances Control Law Reference No.: 2-798 (Fatty acid (C = 9–24) alkyl (C = 1–12) ester)</p> <p>PRTR Law Cabinet Order No.:</p> <p>Molecular Formula: C₁₃H₂₆O₂ Structural Formula:</p> <p>Molecular Weight: 214.34</p> <div style="text-align: center;"> </div>		
<p>1. General information</p> <p>The aqueous solubility of this substance is <4.4 mg/L (20°C), the partition coefficient (1-octanol/water) (log K_{ow}) is 6.5 (25°C), and the vapor pressure is 4.11×10⁻³ mmHg (=0.548 Pa) (25°C). Biodegradability (aerobic degradation) is judged to be good, and its half-life for hydrolysis is 5.14 d (25°C).</p> <p>This substance is designated as a Priority Assessment Chemical Substance under the Chemical Substances Control Law from the perspective of effects on human health. The main uses of this substance are as an industrial raw material (intermediate for emulsifiers, surfactants, etc.) and as a coating additive. Further, this substance is designated as a food additive (designated additive) under Article 10 of the Food Sanitation Act. It is also listed in the perfume ingredients list for consumer goods used globally compiled by the International Fragrance Association. The production and import quantity in fiscal 2014 was 4,490 t.</p> <hr/> <p>2. Exposure assessment</p> <p>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.</p> <p>Predictions of proportions distributed to individual media by using a Mackay-type level III fugacity model indicate that if equal quantities are released to the atmosphere, water bodies, and soil, the proportion distributed to soil would be largest.</p> <p>Information to determine the maximum expected exposure via inhalation could not be obtained. Data from public freshwater bodies yielded a maximum expected oral exposure of around 0.00068 µg/kg/day. The exposure level 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.</p> <p>The predicted environmental concentration (PEC), which indicates exposure to aquatic organisms, is around 0.017 µg/L for public freshwater bodies, and around 0.038 µg/L for seawater.</p> <hr/> <p>3. Initial assessment of health risk</p> <p>No information was available on acute symptoms of humans. No abnormalities were observed in the rats exposed to this substance by ingestion. Lethargy, hunched posture and labored respiration were observed in all rats at 1 hour after inhalation exposure. The hunched posture persisted until the second day after exposure.</p> <p>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.</p> <p>The NOAEL for oral exposure of 1,000 mg /kg/day or more (no observed effects at the highest dose), determined from medium-term toxicity tests in rats, was divided by a factor of 10 to account for extrapolation from sub-chronic to chronic exposure. The calculated value of 100 mg/kg/day was deemed to be the lowest reliable dose and was identified as the ‘non-toxic level*’ for oral exposure. The ‘non-toxic level*’ for inhalation exposure could not be identified.</p> <p>With regard to oral exposure, assuming the substance is absorbed via public freshwater bodies, the predicted</p>		

maximum exposure level would be 0.00068 µg/kg/day, approximately. The MOE (Margin of Exposure) would be 15,000,000, when calculated from the predicted maximum exposure level and the ‘non-toxic level*’ of 100 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, including the concentration 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 concentrations, the health risk could not be assessed. Assuming that 100% of the ingested substances is absorbed, the ‘non-toxic level*’ for inhalation exposure, derived from the conversion of oral exposure concentration, would be 333 mg/m³. Considering the fact that the ‘non-toxic level*’ for oral exposure was obtained from an endpoint where ‘no effects were observed at the highest dose’, it is likely that the actual ‘non-toxic level*’ is higher than this value. Furthermore, considering the facts that this substance is a natural fragrant constituent in food and beverage, and used in perfume, cosmetics, food and additives as a flavoring agent, the concentration of this substance in ambient air is not likely to become a major concern. Therefore, 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*’ 100 mg/kg/day	Rats	No observed effects at the highest dose	Drinking water	— µg/kg/day	MOE	—	×	○
				Public Freshwater bodies	0.00068 µg/kg/day	MOE	15,000,000	○	
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.

4. Initial assessment of ecological risk

With regard to acute toxicity, the following reliable data were obtained: a 72-h of EC₅₀ of 78.4 µg/L for growth inhibition in the green algae *Pseudokirchneriella subcapitata*, a 48-h EC₅₀ of 225 µg/L for immobilization in the crustacean *Daphnia magna*, and a 96-h LC₅₀ of more than 524 µg/L for the fish species *Oryzias latipes* (medaka). Accordingly, based on these acute toxicity values and an assessment factor of 100, a predicted no effect concentration (PNEC) of 0.78 µg/L was obtained.

With regard to chronic toxicity, the following reliable data were obtained: a 72-h NOEC of 5.9 µg/L for growth inhibition in the green algae *P. subcapitata*, and a 21-d NOEC of 81.4 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 0.059 µg/L was obtained.

The value of 0.059 µg/L, obtained from the chronic toxicity to the green algae, was used as the PNEC for this substance.

The PEC/PNEC ratio is 0.3 for freshwater bodies and 0.6 for seawater. Accordingly, efforts to collect data on

this substance are needed. Furthermore, there is a need to consider gathering more comprehensive toxicity data for this substance.

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	0.059	Freshwater	0.017	0.3	▲	▲
					Seawater	0.038	0.6		

5. Conclusions

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

[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.