8	CAS No.: 76-06-2	Substance: Trichloronitromethane

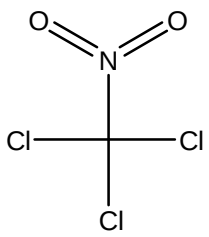
Chemical Substances Control Law Reference No.:2-199

PRTR Law Cabinet Order No.*: 1-285

Molecular Formula: CCl_3NO_2

Molecular Weight: 164.38

Structural formula



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

1. General information

The water solubility of this substance is 1.62×10^3 mg/1,000 g (25°C), the partition coefficient (1-octanol/water) (log K_{ow}) is 2.09, and the vapor pressure is 23.8–23.9 mmHg (=3.17×10^3–3.18×10^3 Pa) (25°C). This substance is judged not to be readily biodegradable (aerobic degradation), and not to be bioaccumulative.

This substance is a registered agricultural chemical under the Agricultural Chemicals Regulation Law and 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 is as an active ingredient for agricultural chemicals used as soil insecticides, fungicides and herbicides. It is used as a fumigant. The production and import quantity of this substance in FY 2008 was 2,529 t, the quantity produced as an active ingredient for agricultural chemicals in FY 2009 was 7,421 kL, and the import quantity was 2,379 kL. The production and import category under the PRTR Law is more than 10 t.

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2. Exposure assessment

Total release to the environment in FY 2009 under the PRTR Law was approximately 6,700 t, of which approximately 6,700 t or in excess of 99% were reported releases. All reported releases were released to the atmosphere. The main source of reported releases was the agricultural chemicals manufacturing industry. The largest release among releases to the environment including unreported ones was to soil. A multi-media model used to predict the distribution into each medium in the environment indicated that in regions where the largest quantities were estimated to have been released to soil, the proportion distributed to soil would be 95.0%. In regions where the largest estimated releases were to the environment or the atmosphere, the predicted proportion distributed to soil would be 80.4%.

The predicted maximum exposure to humans via inhalation, based on general environmental atmospheric data, was around less than 0.22 μg/m^3. Meanwhile, the mean value of atmospheric concentration estimated from reported releases to the atmosphere under the PRTR Law was a maximum of 0.24 μg/m^3. The predicted maximum oral exposure was reported to be less than 0.0012 μg/kg/day based on calculations from data for public freshwater bodies. Further, there is a report of around 0.08 μg/kg/day calculated from drinking water data, albeit from a limited area. The risk of exposure to this substance by intake from an environmental medium via food is considered slight based on estimates of oral exposure using estimated concentrations in fish.

The predicted environmental concentration (PEC), which indicates exposure to aquatic organisms, was reported to be less than 0.03 μg/L. Data for setting the PEC for seawater could not be obtained. Further, past data for public seawater body was less than around 0.2 μg/L.

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3. Initial assessment of health risk

This substance induces lacrimation and is highly irritating to eyes, skin and respiratory tract. Inhalation of its vapor may cause pulmonary edema. When inhaled or orally taken, the substance may cause abdominal pain, cough, diarrhea,

dizziness, headache, nausea, sore throat, vomiting and weakness. Contact of skin to the substance makes it red and causes pain. When taken into eyes, they will be red, and pain and blurred vision will occur.

Carcinogenicity of the substance was reported by some animal experiments, but sufficient information was not available on its carcinogenicity to humans, and an initial assessment was conducted on the basis of information on its non-carcinogenic effects.

As for oral exposure to the substance, a NOAEL of 0.1 mg/kg/day (for suppressed body weight increase and hepatocyte vacuolation around the hepatic portal vein) obtained from mid- and long-term toxicity tests on rats was deemed to be the lowest reliable dose without any effect, and this was identified as its 'non-toxic level*'. As for inhalation exposure, a NOAEL of 0.1 ppm (for effects such as reduced survival rate, suppressed body weight increase, and degeneration of tissue of nasal cavity or bronchial tube) was obtained from mid-term and long-term toxicity tests on rats and mice. It was then adjusted against exposure conditions, and outcome of 0.018 ppm (0.12 mg/m^3) was deemed to be the lowest reliable dose without any effect, and this was identified as its 'non-toxic level*'.

As for its oral exposure to the substance, both its mean exposure and predicted maximum exposure were less than 0.0012 μg/kg/day, if its intakes through freshwater from public water bodies were assumed. The MOE would be more than 8,300 when calculated from the 'non-toxic level*' of 0.1 mg/kg/day and the predicted maximum exposure, and divided by 10 for conversion of the 'non-toxic level*' from animal experiments to an equivalent concentration for humans. For reference, its maximum exposure would be less than 0.08 μg/kg/day, even if intakes of the drinking water reported for some location were assumed, and this will provide MOE of more than 130. Since exposure to this substance through food intakes from the environment would be limited, even if this exposure is combined, significant changes in the MOE would not be likely. Available data on its exposure suggest that further actions would not be required at the moment to access risk from its oral exposure. Nevertheless, difficulties to understand exposure reflecting its seasonal use would rather require consideration of identification of its annual average ambient concentration.

As for its inhalation exposure, its mean exposure concentration and the predicted maximum exposure concentration would be less than around 0.22 μg/m^3 when concentrations in the ambient air were considered. The MOE would be more than 55 when calculated from the 'non-toxic level*' of 0.12 mg/m^3 and the predicted maximum exposure concentration, and divided by 10 for conversion of the 'non-toxic level*' from animal experiments to an equivalent concentration for humans. This does not allow identification of its health risk. Its releases to the ambient air reported in FY 2009 under the PRTR Law suggest that its maximum annual average concentration in the ambient air around its major sources of emissions would be 0.24 μg/m^3 and associated MOE would be 50. Therefore, collection of information would be required to assess health risk from inhalation exposure to this substance in the ambient air. As a part of such effort, it is desirable to measure its concentrations in the ambient air around its major sources of emissions.

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 * ' 0.1 mg/kg/day	Rats	Suppressed body weight increase, tremor	Drinking water	—	μg/kg/day	MOE	—	×	(▲)
				Freshwater	< 0.0012	μg/kg/day	MOE	> 8,300	○	
Inhalation	Non-toxic level * ' 0.12 mg/m^3	Rats Mice	Reduced survival rate, suppressed body weight increase, degeneration of tissue of nasal cavity or bronchial tube, etc.	Ambient air	< 0.22	μg/m^3	MOE	> 55	×	(▲)
				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

With regard to acute toxicity, the following reliable data were obtained: a 72-h EC_{50} of 0.078 µg/L for growth inhibition in the green algae *Pseudokirchneriella subcapitata*; a 48-h EC_{50} of 110 µg/L for immobilization in the crustacean *Daphnia magna*; and a 96-h LC_{50} of 10 µg/L for the fish species *Oryzias latipes* (medaka). Accordingly, based on these acute toxicity values and an assessment factor of 100, a predicted no effect concentration (PNEC) of 0.00078 µg/L was obtained.

With regard to chronic toxicity, the following reliable data was obtained: a 72-h NOEC of less than 0.032 µg/L for growth inhibition in the green algae *P. subcapitata*. Accordingly, based on these chronic toxicity values and an assessment factor of 100, a predicted no effect concentration (PNEC) of less than 0.00032 µg/L was obtained. This less than 0.00032 µg/L obtained from the algae chronic toxicity was used as the PNEC for this substance.

Ecological risk could not be judged because the PEC/PNEC ratio could not be calculated. This substance is used as an agricultural chemical and further study is considered necessary for understanding average environmental concentrations at a lower detection limit while taking into account emissions to the environment because the amount used is varying greatly with 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)			
Green algae	Chronic	NOEC growth inhibition	100	<0.00032	Freshwater	<0.03	－	×	▲
					Seawater	－	－		

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5. Conclusions

	Conclusions		Judgment
Health risk	Oral exposure	Further information collection would be required for risk characterization.	(▲)
	Inhalation exposure	Further information collection would be required for risk characterization.	(▲)
Ecological risk	Further study considered necessary for understanding average environmental concentrations at lower detection limit while taking into account emissions to environment because usage situation varies greatly over time.		▲

［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.