10	CAS No.: 77-73-6	Substance: Dicyclopentadiene

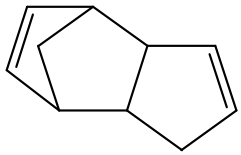
Chemical Substances Control Law Reference No.: 4-634

PRTR Law Cabinet Order No.:

Structural Formula:

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

Molecular Weight: 132.20



1. General information

The aqueous solubility of this substance is 20 mg/L (25°C) and the partition coefficient (1-octanol/water) (log Kow) is 2.78 (25°C). The vapor pressure is 2.29 mmHg (= 305 Pa) (25°C, extrapolated value). Degradability (aerobic degradation) in terms of BOD-based degradation percentage is estimated to be 0%. This substance is determinated to be non or not highly bioaccumulative. The hydrolytic stability was achieved at 25°C for five days.

It is mainly used for EP rubbers, unsaturated polyester resins, himic anhydrides, and resins for reaction injection molding. The total amounts of production and imports in FY 2001 and FY 2004 were 10,000 to less than 100,000 tons/yr and 100,000 to 1,000,000 tons/yr, respectively.

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2. Exposure assessment

As dicyclopentadiene 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), no information on release and transfer quantities could 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 and water.

No predicted maximum exposure concentration for inhalation exposure to human beings could be established because data for both ambient air and indoor air could not be obtained. The highest oral predicted exposure was calculated to be approximately less than 0.0004 μg/kg/day based on groundwater data. The risk of exposure to this substance through food in environmental media is considered to be low.

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

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3. Initial assessment of health risk

The substance is irritating to the eyes, the skin and the respiratory tract. Contact with eyes or skin may cause their redness and pain. By Inhalation, it may cause cough, sore throat and headache. By ingestion, it may cause abdominal pain and nausea. There is a report that determined the toxic concentration lowest (TCLo) in human to be 16 mg/m^3（headache）.

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.

A no observed adverse effect level (NOAEL) of 4 mg/kg/day (degeneration in adrenal) was obtained for oral exposure from the medium- and long-term toxicity testing for rats. The NOAEL was divided by 10, because of the experimental period being short, and a value of 0.4 mg/kg/day was derived as the 'Non-toxic level*'. A no observed adverse effect level (NOAEL) for the inhalation exposure of 28 mg/m^3（increase in the relative weight of liver in rats, degrease in the survival rate in mice） were obtained from the medium- and long-term toxicity testings for rats and mice. The NOAEL was adjusted to 5 mg/m^3 taking into account the exposure situation. The value was divided by 10, because of the experimental period being short, and a value of 0.5 mg/m^3 was derived as the 'Non-toxic level*'.

With regard to oral exposure, in case of intakes of groundwater, the predicted maximum exposure was approximately less than 0.0004 μg/kg/day. The margin of exposure (MOE) of exceeding 100,000 was derived from the 'Non-toxic level*' of 0.4 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. As the exposure to this substance through food intakes was estimated minor, even when the exposure through groundwater and food are combined, it would not greatly affect the MOE values. Accordingly, further action for assessment of its health risk from oral exposure to this substance would not be required at present.

Concerning inhalation exposure, because the exposure concentrations have not been estimated, its health risk can not be identified. The half- life of this substance in the atmosphere was estimated to be 0.54-5.4 days. It was estimated to distribute mostly into the atmosphere, when this substance was released only to the atmosphere. The production volume of this substance was relatively high. The released quantity of this substance to the environment has not been surveyed. Accordingly, it would be required to collect information on inhalation exposure to this substance in the ambient air for its health risk 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*' 0.4 mg/kg/day	Rats	degeneration in adrenal	Drinking water	— μg/kg/day	MOE	—	×	○
				Groundwater	< 0.0004 μg/kg/day	MOE	> 100,000	○	
Inhalation	'Non-toxic level*' 0.5 mg/m^3	Rats, Mice	increase in the relative weight of liver in rats, degrease in the survival rate in mice	Ambient air	— $\mu g/m^3$	MOE	—	×	(▲)
				Indoor air	— $\mu g/m^3$	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, reliable information of a 48-hour median effective concentration (EC_{50}) immobilization value of 4,200 μg/L was found for the crustacea *Daphnia pulex* (water flea), and a 96-hour median lethal concentration (LC_{50}) value of 4,300 μg/L was found for the fish *Oryzias latipes* (medaka). Accordingly, an assessment factor of 1,000 was used, and a predicted no effect concentration (PNEC) of 4.2 μg/L was obtained based on the acute toxicity values. With regard to chronic toxicity, reliable information of a 21-day no observed effect concentration (NOEC) reproduction value of 3,200 μg/L was found for the crustacea *Daphnia magna* (water flea). Accordingly, an assessment factor of 100 was used, and a PNEC value of 32 μg/L was obtained based on the chronic toxicity values. As the PNEC for the substance, a value of 4.2 μg/L obtained from the acute toxicity for the crustacea was used.

The PEC/PNEC ratio was less than 0.002 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)		
Crustacea (water flea)	Acute	EC_{50} immobilization	1,000	4.2	Freshwater	<0.01	<0.002	○
					Seawater	<0.01	<0.002	

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5. Conclusions

	Conclusions		Judgment
Health risk	Oral exposure	No need for further work.	○
	Inhalation exposure	Risk assessment for the ambient air is not feasible, but collection of information is required.	(▲)
Ecological risk	No need for further work.		○

［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.