

## Summary of Initial Risk Assessment Report

CAS No : **79-06-1 Acrylamide**

PRTR No of Japan: 2

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

### 1. General Information

#### 1.1 Physico-chemical properties

Appearance	Colorless Solid
Melting point	84.5 degC
Boiling point	87degC (0.2kPa), 103(degC)(0.7kPa)
Water solubility	640g/L (25degC)
Henry's constant	$1.01 * 10^{-4} \text{Pa} \cdot \text{m}^3 / \text{mol}$ (25degC, estimated )
Octanol/water partition coefficient ( log Kow)	-0.67(measured), -0.81(measured)
Soil adsorption coefficient	Koc = 11 (estimated)

#### 1.2 Environmental fate

Bioaccumulation	Low bioaccumulative Bioconcentration factor (BCF) (measured); 0.26 (1 mg/L); 0.77 (10 mg/L) (carp), 0.31 (1 mg/L); 2.53 (10 mg/L) (killifish) , 1.44 (whole body); 1.65 (internal organ) (rainbow trout)
Biodegradation	Readily biodegradable
Stability in the environment	(In air) Reaction with OH radical : The reaction rate constant : $1.12 * 10^{-11} \text{cm}^3 / \text{molecule} \cdot \text{sec}$ (25degC, estimated value) The half-life is 20-40 hours, given OH radical concentration is $5 * 10^5 - 1 * 10^6 \text{molecule} / \text{cm}^3$ . Reaction with ozone : The reaction rate constant : $1.75 * 10^{-18} \text{cm}^3 / \text{molecule} \cdot \text{sec}$ (25degC, estimated) The half-life is 7 days, given ozone concentration is $7 * 10^{11} \text{molecule} / \text{cm}^3$ . Reaction with nitrate radical : No data (In water): The hydrolysis rate is low, due to 1year or more of half-life. By hydrolysis, acrylic acid and ammonia can be produced.
Environmental fate	Acrylamide is expected to be removed mainly by biodegradation when released into the aquatic environment. Although acrylamide may be hydrolyzed, it is not main removal route.

## 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
73,000	--	15,500	--	--

### 2.2 Uses

Raw material of reinforcing agents for paper and flocculant; processing agents for fiber and adhesive; raw material for cosmetics and thermoset acrylic paint

### 2.3 Release from the industries within the scope of PRTR system (in 2001)

Release sources		Air (ton)	Waters (ton)	Soil (ton)	Remarks
Listed industries	Reported release	0.84	0.21	<0.01	Release to rivers: 0.17 ton
	Release outside notification	0.010	<0.01	<0.01	
Release outside notification from non listed industry		--	--	--	
Households		--	--	--	
Mobile sources		--	--	--	
Total		0.85	0.21	<0.01	

### 2.4 Releases from other sources

Acrylamide has been reported to exist as residual monomers in filtrated water treated with floccutants.

### 2.5 Main release route

Acrylamide may be released mainly to the atmosphere. It may also be released to the aquatic environment.

## 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	--	--	--	--	--	--
River water (microg/L)	5/59	5/59	nd-0.05	0.030	0.02	2000, Ministry of Environment

Drinking water (microg/L)(or ground water)	0/15	0/15	nd	--	0.02	2000, Ministry of Environment
Food	<p>The sum of the dietary intake via food (137 microg/person/day) and tea (4.2 microg/person/day) is 141 microg/person/day.</p> <p>(Food)</p> <p>The intake of acrylamide via food is derived from the concentrations in food representative of the diet of the Japanese population. As a result, the intake via food was 137 microg/person/day.</p> <p>&gt;&gt;&gt; e.g. ,intake from rice:</p> <p>Intake of rice: 0.35 kg/person/day</p> <p>Acrylamide concentration in rice: 4.5microg/kg</p> <p>Intake of acrylamide via rice: 1.6 microg/person/day</p> <p>(Tea)</p> <p>Acrylamide concentration in liquid tea brewed from tea leaves: 14 microg/kg ,</p> <p>Intake of tea: 0.30 kg/person/day</p> <p>Intake via tea: 4.2 microg/person/day</p>					2002 Health, Labor and Welfare Ministry

1) nd: not detected

For calculation of the 95th percentile, data less than the detection limit are replaced with a value equal to 1/2 of the detection limit.

### 3.2 Estimated environmental concentration

Media	Assumed concentration	Description
Air (microg/m <sup>3</sup> )	0.0051	Calculated by mathematical model/ Atmospheric Dispersion Model for Exposure and Risk Assessment (AIST-ADMER) ver.1.5
River water (microg/L)	0.55	Calculated by mathematical model/ Initial Assessment System for the PRTR chemicals (IAS).

### 3.3 Estimated environmental concentration in water (EEC) for risk assessment

EEC(microg/L)	0.55
	Estimated concentration of 0.55microg/L was used, since the value is larger than the measured concentration. <sup>1)</sup>

### 3.4 Estimated human intake

Intake route		Estimated concentration	Estimated intake (microg/ person/ day)	Estimated intake (microg/ kg-Bodyweight (BW)/ day)
Inhalation	Air	0.0051 (microg/m <sup>3</sup> )	0.10	0.0020
		Estimated concentration by model was used for the risk assessment, since measured concentration was not available.		
Oral	Drinking water	0.010 (microg/L)	0.020	0.004
		Since drinking water concentration data were not available, concentration in ground water was used instead. In this case, acrylamide was not detected in any ground water samples. Thus, value (0.010 microg/L) equal to 1/2 of the detection limit of measured concentrations in ground water was used for the risk assessment.		
	Food	-	141	2.8
		The sum (141 microg/person/day) of an intake via food of 137 microg/person/day and an intake via tea of 4.2 microg/person/day was used for the risk assessment.		
Sub total	-	141	2.8	
Total route		-	141	2.8

1) This substance is assessed based on the Guideline for Initial Risk Assessment Version 2.0. 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 Environmental organisms toxicity

	Acute or Chronic	Species	Endpoint	Concentration
Algae	Chronic	<i>Selenastrum capricornutum</i>	72 hours NOEC Growth inhibition	16 (mg/L)
Crustacea	Chronic	<i>Americamysis bahia</i>	28 days NOEC Mortality	2.04 (mg/L)
Fish	Acute	<i>Lepomis macrochirus</i>	96 hours LC <sub>50</sub>	100 (mg/L)
Key study		Data of crustacea was chosen for the key study because effects were observed at the lowest concentration in the hazard assessment.		

#### 4.2 Human health toxicity

	Exposure route	Species	Dose term/ Dose method	Toxic effects	NOAEL or LOAEL (converted)
Repeated dose toxicity	Oral	Rat	90 days, drinking water	Peripheral nerve lesions (axonal degeneration, demyelization)	NOAEL: 0.2 mg/kgBW/day
Reproductive and developmental toxicity	Oral	Rat	Drinking water	In a two-generation reproduction toxicity study, the numbers of implantations, fetuses, live pups per litter and fertility index were reduced.	NOAEL: 2 mg/kgBW/day
Carcinogenicity	Evaluation by IARC: Group 2A (probably carcinogenic to humans)				
Genotoxicity	Considered to be genotoxic				

### 5. Risk Assessment

#### 5.1 Environmental organisms

	EEC (microg/L)	NOEC * (mg/L)	MOE (NOEC */EEC)	Product of uncertainty factors	Conclusion
Risk characterization	0.55	NOEC:2.04	3,700	50	No immediate concern
	Product of uncertainty factors (UF) : Extrapolation from laboratory test (10) * Extrapolation from chronic toxicity data on two trophic levels (5) = 50				
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, 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	0.0020	No adequate data	Not calculated	--	Could not be assessed
Oral	2.8	NOAEL: 0.2	71	500	Substance of concern
Total	--	--	--	--	--

Product of uncertainty factors (UF) : Interspecies (10) \* Intraspecies (10) \* Duration of test (5) = 500

### 5.2.2 Reproductive and developmental toxicity

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

### 5.2.3 Carcinogenicity

--

### 5.2.4. Recommendation for human health

The substance is considered to be of concern and necessary for further investigation, analysis and assessment. Especially, a further survey of exposure via food is necessary.

## 6. Supplement

--