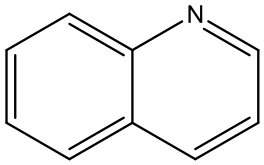
7	CAS No.: 91-22-5	Substance: Quinoline

Chemical Substances Control Law Reference No.: 5-794

PRTR Law Cabinet Order No.: 1-81

Molecular Formula: C_9H_7N Structural Formula:

Molecular Weight: 129.16



1. General information

The aqueous solubility of this substance is 6.33×10^3 mg/1000 g (20°C), the partition coefficient (1-octanol/water) (log K_{ow}) is 2.03, and the vapor pressure is 0.083 mmHg (=11 Pa) (25°C). Biodegradability (aerobic degradation) is characterized by a BOD degradation rate of 0.2%, and bioaccumulation is judged to be non-existent or low. Furthermore, 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 use of this substance is as a raw material for 8-hydroxyquinoline. Whereas 70–80% of the 8-hydroxyquinoline thus produced is estimated to be used as a raw material for an agricultural chemical (the bactericide copper 8-hydroxyquinoline), 5–10% is estimated to be used as a raw material for pharmaceuticals, analytical reagents, or chelating agents for removing metals. The production quantity in fiscal 2010 was approximately 900 t (estimated). The production and import category under the PRTR Law is more than 100 t.

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2. Exposure assessment

Total release to the environment in fiscal 2010 under the PRTR Law was approximately 0.13 t, and all releases were reported. All reported releases were to the atmosphere. In addition, approximately 12 t was transferred to waste materials, and 0.024 t was transferred to sewage. The main source of reported releases was the chemical industry. A multi-media model used to predict the proportions distributed to individual media in the environment indicated that in regions where the largest quantities were estimated to have been released to the overall environment or to the atmosphere in particular, the predicted proportion distributed to the soil was 88.9%.

The maximum expected concentration of exposure to humans via inhalation, based on general environmental atmospheric data, was around 0.0069 μg/m^3. The mean annual value for atmospheric concentration in fiscal 2010 was calculated by using a plume-puff model on the basis of reported releases to the atmosphere according to the PRTR Law; this model predicted a maximum level of 0.021 μg/m^3. The maximum expected oral exposure was estimated to be around 0.00032 μg/kg/day on the basis of calculations from data for public freshwater bodies.

The predicted environmental concentration (PEC), which indicates exposure to aquatic organisms, was reported to be around 0.0081 μg/L for public freshwater bodies and 0.0067 μg/L for seawater.

3.Initial assessment of health risk

This substance may cause irritation to eyes and skin. Inhalation exposure to the substance may cause coughing and sore throat, while oral exposure may cause sore throat. Redness of skin and the redness and pain of eyes may occur if they accidentally come into direct contact with the substance.

With regard to the substance's non-carcinogenic health risk, as some studies reported that its repeated administration to rats had caused tumor in all of the low dose groups, it would not be logical to assume the lowest dose as its LOAEL for assessment of its non-carcinogenic health risk. Therefore, the 'non-toxic level*' of

the substance could not be identified on the basis of its non-carcinogenic effects.

Although sufficient information was not available to evaluate the carcinogenic potential of the substance to human, most of the information suggests its possible carcinogenic effects. Therefore, assessment was conducted with assumption that there would be no threshold for its carcinogenicity, although it was still uncertain whether the substance was carcinogenic to human.

As for oral exposure to the substance, with assumption that there would be no threshold for its carcinogenicity, a slope factor of 3 $(mg/kg/day)^{-1}$ (for hemangioendothelioma or hemangiosarcoma) obtained from experiments on rats was used. As for inhalation exposure to the substance, its unit risk could not be identified.

As for oral exposure to the substance, its maximum exposure was estimated to be approximately 0.00032 μg/kg/day when its intakes through freshwater from public water bodies were assumed. For its carcinogenic potential, the excess cancer incidence rate for the predicted maximum exposure was calculated to be 9.6×10^{-7} with the above slope factor. In addition, when its intakes through fish and freshwater from public water bodies were assumed, its oral exposure would be below 0.0061 μg/kg/day (for 60 to 69 years of age) and below 0.0044 μg/kg/day (for all age groups). The excess incidence rates for exposures below 0.0061 μg/kg/day and below 0.0044 μg/kg/day would be below 1.8×10^{-5} and below 1.3×10^{-5}, respectively, with the above slope factor. Therefore, collection of further information would be required to assess health risk from its oral exposure.

With regard to inhalation exposure to the substance, its health risk could not be assessed as neither its 'non-toxic level*' nor its unit risk could be identified. If 100 % absorption were assumed, the maximum exposure to the substance would be 0.0021 μg/kg/day. This ingestion rate would provide an excess incidence rate of 6.2×10^{-6} with the above slope factor. Therefore, collection of further information on inhalation exposure to the substance would be required to assess health risk from its inhalation.

Toxicity				Exposure assessment		Result of risk assessment			Judgment
Exposure Path	Criteria for risk assessment	Animal	Criteria for diagnoses (endpoint)	Exposure medium	Predicted maximum exposure dose and concentration				
Oral	'Non-toxic level*' — mg/kg/day	—	Suppressed body weight increase	Drinking water	— μg/kg/day	MOE	—		(▲)
						Excess incidence rate	—	×	
	Slope factor 3 $(mg/kg/day)^{-1}$	Rat	Hemangioendothelioma or hemangiosarcoma	Freshwater	0.00032 μg/kg/day	MOE	—	×	
						Excess incidence rate	9.6×10^{-7}	○	
Inhalation	'Non-toxic level*' — mg/m^3	—	—	Ambient air	0.0069 $\mu g/m^3$	MOE	—		(▲)
						Excess incidence rate	—	×	
	Unit risk — $(\mu g/m^3)^{-1}$	—	—	Indoor air	— $\mu g/m^3$	MOE	—		×
						Excess incidence rate	—	×	

Non-toxic level *

- When a LOAEL is available, it is divided by 10 to obtain a NOAEL-equivalent level.
- 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

With regard to acute toxicity, the following reliable data were obtained: a 72-h EC_{50} of 65,900 μg/L for growth inhibition in the green alga *Pseudokirchneriella subcapitata*, a 48-h EC_{50} of 25,000 μg/L for swimming inhibition in the crustacean *Daphnia magna*, a 96-h LC_{50} of 440 μg/L for the fish species *Pimephales promelas* (fathead minnow), and a 96-h LC_{50} of 4,897 μg/L for the midge *Chironomus riparius* species. Accordingly, based

on these acute toxicity values and an assessment factor of 100, a predicted no effect concentration (PNEC) of 4.4 µg/L was obtained.

With regard to chronic toxicity, the following reliable data were obtained: a 72-h NOEC of 4,800 µg/L for growth inhibition in the green alga *P. subcapitata*, and a 21-d NOEC of 800 µg/L for reproductive inhibition in the crustacean *D. magna*. Accordingly, based on these chronic toxicity values and an assessment factor of 100, a predicted no effect concentration (PNEC) of 8 µg/L was obtained.

The value of 4.4 µg/L obtained from the acute toxicity to the fish species was used as the PNEC for this substance.

The PEC/PNEC ratio was 0.002 for freshwater bodies and seawater. Accordingly, further work is considered unnecessary at this time.

Hazard assessment (basis for PNEC)			Assessment factor	Predicted no effect concentration PNEC (µg/L)	Exposure assessment		PEC/PNEC ratio	Judgment based on PEC/PNEC ratio	Assessment result
Species	Acute/ chronic	Endpoint			Water body	Predicted environmental concentration PEC (µg/L)			
Fish (fathead minnow)	Acute	LC_{50} mortality	100	4.4	Freshwater	0.0081	0.002	○	○
					Seawater	0.0067	0.002		

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5. Conclusions

	Conclusions		Judgment
Health risk	Oral exposure	Collection of further information would be required.	(▲)
	Inhalation exposure	Although risk to human health could not be identified, collection of further information would not 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.