2	CAS No.: 120-12-7	Substance: Anthracene

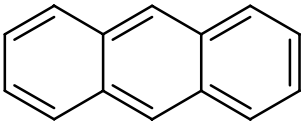
Chemical Substances Control Law Reference No.: 4-683

PRTR Law Cabinet Order No.:

Molecular Formula: $C_{14}H_{10}$

Molecular Weight: 178.23

Structural Formula:



1. General information

The aqueous solubility of this substance is 0.0431 mg/1000g (24.6℃) and the partition coefficient (1-octanol / water) (log Kow) is 4.45±0.05. The vapor pressure is 2.67 x 10^{-6} mmHg (= 3.56 x 10^{-4} Pa) (25°C, extrapolated value). Degradability (aerobic degradation) is insufficient, and this substance is determined to be moderately bioaccumulative. In addition, it does not have hydrolyzable groups.

Its primary uses are as original material of anthraquinone and (crude) carbon black. Import quantity in 2004 was 1,330 tons (total of naphthalene, methylnaphthalene and anthracene).

---

2. Exposure assessment

As Anthracene is not 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), release and transfer quantities could not be obtained. When predictions of distribution ratios by medium were made using the Mackay-Type Level III Fugacity Model, in the event of equal release to the atmosphere, water and soil, the distribution ratio was highest for soil.

No predicted maximum exposure concentration for inhalation exposure to human beings could be established. The predicted maximum oral exposure was estimated to be less than 0.00052 μg/kg/day.

The predicted environmental concentration (PEC) that indicates exposure to aquatic organisms was estimated to be less than 0.013 μg/L for freshwater and less than 0.013 μg/L for seawater public water bodies.

---

3. Initial assessment of health risk

This substance may result in slight irritation of the skin and respiratory tract. It may cause coughing and sore throat by inhalation, and abdominal pains by ingestion. Contact with skin or eyesmay cause redness of skin, and redness and pain of eyes.

There was insufficient information regarding the carcinogenicity of the substance. For this reason, an initial assessment of the substance was conducted based on information of non-carcinogenic effects.

As the ‘Non-toxic level’ for oral exposure, a lowest observed adverse effect level (LOAEL) of 288 mg/kg/day (prevention of weight increase, increase in liver and kidney weights, cellular foci in liver etc.) was obtained from the medium- and long-term toxicity testing for rats. As this was a LOAEL, it was divided by 10 to establish a value of 29 mg/kg/day. The ‘Non-toxic level’ could not be estimated for inhalation exposure.

With regard to oral exposure, in case of groundwater intakes, the predicted maximum exposure of less than 0.00052 μg/kg/day was obtained. The MOE of exceeding 5,600,000 was derived from the ‘Non-toxic level’ of 29 mg/kg/day divided by the predicted maximum dose, and divided by 10, because the ‘Non-toxic level’ was established by means of animal testing. The exposure to this substance through food intakes has not been estimated. However, as the surveys on fish showed that its concentrations were not more than 0.00075μg/g and the absorption from digestive tracts is not substantial, even when the exposures through groundwater and food are combined, it would not greatly affect the MOE Accordingly, further action for

assessment of its health risk from oral exposure to this substance would not be required at present.

For the inhalation exposure, because 'Non toxic level' was not determined and the exposure concentrations have not been surveyed, its health risk cannot be identified. In the atmosphere, most of this substance exists in gas form, and its half-life was estimated to be 0.58-5.8hrs or 1.6-16hrs. Additionally, prediction on its partition to various medias suggests that this substance scarcely distributes in the atmosphere. However, collecting the information on inhalation exposure to this substance would be required for its health risk assessment, because 'Non toxic level' and exposure concentration have not been determined.

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' 29 mg/kg/day	Rat	Prevention of weight increase, Increase in liver and kidney weight, Cellular foci in liver etc.	Drinking water	– μg/kg/day	MOE	–	×	○
				Groundwater	< 0.00052 μg/kg/day	MOE	> 5,600,000	○	
Inhalation	'Non toxic level' – mg/m^3	–	–	Ambient air	– μg/m^3	MOE	–	×	×
				Indoor air	– μg/m^3	MOE	–	×	×

---

4. Initial assessment of ecological risk

With regard to acute toxicity, reliable information of a 96-hour LC_{50} value of 2.78 μg/L was found for the fish *Lepomis macrochirus* (bluegill). Accordingly, an assessment factor of 1000 was used, a predicted no effect concentration (PNEC) of 0.0028 μg/L was obtained based on the acute toxicity values.

With regard to chronic toxicity, reliable information of a 21-day NOEC reproduction value of less than 1.9 μg/L was found for the crustacea *D. magna* and a 8-day no observed effect concentration (NOEC) growth inhibition value of 200 μg/L was found for the other organism *Lemna gibba* (Inflated duckweed). Accordingly, an assessment factor of 100 was used, and a PNEC value of less than 0.019 μg/L was obtained based on the chronic toxicity values. As the PNEC for the substance, a value of 0.0028 μg/L obtained from the acute toxicity for the fish was used.

The PEC/PNEC ratio was less than 5 for both freshwater bodies and seawater bodies, and the ecological risk could not be determined at this time. For this substance, the PNEC was determined from the toxicity levels in limited species, efforts to improve knowledge through the implementation of acute toxicity tests are thought to be needed.

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)		
Fish (bluegill)	Acute	LC_{50} Mortality	1,000	0.0028	Freshwater	< 0.013	< 5	×
					Seawater	< 0.013	< 5	

---

5. Conclusions

	Conclusions		Judgment
Health risk	Oral exposure	No need of further work.	○
	Inhalation exposure	Impossible of risk characterization. The efforts to collect information would be required.	×
Ecological risk	Impossible of risk characterization. The efforts to improve knowledge of ecological toxicity through the implementation of acute toxicity tests are thought to be needed.		×

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

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.