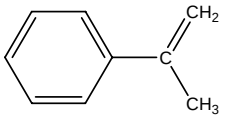
16	CAS No.: 98-83-9	Substance: Alpha-methylstyrene

Chemical Substances Control Law Reference No.: 3-5 and 3-8 (as mono or dialkyl [C = 1 - 2] styrene)

PRTR Law Cabinet Order No.: 1-335

Molecular Formula: C_9H_{10} Structural Formula:

Molecular Weight: 118.18



1. General information

The aqueous solubility of this substance is 116 mg/L, and the partition coefficient (1-octanol / water) (log Kow) is 3.48. The vapor pressure is 1.9 mmHg (= 25 Pa) (20°C). Degradability is 0% by BOD degradation rate, and the accumulation factor is thought to be zero or very low. In addition, the substance does not have hydrolyzable groups.

This substance is 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). It is used primarily to increase the thermal resistance and impact resistance of ABS resins, and when denaturing polyester resins and alkyd resins. Domestic production in 2003 was 30,000 tons (estimated).

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2. Exposure assessment

Total release to the environment in FY2003 under the PRTR Law came to approximately 46 tons, all of which was reported. Release to the atmosphere accounted for a large part of the reported release. Chemical Industry accounted for high levels of the reported release.

Release to the atmosphere accounted for the greatest quantity of release to the environment. The distribution into the different media in the environment predicted by means of a multimedia model was 60.0% for atmosphere, 29.8% for water bodies and 9.2% for soil.

The predicted maximum exposure concentration for inhalation exposure to human beings was approximately 0.053 μg/m^3. The predicted maximum oral exposure was estimated to be less than 0.0004 μg/kg/day. The substance is released primarily to the atmosphere, and its distribution in the environment is also predicted to be in the atmosphere. As accumulation is judged to be zero or very low, exposure from environmental media via the food chain is assumed to be low.

The predicted environmental concentration (PEC) that indicates exposure to aquatic organisms was estimated to be less than 0.01 μg/L for freshwater and generally less than 0.01 μg/L for seawater public water bodies as well.

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3. Initial assessment of health risk

Even brief exposure to this substance may result in irritation of the eyes, skin and respiratory tract. If inhaled, it may cause coughing, dizziness and sore throat. Contact with the skin or eyes may result in redness. A toxic concentration lowest (TCLo) of 2,900 mg/m^3 for humans has been reported.

There is insufficient information regarding the carcinogenicity of the substance, and it is not possible to make a judgment as to whether it causes cancer in humans. For this reason, an initial assessment of the substance was conducted based on information of non-carcinogenic effects.

As the 'Non-toxic level' was observed, used to estimate the margin of exposure (MOE), a no observed adverse effect level (NOAEL) of 40 mg/kg/day (increase in liver and kidney weight, etc.), obtained from rat medium- and long-term toxicity testings, was obtained for oral exposure. As the test period was short, this value was divided by 10 to establish a value of 4 mg/kg/day. For inhalation exposure, a lowest observed adverse effect level (LOAEL) value of 360 mg/m^3 (atrophy and necrosis, etc. of olfactory epithelia) was obtained from mouse medium- and long-term toxicity testings. This value was corrected to 64 mg/m^3 to match the exposure circumstances and, as the test period

was short, it was divided by 10 and, as it was an LOAEL value, was further divided by 10 to establish a value of 0.64 mg/m^3.

With regard to oral exposure, when intake of freshwater from public water bodies and food was postulated, the maximum predicted exposure was estimated to be less than 0.0004 µg/kg/day. As the 'Non-toxic level' of 4 mg/kg/day and the maximum predicted exposure were established by means of animal testing, the value was divided by 10 to derive an MOE exceeding 1,000,000. The food-borne exposure originating in the environment was estimated to be minor, and it is thought that adding this exposure would not greatly affect the MOE. Accordingly, assessment of the health risk from oral exposure to this substance is thought to be unnecessary at this time.

With regard to inhalation exposure, the predicted maximum exposure concentration in ambient air was estimated at 0.053 µg/m^3. Judging from the 'Non-toxic level' of 0.64 mg/m^3 and the predicted maximum exposure concentration, the MOE derived in the same manner was 1,200. Accordingly, there is thought to be no need at this time for assessment of the health risk with regard to inhalation exposure to the substance in the ambient air.

Knowledge of toxicity				Exposure assessment			Result of risk assessment			Judgment
Exposure path	Guidelines for risk assessment	Animal	Impact assessment guideline (endpoint)	Exposure medium	Predicted maximum exposure quantity and concentration					
Oral	No observed adverse effect level 4 mg/kg/day	Rat	Increase in liver and kidney weight, etc.	Drinking water	–	µg/kg/day	MOE	–	×	○
				Fresh water	< 0.0004	µg/kg/day	MOE	> 1,000,000	○	
Inhalation	No observed adverse effect level 0.64 mg/m^3	Mouse	Atrophy and necrosis, etc. of olfactory epithelia	Ambient air	0.053	µg/m^3	MOE	1,200	○	○
				Indoor air	–	µg/m^3	MOE	–	×	×

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4. Initial assessment of ecological risk

With regard to acute toxicity, reliable information of a 72-hour EC_{50} growth inhibition value of 5,090 µg/L was found for the algae *Pseudokirchneriella subcapitata*, a 48-hour EC_{50} immobilization value of 2,620 µg/L was found for the crustacea *Daphnia magna* (water flea), and a 96-hour LC_{50} value of 7,280 µg/L was found for the fish *Oryzias latipes* (medaka). Accordingly, an assessment factor of 100 was used, and a predicted no effect concentration (PNEC) of 26 µg/L was obtained based on the acute toxicity values. With regard to chronic toxicity, reliable information of a 72-hour no observed effect concentration (NOEC) growth inhibition value of 300 µg/L was found for the algae *P. subcapitata*, and a 21-day NOEC reproduction value of 401 µg/L was found for the crustacea *D. magna*. Accordingly, an assessment factor of 100 was used, and a PNEC value of 3 µg/L was obtained based on the chronic toxicity values. As the PNEC for the substance, a value of 3 µg/L obtained from the chronic toxicity for the algae was used.

The PEC/PNEC ratio was less than 0.003 for both freshwater bodies and seawater bodies. Accordingly, further work is thought to be unnecessary at this time.

Hazard assessment (basis for PNEC)			Assessment factor	Predicted no effect concentration PNEC (µg/L)	Exposure assessment		PEC/PNEC ratio	Result of assessment
Species	Acute / chronic	Endpoint			Water body	Predicted environmental concentration PEC (µg/L)		
Algae	Chronic	NOEC growth inhibition	100	3	Freshwater	< 0.01	< 0.003	○
					Seawater	< 0.01	< 0.003	

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5. Conclusions

	Conclusions		Judgment
Health risk	Oral exposure	Assessment is thought to be unnecessary at this time.	○
	Inhalation exposure	Assessment with regard to the ambient air is thought to be unnecessary at this time.	○
Ecological risk	No need of further work.		○

［Risk judgments］○: No need of further work　▲: Requiring information collection
■: Candidates for further work　×: Impossible of risk characterization