14	CAS No.: 91-20-3	Substance: Naphthalene

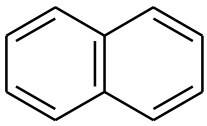
Chemical Substances Control Law Reference No.: 4-311

PRTR Law Cabinet Order No.*: 1-302

Molecular Formula: $C_{10}H_8$

Molecular Weight: 128.17

Structural formula:



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

1. General information

The aqueous solubility of this substance is 31.6 mg/1000 g (25°C), the partition coefficient (1-octanol/water) (log K_{ow}) is 3.34, and the vapor pressure is 0.085 mmHg (=11 Pa) (25°C). The biodegradability (aerobic degradation) is characterized by a BOD degradation rate of 2%, and bioaccumulation is thought to be nonexistent or low. The substance does not have any hydrolyzable groups.

This substance is designated 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 of purified naphthalene are dyestuff intermediates, synthetic resins, explosives, insect repellant, organic pigments, tetralin, decalin, and naphthylamine. The main uses of 95% naphthalene are as a raw material for purified naphthalene and phthalic anhydride. The production quantity in 2007 according to chemical industry statistics was 202,680 t. The production (shipments) and import quantity in fiscal 2007 based on a factual survey of production and import quantities of chemical substances was 10,000 to <100,000 t/y.

---

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.

The predicted maximum exposure to humans via inhalation, based on general environmental atmospheric data, was approximately 0.27 μg/m^3. Furthermore, there was a report of around 120 μg/m^3 for indoor air, albeit for a limited area. The predicted maximum oral exposure was estimated to be generally less than 0.0012 μg/kg/day based on calculations from data for groundwater, and around 0.0076 μg/kg/day based on calculations from data for public freshwater bodies. A predicted maximum oral exposure estimated to be around 0.0076 μg/kg/day was adopted for this substance.

The predicted environmental concentration (PEC), which indicates exposure to aquatic organisms, was around 0.19 μg/L for public freshwater bodies and less than around 0.03 μg/L for seawater.

---

3. Initial assessment of health risk

This substance may influence blood and cause hemolysis. Its exposure through oral intakes may result in death. When inhaled, it will cause headache, torpor, nausea, vomiting, diaphoresis, muddle, jaundice or dark urine. When orally taken, it will cause stomachache, diarrhea, twitch or unconsciousness. These symptoms may occur through its absorption by skin. Its minimum lethal dose of 100 mg/kg for oral intakes by children has been reported, while 29 mg/kg and 74 mg/kg have been reported as its minimum lethal dose for humans although its exposure pathways have not been described.

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, NOAEL of 53 mg/kg/day (for reduced spleen weight) obtained from its mid-term and

long-term toxicity tests for mice was divided by 10, due to their short test periods, to provide 5.3 mg/kg/day as its 'non-toxic level*'.

As for its inhalation exposure, LOAEL of 10 ppm (for degeneration of nasal mucosa) was obtained from its mid-term and long-term toxicity tests for rats, and this LOAEL of 10 ppm (for degeneration of nasal mucosa) was obtained also from its mid-term and long-term toxicity tests for mice. LOAEL of 10 ppm was then adjusted against exposure conditions to provide 1.8 ppm (9.4 mg/m^3). This was divided by 10, as is always the case with LOAEL, to provide 0.18 ppm (0.94 mg/m^3) as its 'non-toxic level*'.

As for its oral exposure, its maximum exposure was estimated to be around 0.0076 μg/kg/day, when intakes of freshwater from public water supply were assumed. Its margin of exposure (MOE) would be 14,000 when calculated from its 'non-toxic level*' of 5.3 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, and divided again by 5 when its carcinogenicity was considered. Its intakes through food up to 0.026 μg/kg/day have been reported for some location. For information, if this is combined with its estimated maximum exposure through water to produce 0.034 μg/kg/day for calculation of MOE, it will be 3,100. Even when its intakes through drinking water at this location are considered, MOE will be no less than 3,100. No further action will be required at the moment to assess health risk from oral exposure to this substance.

As for its inhalation exposure, its maximum exposure concentration was estimated to be around 0.27 μg/m^3, when its concentrations in the ambient air were considered. Its MOE would be 70, when calculated from its 'non-toxic level*' of 0.94 mg/m^3 and its estimated maximum exposure concentration, then divided by 10 due to the fact that 'non-toxic level*' was obtained from animal experiments, and divided again by 5 when its carcinogenicity was considered. For information, its exposure concentrations up to around 120 μg/m^3 have been reported for some location, and this will provide MOE of 0.16. Collection of information would be required to assess health risk from inhalation exposure to this substance in the ambient air, and its exposure in the indoor air would be among those which may require detailed assessment.

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*' 5.3 mg/kg/day	Mice	reduced spleen weight	Drinking water	— μg/kg/day		MOE	—	×	○
				Freshwater	0.0076 μg/kg/day		MOE	14,000	○	
Inhalation	'Non-toxic level*' 0.94 mg/m^3	Rats, Mice	degeneration of nasal mucosa	Ambient air	0.27 μg/m^3		MOE	70	▲	▲
				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.

---

4. Initial assessment of ecological risk

An initial assessment of ecological risk posed to aquatic organisms was not carried out for this substance because a water quality target value related to the preservation of aquatic organisms has been derived.

---

5. Conclusions

	Conclusions		Judgment
Health risk	Oral exposure	No further action required.	○
	Inhalation	For the ambient air, collection of information required on health risk	(■)

	exposure	associated with inhalation exposure in it. For the indoor air, risk can not be assessed, but this substance is considered to be a candidate of assessment in detail.	
Ecological risk	An initial assessment of ecological risk posed to aquatic organisms was not carried out for this substance because a water quality target value related to the preservation of aquatic organisms has been derived.		（－）

［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.