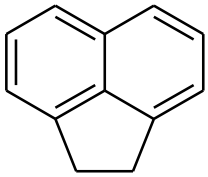
1	CAS No.: 83-32-9	Substance: Acenaphthene

Chemical Substances Control Law Reference No.: 4-645

PRTR Law Cabinet Order No.*: 1-15

Molecular Formula: $C_{12}H_{10}$ Structural formula:

Molecular Weight: 154.21



*Note: No. in Revised Cabinet Order enacted on October 1, 2009

1. General information

The aqueous solubility of this substance is 3.80 mg/1000 g (25°C), the partition coefficient (1-octanol/water) (log K_{ow}) is 3.96, and the vapor pressure is 2.50×10^{-3} mmHg (=0.333 Pa) (25°C). The biodegradability (aerobic degradation) is characterized by a BOD degradation rate of 0%, and bioaccumulation is thought to be nonexistent or low. The substance does not possess any hydrolyzable groups.

This substance is designated as a Type II and Type III Monitoring Chemical Substance under the Law Concerning the Examination and Regulation of Manufacture, etc. of Chemical Substances. This substance is classified as 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). The main uses are as a dyestuff raw material, disinfectant, and insecticide. Coal tar contains 1.2% of this substance. The main uses of coal tar, road sealing tar, and prepared tar are raw materials for tar products, anticorrosion paints, fishing net dyestuffs, lamp black, fuel, road paving, roof paint, cast iron pipe coating, waterproof coatings, and electrode binding materials. The production and import category under the PRTR Law is 1 t to <100 t.

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2. Exposure assessment

Because this substance was not a Class 1 Designated Chemical Substance prior to revision of substances regulated by the PRTR Law, release and transfer quantities could not be obtained. 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 proportion distributed to soil would be greater.

Data for setting the predicted maximum exposure to humans via inhalation could not be obtained, but there is a report of 0.0044 μg/m^3 when data from a limited area was used. The predicted maximum oral exposure was estimated to be less than around 0.0008 μg/kg/day based on calculations from data for groundwater, and around 0.0044 μg/kg/day based on calculations from data for public freshwater bodies. A predicted maximum oral exposure estimated to be around 0.0044 μg/kg/day was adopted for this substance. Furthermore, there is a report of less than around 0.004 μg/kg/day calculated from food data, albeit from a limited area.

The predicted environmental concentration (PEC), which indicates exposure to aquatic organisms, was around 0.11 μg/L for public freshwater bodies and less than around 0.02 μg/L for seawater.

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3. Initial assessment of health risk

This substance is irritating to skin and mucous membrane, and it may lead to vomiting when taken in large quantities. In the acute toxicity test, which produced LD_{50} of more than 2,000 mg/kg, its compulsory oral administration of 0, 1,000

and 2,000 mg/kg to both male and female rats did not result in any mortality, and no effect was observed on their general health condition, body weight and histology (during their autopsy).

Sufficient information could not be obtained on its carcinogenicity, and its initial assessment was conducted on the basis of data on its non-carcinogenic effects.

As for its oral exposure, its no-observed-adverse-effect-level (NOAEL) of 12 mg/kg/day (for effects on liver and kidney) obtained from its mid-term and long-term toxicity tests for rats was divided by 10, due to their short test periods, to produce 1.2 mg/kg/day as a reliable finding for its lowest dose, and this is identified as its 'non-toxic level*'. As for inhalation exposure, its 'non-toxic level*' could not be identified.

As for its oral exposure, its maximum exposure was estimated to be around 0.0044 μg/kg/day, when intakes of freshwater from public water supply were assumed. Its margin of exposure (MOE) would be 27,000 when calculated from its 'non-toxic level*' of 1.2 mg/kg/day and its estimated maximum exposure, then divided by 10 due to the fact that 'non-toxic level*' was obtained from animal experiments. Its maximum exposure of less than around 0.004 μg/kg/day through food intake at a certain location and its estimated maximum exposure through water intake make no less than 0.0044 μg/kg/day but less than 0.0084 μg/kg/day, and its MOE would be calculated to be more than 14,000 but up to 27,000. No further action, therefore, will be required at the moment to assess health risk from oral exposure to this substance.

As for inhalation exposure to this substance, its 'non-toxic level*' was not identified and its exposure concentration was not understood, so its health risk could not be assessed. Its half-life in the atmosphere is 1.1 to 11 hrs. When released to the atmosphere, most of it is expected to go into media other than the ambient air. For information, the 'non-toxic level' for its oral exposure, if 100% absorption is assumed for it, turns to be the 'non-toxic level' of 4 mg/m^3 for its inhalation exposure. When combined with its maximum concentration in the ambient air of 0.0044 μg/m^3 reported for a certain location, MOE will be calculated to be 91,000. Collection of information on its inhalation exposure to assess health risk associated with exposure to it in the ambient air would not be required.

Information of toxicity				Exposure assessment			Result of risk assessment			Judgment
Exposure Path	Criteria for risk assessment	Animal	Criteria for diagnoses (endpoint)	Exposure medium	Predicted maximum exposure quantity and concentration					
Oral	'Non-toxic level*' 1.2 mg/kg/day	Rats	effects on liver and kidney	Drinking water	–	μg/kg/day	MOE	–	×	○
				Freshwater	0.0044	μg/kg/day	MOE	27,000	○	
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 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.

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4. Initial assessment of ecological risk

With regard to acute toxicity, the following reliable data were obtained: a 72-h median effective concentration (EC_{50}) of 1,360 μg/L for growth inhibition in the green algae *Pseudokirchneriella subcapitata*; a 96-h median lethal concentration (LC_{50}) of 250 μg/L for the crustacean *Americamysis bahia*; a 96-h LC_{50} of 580 μg/L for the fish species *Salmo trutta* (brown trout), and a 48-h LC_{50} of more than 1,800 μg/L for the insect species *Paratanytarsus parthenogeneticus*. Accordingly, based on these acute toxicity values and an assessment factor of 100, a predicted no effect concentration (PNEC) of 2.5 μg/L was obtained.

With regard to chronic toxicity, the following reliable data were obtained: a 72-h no observed effect concentration (NOEC) of 90.3 μg/L for growth inhibition in the green algae *P. subcapitata*; a 21-d NOEC of 83.5 μg/L for reproductive inhibition in the crustacean *Daphnia magna*; and a 30-d NOEC of 77.5 μg/L for growth inhibition in the fish species *Pimephales promelas* (fathead minnow). Accordingly, based on these chronic toxicity values and an assessment factor of

10, a predicted no effect concentration (PNEC) of 7.8 μg/L was obtained. The value of 2.5 μg/L obtained from the acute toxicity was used as the PNEC for this substance.

The PEC/PNEC ratio was 0.04 for freshwater bodies and less than 0.008 for seawater. 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	Assessment result
Species	Acute/ chronic	Endpoint			Water body	Predicted environmental concentration PEC (μg/L)		
Crustacean Mysidae	Acute	LC_{50} Mortality	100	2.5	Freshwater	0.11	0.04	○
					Seawater	<0.02	<0.008	

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5. Conclusions

	Conclusions		Judgment
Health risk	Oral exposure	No further action required.	○
	Inhalation exposure	Risk can not be assessed. Collection of information would not to be required.	(○)
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.