

Summary of Initial Risk Assessment Report

1,4-Dichloro-2-nitrobenzene CAS No : 89-61-2

PRTR No of Japan: 128

This substance is assessed based on Guideline for Initial Risk Assessment Version 2.0

1. General Information

1.1 Physico-chemical properties

Appearance	Pale yellow solid
Melting point	52.8 degC
Boiling point	267 degC
Water solubility	83 mg/L (20 degC)
Henry's constant	1.22 Pa*m ³ /mol (1.20*10 ⁻⁵ atm*m ³ /mol) (25degC, measured)
Octanol/water partition coefficient (log K _{ow})	3.09 (measured), 3.10 (estimated)
Soil adsorption coefficient	K _{oc} = 510 (estimated)

1.2 Environmental fate

Bioaccumulation	Exhibits little to no bioaccumulation Bioconcentration factor (BCF) : 30-103 (carp), (measured)
Biodegradation	Non-biodegradable
Stability in the environment	(In air) Reaction with OH radical: Reaction rate constant is 5.01*10 ⁻¹⁴ cm ³ /molecule-sec. (25 degC, estimated) The half-life is 5-10 months, given OH radical concentration of 5*10 ⁵ -1*10 ⁶ molecule/cm ³ . Reaction with ozone: No data Reaction with nitrate radical: No data (In water) 1,4-Dichloro-2-nitrobenzene is not expected to be hydrolyzed in water.
Environmental fate	If released into water, 1,4-dichloro-2-nitrobenzene is expected to be adsorbed to sediment and suspended solids in water. 1,4-Dichloro-2-nitrobenzene is non-biodegradable under aerobic conditions and removal by volatilization is not considered to be an important process.

2. Sources of release to the environment

2.1 Annual production, import, export and domestic supply in 2003 (ton/year)

Production	Import	Export	Domestic supply	Remarks
1,499	--	--	--	

2.2 Uses

Chemical intermediates for *p*-dichloroaniline. *p*-dichloroaniline is used as a raw material for dyestuffs and organic pigments.

2.3 Release from the industries within the scope of PRTR system (in 2003)

Release sources		Air (ton)	Waters (ton)	Soil (ton)	Remarks
Listed industries	Reported release	0.001	0	0	Release to rivers: 0
	Release outside notification	--	--	--	
Release outside notification from non listed industry		--	--	--	
Households			--	--	
Mobile sources			--	--	
Total		0.001	0	0	

2.4 Releases from other sources

No information about the substance is available.

2.5 Main release route

Release of 1,4-dichloro-2-nitrobenzene into the environment is considered negligible, since estimated amount of release to air was only 1 kg based on the 2003 PRTR data.

3. Exposure Assessment

3.1 Measured environmental concentration

Media	No. of points detected / No. of points measured	No. of samples detected / No. of samples measured	Detection range	95th percentile	Detection limit	Year of investigation, Institution
Air (microg/m ³)	0/9	0/27	nd	--	0.0002-0.011	1994 Ministry of the Environment
River water (microg/L)	0/25	--	nd	--	0.01	2002 Ministry of the Environment
Drinking water (microg/L)(as ground water)	0/10	--	nd	--	0.01	2002 Ministry of the Environment
Food (microg/g) (fish)	0/9	0/27	nd	--	0.002-0.003	1994 Ministry of the Environment

nd: Not detected

3.2 Estimated environmental concentration

Media	Estimated concentration	Description
Air (microg/m ³)	5.5*10 ⁻⁶	Calculated by mathematical model / Atmospheric Dispersion Model for Exposure and Risk Assessment ver.1.5 (AIST-ADMER)
River water (microg/L)	0	Estimation of concentration in river water was not conducted, since 1,4-dichloro-2-nitrobenzene was not released into river according to PRTR data in 2003.

3.3 Estimated environmental concentration in water (EEC)

EEC(microg/L)	0.005
	Measured concentration in river water of 0.005 microg/L was used for EEC ¹⁾ .

3.4 Estimated human intake

Intake route		Concentration used for estimation of intake	Estimated intake (microg/ person/ day)	Estimated intake (microg/ kg-Bodyweight (BW)/ day)	
Inhalation	Air	5.5×10^{-6} (microg/m ³)	1.1×10^{-4}	2.2×10^{-6}	
		Estimated concentration in air of 5.5×10^{-6} microg/ m ³ was used, since no adequate measured data were available.			
Oral	Drinking water	0.005 (microg/L)	0.01	2.0×10^{-4}	
		-Concentration in ground water was used as a substitute for that of in drinking water, since measured concentrations in drinking water were not available. -The value (0.005 microg/L) equal to 1/2 of the detection limit was used for concentration in drinking water, since 1,4-dichloro-2-nitrobenzene was not detected in any samples taken from ground water.			
Food		0.0026 (microg/g)	0.31	6.2×10^{-3}	
		Concentration in fish was calculated as a product of a concentration in sea water and a BCF. The ninety-fifth percentile (0.025 microg/L) of measured concentrations surveyed by the Ministry of the Environment in 2003 was used for the concentration in sea water. $0.025 \text{ (microg/L)} * 103 \text{ (L/kg)} = 0.0026 \text{ (microg/g)}$			
Subtotal		--	0.32	6.4×10^{-3}	
Total route		--	0.32	6.4×10^{-3}	

1) This substance is assessed based on the Guideline for Initial Risk Assessment Version2.0. Under Version 2.0, a measured concentration and an estimated concentration (calculated by mathematical model) are compared and the larger of two concentrations is used for risk assessment.

4. Hazard assessment

4.1 Effects on organisms in the environment

	Acute or Chronic	Species	Endpoint	Concentration
Algae	Acute	<i>Chlorella pyrenoidosa</i>	96 hours EC ₅₀ Growth inhibition	2.1 (mg/L)
Crustacea	Chronic	<i>Daphnia magna</i>	21 days LOEC Reproduction	1.8 (mg/L)
Fish	Acute	<i>Lepomis cyanellus</i>	48 hours LC ₅₀	4.5 (mg/L)
Key study		The toxic data of Crustacea (<i>daphnia magna</i>) was chosen for the key study because effects were observed at the lowest concentration in the hazard assessment.		

4.2 Human health toxicity

Toxicity	Exposure route	Species	Duration / Dose method	Toxic effects (Key study is underlined)	NOAEL or LOAEL
Repeated dose toxicity	Inhalation	--	--	--	--
	Oral	Rat	28 days Gavage	<u>Reduced body weight gains,</u> <u>increased relative weight of liver,</u> <u>increased Bil concentration,</u> salivation, crouching position, hepatocellular hypertrophy, azoospermia, necrosis of germ epithelium, depression of spermatogenesis	NOAEL: 10 mg/kg/day
	Dermal	--	--	--	--
Reproductive and developmental toxicity	Oral	Rat	Preliminary reproduction toxicity screening test administered by oral gavage for 14 days	Delivery of only stillbirth	NOAEL: 20 mg/kg/day
Carcinogenicity	Evaluation by IARC : This substance has not been evaluated by IARC.				
Genotoxicity	Unable to determine genotoxicity				

5. Risk Assessment

5.1 Environmental organisms

Risk characterization	EEC (microg/L)	NOEC * (mg/L)	MOE (NOEC * /EEC)	Product of uncertainty factors	Conclusion
	0.005	LOEC: 1.8	360,000	200	No immediate concern
Product of uncertainty factors (UF): Extrapolation from laboratory test (10) * Toxicity data on one nutritional stage (10) * Using of LOEC (2) = 200					

Recommendation :

The substance is considered to be of no immediate concern for the moment, and a low priority for further work.

* NOEC means NOEC, LOEC, EC₅₀, etc.

5.2 Human health

5.2.1 Repeated dose toxicity

Exposure route	Intake (microg/kgBW/day)	NOAEL (mg/kgBW/day)	Risk characterization		
			MOE	Product of uncertainty factors	Conclusion
Inhalation	$2.2 \times 10^{-6}^{**}$	No data	Not calculated	Not calculated	--
Oral	6.4×10^{-3}	10	1,600,000	1,000	No immediate concern
Total	--	--	--	--	--
Product of uncertainty factors (UF): Interspecies (10) * Intraspecies (10) * Duration of test (10) = 1,000					

** negligible compared to oral exposure

5.2.2 Reproductive and developmental toxicity

Since NOAEL of reproduction toxicity is larger than NOAEL of repeated toxicity, risk characterization was not carried out.

5.2.3 Carcinogenicity

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5.2.4. Recommendation for Human Health

Although adequate inhalation route toxicity data was unavailable, the intake via inhalation is negligible compared to the oral route intake. Thus, the substance is considered to be of no immediate concern for the moment and a low priority for further work.

6. Supplement

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