

## Summary of Initial Risk Assessment Report

***n*-Butyl methacrylate** CAS No : 97-88-1

PRTR No of Japan: 319

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

### 1. General Information

#### 1.1 Physico-chemical properties

Appearance	Colorless liquid
Melting point	-25 degC
Boiling point	163 degC
Water solubility	250-882 mg/L (20 degC), 285 mg/L (25 degC)
Henry's constant	50.2 Pa*m <sup>3</sup> /mol (4.96*10 <sup>-4</sup> atm*m <sup>3</sup> /mol) (25degC, measured)
Octanol/water partition coefficient (log Kow)	2.88 (measured), 2.75 (estimated)
Soil adsorption coefficient	Koc = 64 (estimated)

#### 1.2 Environmental fate

Bioaccumulation	Low bioaccumulative Bioconcentration factor (BCF): 33 (calculated using logKow of 2.88)
Biodegradation	Readily biodegradable.
Stability in the environment	<p>(In air)</p> <p>Reaction with OH radical: The reaction rate constant is 2.30*10<sup>-11</sup> cm<sup>3</sup>/molecule-sec. (25 degC, estimated) The half-life is 8-20 hours, given OH radical concentration of 5*10<sup>5</sup>-1*10<sup>6</sup> molecule/cm<sup>3</sup>.</p> <p>Reaction with ozone: The reaction rate constant is 1.10*10<sup>-17</sup> cm<sup>3</sup>/molecule-sec or smaller. (25 degC, measured) The half-life is calculated to be 1 day, given ozone concentration of 7*10<sup>11</sup> molecule/cm<sup>3</sup>.</p> <p>Reaction with nitrate radical: No data</p> <p><i>n</i>-Butyl methacrylate is not expected to be directly degraded by photolysis.</p> <p>(In water)</p> <p>The hydrolysis reaction rate constant with base catalysts at 25 degC is estimated to be 2.7*10<sup>-3</sup> L/molecule-sec. The hydrolysis half-lives at 25 degC calculated from the rate constant are reported to be 81 years at pH 7 and 8.1 years at pH 8. Methacrylic acid and 1-butanol are expected to be produced by hydrolysis.</p>
Environmental fate	If released into water, <i>n</i> -butyl methacrylate is expected to be removed from water mainly by biodegradation and volatilization.

## 2. Sources of release to the environment

### 2.1 Annual production, import, export and domestic supply in 2002 (ton/year)

Production	Import	Export	Domestic supply	Remarks
14,000	0	4,000-5,000	9,000-10,000	

### 2.2 Uses

Polymerization raw materials for paint resins (acrylic resins and others) (50%), polymerization raw materials for photosensitive resins (25%), polymerization raw materials for adhesives and others (fiber-treating agents, paper processing agents, lubricant additives, metal surface treatment agents, MBS resin modifiers) (25%)

### 2.3 Release from the industries within the scope of PRTR system (in 2004)

Release sources		Air (ton)	Waters (ton)	Soil (ton)	Remarks
Listed industries	Reported release	6.9	1.3	0	Release to rivers: 0.012 ton
	Release outside notification	--	--	--	
Release outside notification from non listed industry		--	--	--	
Households		--	--	--	
Mobile sources		--	--	--	
Total		6.9	1.3	0	

### 2.4 Releases from other sources

No information about the substance is available.

### 2.5 Main release route

*n*-Butyl methacrylate is expected to be released to air mainly during its use in chemical industries.

## 3. Exposure Assessment

### 3.1 Measured environmental concentration

No data

### 3.2 Estimated environmental concentration

Media	Estimated concentration	Description
Air (microg/m <sup>3</sup> )	0.038	Calculated by mathematical model / Atmospheric Dispersion Model for Exposure and Risk Assessment ver.1.5 (AIST-ADMER)
River water (microg/L)	0.034	Calculated by mathematical model / Initial Assessment System for the PRTR chemicals (IAS)

### 3.3 Estimated environmental concentration in water (EEC)

EEC (microg/L)	0.034
	Estimated concentration of 0.034 microg/L was used, since measured concentrations were not available.

### 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	0.038 (microg/m <sup>3</sup> )	0.76	0.015
	The estimated concentration in air (0.038 microg/ m <sup>3</sup> ) was used, since measured concentrations were not available.			
Oral	Drinking water	0.034 (microg/L)	0.068	0.00136
		The estimated concentration in river water (0.034 microg/L) was used, since neither drinking water data nor ground water data were available.		
	Food	0.00011 (microg/g)	0.013	0.00026
		-Data of intake via food were not available. -The concentration in fish was estimated as a product of the concentration in seawater and a BCF. -Since neither measured concentrations in seawater nor river water were available, the concentration in seawater was assumed to be 1/10 of the estimated concentration in river water. $0.034 \text{ (microg/L)} * 1/10 * 33 \text{ (L/kg)} = 0.11 \text{ (microg/kg)}$		
Subtotal	--	0.081	0.0016	
Total route		--	0.84	0.017

## 4. Hazard assessment

### 4.1 Effects on organisms in the environment

	Acute or Chronic	Species	Endpoint	Concentration
Algae	Acute	<i>Selenastrum capricornutum</i>	72 hours EC <sub>50</sub> Growth rate	33.0 (mg/L)
Crustacea	Chronic	<i>Daphnia magna</i>	21 days NOEC Reproduction	1.10 (mg/L)
Fish	Acute	<i>Oryzias latipes</i>	14 days LC <sub>50</sub>	1.67 (mg/L)
Key study		The 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
Repeated dose toxicity	Inhalation	--	--	--	--
	Oral	Rat	Gavage administration for 44 days from 14 days before mating	<u>Decreased absolute and relative weights of spleen, splenic atrophy of red pulp and decreased extramedullary hematopoiesis</u> , reduced body weight gains, increased relative weights of kidneys, prolonged prothrombin time (PT), increased BUN	30 mg/kg/day
	Dermal	--	--	--	--
Reproductive and developmental toxicity	Oral	Rat	Gavage administration (Female) Gavage administration for 44 days from 14 days before mating (Male) 44 days from 14 days before mating	Decreased number of corpora lutea and implantation sites	300 mg/kg/day
Carcinogenicity	Evaluation by IARC : This substance has not been evaluated by IARC.				
Genotoxicity	Not considered to be genotoxic				

## 5. Risk Assessment

### 5.1 Environmental organisms

Risk characterization	EEC (microg/L)	NOEC * (mg/L)	MOE (NOEC * /EEC)	Product of uncertainty factors	Conclusion
	0.034	NOEC: 1.10	32,000	100	No immediate concern
Product of uncertainty factors (UF): Extrapolation from laboratory test (10) * Toxicity data on one nutritional stages (10) = 100					
Recommendation : The substance is considered to be of no immediate concern for the moment, and low priority for further work.					

NOEC\* means NOEC, LOEC, EC<sub>50</sub>, 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	0.015	No adequate data	Not calculated	Not calculated	--
Oral	0.0016	30	19,000,000	1,000	No immediate concern
Total	0.017	30 (oral)	1,800,000	1,000	No immediate concern
Product of uncertainty factors (UF): Interspecies (10) * Intraspecies (10) * Duration of test (10) = 1000					

#### 5.2.2 Reproductive and developmental toxicity

Since NOAEL of reproductive and developmental toxicity is larger than NOAEL of repeated dose toxicity, risk characterization of reproductive and developmental toxicity was not conducted.

#### 5.2.3 Carcinogenicity

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#### 5.2.4. Recommendation for Human Health

Although there was no adequate toxicity data available to evaluate exposure via the inhalation route, the MOE calculated using total intake from both routes (inhalation and oral) is larger than the product of uncertainty factors. 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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