

SAFETY DATA SHEET according to Regulation (EC) No. 1907/2006

AMMONIA 18%

Version 3.0

Print Date 04.04.2023

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SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1. Product identifier

Trade name : AMMONIA 18%
Substance name : ammonia
Index-No. : 007-001-01-2
CAS-No. : 1336-21-6
EC-No. : 215-647-6
EU REACH-Reg. No. : 01-2119488876-14-xxxx

1.2. Relevant identified uses of the substance or mixture and uses advised against

Use of the Substance/Mixture : Identified use: See table in front of appendix for a complete overview of identified uses.
Uses advised against : At this moment we have not identified any uses advised against
Remarks : Before referring to any Exposure Scenario attached to this Safety Data Sheet please check the grade of the product: the Exposure Scenarios presented are not related to all product grade

1.3. Details of the supplier of the safety data sheet

Company : Brenntag N.V.
Nijverheidslaan 38
BE 8540 Deerlijk
Telephone : +32 (0)56 77 6944
Telefax : +32 (0)56 77 5711
E-mail address : info@brenntag.be
Responsible/issuing person : Master Data Administration

Company : Brenntag Nederland B.V.
Donker Duyvisweg 44
NL 3316 BM Dordrecht
Telephone : +31 (0)78 65 44 944
Telefax : +31 (0)78 65 44 919
E-mail address : info@brenntag.nl
Responsible/issuing person : Master Data Administration

1.4. Emergency telephone number

Emergency telephone : Belgium: Antipoison Center - Brussels TEL: +32(0)70 245 245

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number

Netherland: National Poisoning Information Center - Bilthoven
TEL: +31(0) 88 755 8000 (Only for the purpose of informing
medical personnel in cases of acute intoxications)

SECTION 2: Hazards identification

2.1. Classification of the substance or mixture

Classification according to Regulation (EC) No 1272/2008

REGULATION (EC) No 1272/2008			
Hazard class	Hazard category	Target Organs	Hazard statements
Skin corrosion	Category 1B	---	H314
Serious eye damage	Category 1	---	H318
Specific target organ toxicity - single exposure	Category 3	Respiratory system	H335
Long-term (chronic) aquatic hazard	Category 3	---	H412

For the full text of the H-Statements mentioned in this Section, see Section 16.

Most important adverse effects

Human Health : See section 11 for toxicological information.
Physical and chemical hazards : See section 9/10 for physicochemical information.
Potential environmental effects : See section 12 for environmental information.

2.2. Label elements

Labelling according to Regulation (EC) No 1272/2008

Hazard symbols :



Signal word : Danger

Hazard statements : H314 Causes severe skin burns and eye damage.
H335 May cause respiratory irritation.
H412 Harmful to aquatic life with long lasting effects.

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Precautionary statements

Prevention	:	P261 P273 P280	Avoid breathing dust/ fume/ gas/ mist/ vapours/ spray. Avoid release to the environment. Wear protective gloves/ protective clothing/ eye protection/ face protection.
Response	:	P303 + P361 + P353 P304 + P340 + P310 P305 + P351 + P338 P310	IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/ shower. IF INHALED: Remove person to fresh air and keep comfortable for breathing. Immediately call a POISON CENTER/doctor. IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a POISON CENTER/ doctor.

Hazardous components which must be listed on the label:

- ammonia

2.3. Other hazards

The PBT or vPvB criteria of Annex XIII to the REACH Regulation does not apply to inorganic substances.

Ecological information: No information available about endocrine disruption properties for environment.

Toxicological information: No information available about endocrine disruption properties for human health.

SECTION 3: Composition/information on ingredients

3.1. Substances

Chemical nature : Aqueous solution

Hazardous components	Amount [%]	Classification (REGULATION (EC) No 1272/2008)	
		Hazard class / Hazard category	Hazard statements
ammonia			

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Index-No.	: 007-001-01-2	>= 16 - < 19	Skin Corr.1B	H314
CAS-No.	: 1336-21-6		Eye Dam.1	H318
EC-No.	: 215-647-6		STOT SE3	H335
EU REACH-Reg. No.	: 01-2119488876-14-xxxx		Aquatic Acute1	H400
			Aquatic Chronic2	H411
			<u>M-Factor (Acute aquatic toxicity): 1</u>	
			specific concentration limit	
			STOT SE 3; H335	
			>= 5 %	
			<u>Note B</u>	

Remarks : The REACH registration number for the anhydrous ammonia (CAS 7664-41-7) covers ammonia in aqueous solutions (CAS 1336-21-6).

For the full text of the H-Statements mentioned in this Section, see Section 16.
For the full text of the Notes mentioned in this Section, see Section 16.

SECTION 4: First aid measures

4.1. Description of first aid measures

General advice	: Take off all contaminated clothing immediately.
If inhaled	: In case of accident by inhalation: remove casualty to fresh air and keep at rest. If breathing is irregular or stopped, administer artificial respiration. Call a physician immediately.
In case of skin contact	: Wash off immediately with plenty of water. Call a physician immediately.
In case of eye contact	: Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Consult an eye specialist immediately. Go to an ophthalmic hospital if possible.
If swallowed	: Clean mouth with water and drink afterwards plenty of water. Never give anything by mouth to an unconscious person. Do NOT induce vomiting. Call a physician immediately.

4.2. Most important symptoms and effects, both acute and delayed

Symptoms	: See Section 11 for more detailed information on health effects and symptoms.
Effects	: Extremely corrosive and destructive to tissue. If ingested, severe burns of the mouth and throat, as well as a danger of perforation of the oesophagus and the stomach. See Section 11 for more detailed information on health effects and symptoms.

4.3. Indication of any immediate medical attention and special treatment needed

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Treatment : Treat symptomatically.

SECTION 5: Firefighting measures

5.1. Extinguishing media

Suitable extinguishing media : Use extinguishing measures that are appropriate to local circumstances and the surrounding environment. The product itself does not burn.

Unsuitable extinguishing media : High volume water jet

5.2. Special hazards arising from the substance or mixture

Specific hazards during firefighting : Incomplete combustion may form toxic pyrolysis products.

Hazardous combustion products : The formation of caustic fumes is possible. Nitrogen oxides (NO_x)

5.3. Advice for firefighters

Special protective equipment for firefighters : In the event of fire, wear self-contained breathing apparatus. Wear appropriate body protection (full protective suit)

Specific extinguishing methods : Control smoke with water spray.

Further advice : Cool closed containers exposed to fire with water spray. Heating will cause a pressure rise - with risk of bursting. Collect contaminated fire extinguishing water separately. This must not be discharged into drains.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

Personal precautions : Keep people away from and upwind of spill/leak. Use personal protective equipment. Ensure adequate ventilation. Avoid contact with the skin and the eyes. Do not breathe vapours or spray mist.

6.2. Environmental precautions

Environmental precautions : Do not flush into surface water or sanitary sewer system. Avoid subsoil penetration.

6.3. Methods and materials for containment and cleaning up

Methods and materials for containment and cleaning up : Absorb with liquid-binding material (sand, diatomite, acid binders, universal binders). Keep in suitable, closed containers for disposal.

Further information : Treat recovered material as described in the section "Disposal"

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considerations".

6.4. Reference to other sections

See Section 1 for emergency contact information.
 See Section 8 for information on personal protective equipment.
 See Section 13 for waste treatment information.

SECTION 7: Handling and storage

7.1. Precautions for safe handling

Advice on safe handling : Keep container tightly closed. Open drum carefully as content may be under pressure. Ensure adequate ventilation. Use personal protective equipment. Avoid contact with skin, eyes and clothing. Do not breathe vapours or spray mist. Use respirator with appropriate filter if vapours or aerosol are released. Emergency eye wash fountains and emergency showers should be available in the immediate vicinity.

Hygiene measures : Keep away from food, drink and animal feedingstuffs. Smoking, eating and drinking should be prohibited in the application area. Wash hands before breaks and at the end of workday. Take off all contaminated clothing immediately.

7.2. Conditions for safe storage, including any incompatibilities

Requirements for storage areas and containers : Keep in an area equipped with alkali resistant flooring. Store in original container.

Advice on protection against fire and explosion : The product is not flammable. Normal measures for preventive fire protection.

Further information on storage conditions : Keep tightly closed in a dry and cool place. Keep in a well-ventilated place. Keep away from direct sunlight.

Advice on common storage : Keep away from food, drink and animal feedingstuffs. Do not store near acids. Incompatible with: Strong oxidizing agents

Suitable packaging materials : Polyethylene, polypropylene, Stainless steel

Unsuitable packaging materials : , Aluminium, Zinc, copper

7.3. Specific end use(s)

Specific use(s) : Identified use: See table in front of appendix for a complete overview of identified uses.

SECTION 8: Exposure controls/personal protection

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8.1. Control parameters

Component:	ammonia	CAS-No. 1336-21-6
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Derived No Effect Level (DNEL)/Derived Minimal Effect Level (DMEL)

DNEL	Workers, Acute - local effects, Inhalation	: 36 mg/m3
DNEL	Workers, Long-term - local effects, Inhalation	: 14 mg/m3
DNEL	Workers, Acute - systemic effects, Inhalation	: 47,6 mg/m3
DNEL	Workers, Long-term - systemic effects, Inhalation	: 47,6 mg/m3
DNEL	Workers, Acute - systemic effects, Skin contact	: 6,8 mg/kg bw/day
DNEL	Workers, Long-term - systemic effects, Skin contact	: 6,8 mg/kg bw/day
DNEL	Consumers, Acute - local effects, Inhalation	: 7,2 mg/m3
DNEL	Consumers, Long-term - local effects, Inhalation	: 2,8 mg/m3
DNEL	Consumers, Acute - systemic effects, Inhalation	: 23,8 mg/m3
DNEL	Consumers, Long-term - systemic effects, Inhalation	: 23,8 mg/m3
DNEL	Consumers, Acute - systemic effects, Skin contact	: 68 mg/kg bw/day
DNEL	Consumers, Long-term - systemic effects, Skin contact	: 68 mg/kg bw/day
DNEL	Consumers, Acute - systemic effects, Ingestion	: 6,8 mg/kg bw/day
DNEL	Consumers, Long-term - systemic effects, Ingestion	: 6,8 mg/kg bw/day

Predicted No Effect Concentration (PNEC)

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Fresh water	:	0,0011 mg/l
Marine water	:	0,0011 mg/l
Intermittent releases	:	0,0068 mg/l

Other Occupational Exposure Limit Values

EU. Indicative Occupational Exposure Limit Values in Directives 91/322/EEC, 2000/39/EC, 2006/15/EC, 2009/161/EU, 2017/164/EU, as amended, Short Term Exposure Limit (STEL):
50 ppm, 36 mg/m³
Indicative

EU. Indicative Occupational Exposure Limit Values in Directives 91/322/EEC, 2000/39/EC, 2006/15/EC, 2009/161/EU, 2017/164/EU, as amended, Time Weighted Average (TWA):
20 ppm, 14 mg/m³
Indicative

Netherlands. OELs (binding), as amended, Time Weighted Average (TWA):
14 mg/m³

Netherlands. OELs (binding), as amended, Short Term Exposure Limit (STEL):
36 mg/m³, (15 minutes)

EU. Indicative Occupational Exposure Limit Values in Directives 91/322/EEC, 2000/39/EC, 2006/15/EC, 2009/161/EU, 2017/164/EU, as amended, Short Term Exposure Limit (STEL):
50 ppm, 36 mg/m³
Indicative

EU. Indicative Occupational Exposure Limit Values in Directives 91/322/EEC, 2000/39/EC, 2006/15/EC, 2009/161/EU, 2017/164/EU, as amended, Time Weighted Average (TWA):
20 ppm, 14 mg/m³
Indicative

8.2. Exposure controls

Appropriate engineering controls

Refer to protective measures listed in sections 7 and 8.

Personal protective equipment

Respiratory protection

Advice : In case of brief exposure or low pollution use breathing filter apparatus.
Recommended Filter type:K
In case of intensive or longer exposure use self-contained breathing apparatus.
Respiratory protection complying with EN 141.

Hand protection

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Advice : Protective gloves complying with EN 374.
Please observe the instructions regarding permeability and breakthrough time which are provided by the supplier of the gloves. Also take into consideration the specific local conditions under which the product is used, such as the danger of cuts, abrasion, and the contact time.
Protective gloves should be replaced at first signs of wear.

Material : butyl-rubber
Break through time : ≥ 8 h
Glove thickness : 0,5 mm

Material : Fluorinated rubber
Break through time : ≥ 8 h
Glove thickness : 0,4 mm

Eye protection

Advice : Safety glasses with side-shields conforming to EN166

Skin and body protection

Advice : alkali resistant protective clothing
Chemical resistant apron
Protective clothing against the effects of liquid chemicals (EN 13034).
Protective footwear according to ISO 20345.

Environmental exposure controls

General advice : Do not flush into surface water or sanitary sewer system.
Avoid subsoil penetration.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

Form : liquid
Physical state : liquid
Colour : colourless, light yellow
Odour : ammoniacal
Odour Threshold : 5 - 25 ppm
Freezing point/range : < 0 °C
Boiling point/boiling range : > 40 °C
Flammability (solid, gas) : Not applicable

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Upper explosion limit / Upper flammability limit	:	27 %(V) Ammonia
Lower explosion limit / Lower flammability limit	:	16 %(V) Ammonia 16 %(V) ammonia gas
Flash point	:	No data available
Auto-ignition temperature	:	651 °C ammonia gas
Decomposition temperature	:	No data available
Self-Accelerating decomposition temperature (SADT)	:	No data available
pH	:	12 - 13 Concentration: 100 %
Viscosity		
Viscosity, dynamic	:	No data available
Viscosity, kinematic	:	No data available
Flow time	:	No data available
Solubility(ies)		
Water solubility	:	completely soluble
Solubility in other solvents	:	No data available
Dissolution Rate	:	No data available
Partition coefficient: n-octanol/water	:	No data available
Dispersion Stability	:	No data available
Vapour pressure	:	No data available
Relative density	:	No data available
Density	:	0,936 g/cm ³ 16% solution
Bulk density	:	No data available
Relative vapour density	:	No data available

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Particle characteristics
No data available

9.2 Other information

Explosives : Product is not explosive.

Oxidizing properties : not oxidising

SECTION 10: Stability and reactivity

10.1. Reactivity

Advice : No decomposition if used as directed.

10.2. Chemical stability

Advice : Stable under recommended storage conditions.

10.3. Possibility of hazardous reactions

Hazardous reactions : Corrodes copper and its alloys. Exothermic reaction with strong acids.

10.4. Conditions to avoid

Conditions to avoid : Heat

10.5. Incompatible materials

Materials to avoid : Bases, Acids, Aluminium, Zinc, Copper, Strong oxidizing agents, hypochlorites

10.6. Hazardous decomposition products

Hazardous decomposition products : ammonia

SECTION 11: Toxicological information

11.1. Information on the hazard classes within the meaning of Regulation (EC) No. 1272/2008

Data for the product

Acute toxicity

Oral

No data available

Inhalation

No data available

Dermal

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Study scientifically not justified.

Irritation

Skin

Result : Classified based on the calculation method according to CLP regulation.

Eyes

Result : Classified based on the calculation method according to CLP regulation.

Sensitisation

Result : Not classified based on the calculation method according to CLP regulation.

CMR effects

CMR Properties

Carcinogenicity : Not classified based on the calculation method according to CLP regulation.
 Mutagenicity : Not classified based on the calculation method according to CLP regulation.
 Teratogenicity : Not classified based on the calculation method according to CLP regulation.
 Reproductive toxicity : Not classified based on the calculation method according to CLP regulation.

Specific Target Organ Toxicity

Single exposure

Inhalation : May cause respiratory irritation.

Repeated exposure

Remarks : Not classified based on the calculation method according to CLP regulation.

Other toxic properties

Repeated dose toxicity

No data available

Aspiration hazard

Not applicable,

Component: ammonia CAS-No. 1336-21-6

Acute toxicity

Oral

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Study scientifically not justified.

Inhalation

No data available

Dermal

Study scientifically not justified.

Irritation

Skin

Result : corrosive effects (Rabbit) (OECD Test Guideline 404)

Eyes

Result : Causes serious eye damage. (Rabbit)

Sensitisation

Result : not sensitizing

CMR effects

Carcinogenicity

(negative, Rat, Test substance: Ammonium sulphate)(Oral; 67 mg/kg bw/day; 104 weeks)(OECD Test Guideline 453)Information given is based on data obtained from similar substances.

CMR Properties

Carcinogenicity : Animal testing did not show any carcinogenic effects.
Mutagenicity : Animal testing did not show any mutagenic effects.
In vitro tests did not show mutagenic effects
In vivo tests did not show mutagenic effects
Teratogenicity : Did not show teratogenic effects in animal experiments.
Reproductive toxicity : Animal testing did not show any effects on fertility.

Genotoxicity in vitro

Result : negative (Ames test; Test substance: ammonia) (OECD Test Guideline 471)

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Genotoxicity in vivo

Result : negative (In vivo micronucleus test; Mouse) (Test substance: ammonium chloride) (OECD Test Guideline 474)

Teratogenicity

(Rabbit)(Oral)Did not show teratogenic effects in animal experiments.Information given is based on data obtained from similar substances.

Reproductive toxicity

NOAEL Fertility : 408 mg/kg bw/day
(Rat)(Oral)(OECD Test Guideline 422)Animal testing did not show any effects on fertility.Information given is based on data obtained from similar substances.

Specific Target Organ Toxicity

Single exposure

Inhalation : Target Organs: Respiratory systemMay cause respiratory irritation.

Repeated exposure

Remarks : The substance or mixture is not classified as specific target organ toxicant, repeated exposure.

Other toxic properties

Repeated dose toxicity

NOAEL : 0,035 mg/l
(Rat, male; Test substance: ammonia)(Inhalation; 50 d)

Aspiration hazard

Not applicable,

11.2. Information on other hazards

Data for the product

Endocrine disrupting properties

Assessment : No information available about endocrine disruption properties for human health.

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SECTION 12: Ecological information

12.1. Toxicity

Component:	ammonia	CAS-No. 1336-21-6
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Acute toxicity

Fish

LC50 : 0,89 mg/l (Oncorhynchus mykiss (rainbow trout); 96 h)

Toxicity to daphnia and other aquatic invertebrates

LC50 : 101 mg/l (Daphnia magna (Water flea); 48 h) (ASTM E 729-80)

algae

EC50 : 2700 mg/l (Chlorella vulgaris (Fresh water algae); 18 d; Test substance: Ammonium sulphate) (static test)

Bacteria

: Study scientifically unjustified.

Chronic toxicity

Fish

LOEC : 0,022 mg/l (Oncorhynchus mykiss (rainbow trout); 73 d; Test substance: ammonium chloride) (flow-through test)

Aquatic invertebrates

NOEC : 0,79 mg/l (Daphnia magna (Water flea); 96 h; Test substance: ammonium chloride) (OPPTS 850.1300)

M-Factor

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M-Factor (Acute Aquat. Tox.) : 1

12.2. Persistence and degradability

Component:	ammonia	CAS-No. 1336-21-6
Persistence and degradability		

Persistence

Result : No data available

Biodegradability

Result : Readily biodegradable. Can be oxidized by microorganisms to nitrate but can be also reduced to nitrogen.

12.3. Bioaccumulative potential

Component:	ammonia	CAS-No. 1336-21-6
Bioaccumulation		

Result : Bioaccumulation is not expected.

12.4. Mobility in soil

Component:	ammonia	CAS-No. 1336-21-6
Mobility		

Water : The product is mobile in water environment.
Soil : Adsorbs on soil.

12.5. Results of PBT and vPvB assessment

Data for the product		
Results of PBT and vPvB assessment		

Result : The PBT or vPvB criteria of Annex XIII to the REACH Regulation does not apply to inorganic substances.

Component:	ammonia	CAS-No. 1336-21-6
Results of PBT and vPvB assessment		

Result : The PBT or vPvB criteria of Annex XIII to the REACH Regulation does not apply to inorganic substances.

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12.6. Endocrine disrupting properties

Data for the product

Endocrine disrupting potential : No information available about endocrine disruption properties for environment.

12.7. Other adverse effects

Data for the product

Additional ecological information

Result : Do not flush into surface water or sanitary sewer system.
Avoid subsoil penetration.
Harmful effects to aquatic organisms due to pH-shift.

Component:	ammonia	CAS-No. 1336-21-6
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Additional ecological information

Result : Harmful effects to aquatic organisms due to pH-shift.
Do not flush into surface water or sanitary sewer system.
Avoid subsoil penetration.

SECTION 13: Disposal considerations

13.1. Waste treatment methods

- Product : Disposal together with normal waste is not allowed. Special disposal required according to local regulations. Do not let product enter drains. Contact waste disposal services. This product shall be disposed of or recovered in compliance with Directive 2008/98/EC on waste as lastly amended.
- Contaminated packaging : Empty contaminated packagings thoroughly. They can be recycled after thorough and proper cleaning. If recycling is not practicable, dispose of in compliance with local regulations.
- European Waste Catalogue Number : No waste code according to the European Waste Catalogue can be assigned for this product, as the intended use dictates the assignment. The waste code is established in consultation with the regional waste disposer.

SECTION 14: Transport information

14.1. UN number or ID number

2672

14.2. UN proper shipping name

ADR : AMMONIA SOLUTION

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RID : AMMONIA SOLUTION
IMDG : AMMONIA SOLUTION

14.3. Transport hazard class(es)

ADR-Class : 8
 (Labels; Classification Code; Hazard Identification Number; Tunnel restriction code) 8; C5; 80; (E)
 RID-Class : 8
 (Labels; Classification Code; Hazard Identification Number) 8; C5; 80
 IMDG-Class : 8
 (Labels; EmS) 8; F-A, S-B

14.4. Packaging group

ADR : III
 RID : III
 IMDG : III

14.5. Environmental hazards

Environmentally hazardous according to ADR : no
 Environmentally hazardous according to RID : no
 Marine Pollutant according to IMDG-Code : yes

14.6. Special precautions for user

Not applicable.

14.7 Maritime transport in bulk according to IMO instruments

Not applicable for product as supplied.

SECTION 15: Regulatory information

15.1. Safety, health and environmental regulations/legislation specific for the substance or mixture

Data for the product

EU. REACH, Annex XVII, : Point Nos.: , 3; Listed
 Marketing and Use
 Restrictions (Regulation
 1907/2006/EC)

EU. Directive : ; The substance/mixture does not fall under this legislation.
 2012/18/EU (SEVESO
 III) on major accident
 hazards involving
 dangerous substances,
 Annex I

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Component:	ammonia	CAS-No. 1336-21-6
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EU. Chemicals Subject to PIC Procedure: Regulation 649/2012/EU on export and import of dangerous chemicals, as amended : ; The substance/mixture does not fall under this legislation.

EU. REACH, Annex XVII, Marketing and Use Restrictions (Regulation 1907/2006/EC) : Point Nos.: , 3; Listed

Point Nos.: , 75; Listed

EU. Regulation No. 1223/2009 on cosmetic products, Annex III: List of Restricted Substances in Cosmetic Products : Maximum concentration in ready for use preparation: 6 %; See the text of the regulation for applicable exceptions or provisions.

EU. Directive 2012/18/EU (SEVESO III) on major accident hazards involving dangerous substances, Annex I : Qualifying quantity for the application of Lower-tier requirements: 100 tonnes; Part 1: Categories of dangerous substances; Hazardous to the Aquatic Environment in Category Acute 1 or Chronic 1

Qualifying quantity for the application of Upper-tier requirements: 200 tonnes; Part 1: Categories of dangerous substances; Hazardous to the Aquatic Environment in Category Acute 1 or Chronic 1

Notification status ammonia:

Regulatory List	Notification	Notification number
AICS	YES	
DSL	YES	
EINECS	YES	215-647-6
ENCS (JP)	YES	(1)-314
IECSC	YES	
INSQ	YES	
ISHL (JP)	YES	(1)-314
KECI (KR)	YES	KE-01688
KECI (KR)	YES	97-1-184
NZIOC	YES	HSR001516

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NZIOC	YES	HSR001517
NZIOC	YES	HSR001526
NZIOC	YES	HSR001563
ONT INV	YES	
PHARM (JP)	YES	
PICCS (PH)	YES	
TCSI	YES	
TH INV	YES	2814.20
TH INV	YES	55-1-01485
TSCA	YES	
VN INVL	YES	

15.2. Chemical safety assessment

No data available

SECTION 16: Other information

II

Full text of H-Statements referred to under sections 2 and 3.

H314	Causes severe skin burns and eye damage.
H318	Causes serious eye damage.
H335	May cause respiratory irritation.
H400	Very toxic to aquatic life.
H411	Toxic to aquatic life with long lasting effects.
H412	Harmful to aquatic life with long lasting effects.

Full text of the Notes referred to under section 3.

Note B	Some substances (acids, bases, etc.) are placed on the market in aqueous solutions at various concentrations and, therefore, these solutions require different classification and labelling since the hazards vary at different concentrations. In Part 3 entries with Note B have a general designation of the following type: "nitric acid ...%". In this case the supplier must state the percentage concentration of the solution on the label. Unless otherwise stated, it is assumed that the percentage concentration is calculated on a weight/weight basis.
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Abbreviations and Acronyms

AU AIICL	Australia. Industrial Chemicals Act (AIC) List
BCF	bioconcentration factor
BOD	biochemical oxygen demand
CAS	Chemical Abstracts Service
CLP	Classification, Labelling and Packaging
CMR	carcinogenic, mutagenic or toxic to reproduction
COD	chemical oxygen demand
DNEL	derived no-effect level
DSL	Canada. Environmental Protection Act, Domestic Substances List

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EINECS	European Inventory of Existing Commercial Chemical Substances
ELINCS	European List of Notified Chemical Substances
ENCS (JP)	Japan. Kashin-Hou Law List
GHS	Globally Harmonized System of Classification and Labelling of Chemicals
IECSC	China. Inventory of Existing Chemical Substances
INSQ	Mexico. National Inventory of Chemical Substances
ISHL (JP)	Japan. Inventory of Industrial Safety & Health
KECI (KR)	Korea. Existing Chemicals Inventory
LC50	median lethal concentration
LOAEC	lowest observed adverse effect concentration
LOAEL	lowest observed adverse effect level
LOEL	lowest observed effect level
NDSL	Canada. Environmental Protection Act. Non-Domestic Substances List
NLP	no-longer polymer
NOAEC	no observed adverse effect concentration
NOAEL	no observed adverse effect level
NOEC	no observed effect concentration
NOEL	no observed effect level
NZIOC	New Zealand. Inventory of Chemicals
OECD	Organisation for Economic Cooperation and Development
OEL	occupational exposure limit
ONT INV	Canada. Ontario Inventory List
PBT	persistent, bioaccumulative and toxic
PHARM (JP)	Japan. Pharmacopoeia Listing
PICCS (PH)	Philippines. Inventory of Chemicals and Chemical Substances
PNEC	predicted no-effect concentration
REACH Auth. No.:	REACH Authorisation Number
REACH AuthAppC. No.	REACH Authorisation Application Consultation Number
STOT	specific target organ toxicity
SVHC	substance of very high concern
TCSI	Taiwan. Existing Chemicals Inventory
TH INV	Thailand. Existing Chemicals Inventory from FDA
TSCA	US. Toxic Substances Control Act
UVCB	substance of unknown or variable composition, complex reaction products or biological materials
VN INVL	Vietnam. National Chemical Inventory
vPvB	very persistent and very bioaccumulative

Further information

Key literature references : Supplier information and data from the "Database of registered

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and sources for data		substances" of the European Chemicals Agency (ECHA) were used to create this safety data sheet.
Methods used for product classification	:	The classification for human health, physical and chemical hazards and environmental hazards were derived from a combination of calculation methods and if available test data.
Hints for trainings	:	The workers have to be trained regularly on the safe handling of the products based on the information provided in the Safety Data Sheet and the local conditions of the workplace. National regulations for the training of workers in the handling of hazardous materials must be adhered to.
Other information	:	<p>The information provided in this Safety Data Sheet is correct to our knowledge at the date of its revision. The information given only describes the products with regard to safety arrangements and is not to be considered as a warranty or quality specification and does not constitute a legal relationship.</p> <p>The information contained in this Safety Data Sheet relates only to the specific material designated and may not be valid for such material used in combination with any other material or in any process, unless specified in the text.</p>

|| Indicates updated section.

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No.	Short title	Main User Group (SU)	Sector of Use (SU)	Product Category (PC)	Process Category (PROC)	Environmental Release Category (ERC)	Article Category (AC)	Specified
1	Manufacture of substance	3	8	NA	1, 2, 8a, 8b, 15	1	NA	ES14639
2	Use as an intermediate	3	NA	NA	1, 2, 3, 4, 5, 8a, 8b, 9, 15	6a	NA	ES14653
3	Formulation & (re)packing of substances and mixtures	3	NA	NA	1, 2, 3, 4, 5, 8a, 8b, 9, 15	2	NA	ES14651
4	Industrial use	3	NA	NA	1, 2, 3, 4, 5, 7, 8a, 8b, 9, 10, 13, 15, 19	4, 5, 6b, 7	NA	ES14655
5	Professional use	22	NA	NA	1, 2, 3, 4, 5, 8a, 8b, 9, 10, 11, 13, 15, 19, 20	8b, 8e, 9a, 9b	NA	ES14657
6	Consumer use	21	NA	9a, 16, 35, 39	NA	8b, 8e, 9a, 9b	NA	ES17818

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1. Short title of Exposure Scenario 1: Manufacture of substance

Main User Groups	SU 3: Industrial uses: Uses of substances as such or in preparations at industrial sites
Sectors of end-use	SU8: Manufacture of bulk, large scale chemicals (including petroleum products)
Process categories	PROC1: Use in closed process, no likelihood of exposure PROC2: Use in closed, continuous process with occasional controlled exposure PROC8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities PROC8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities PROC15: Use as laboratory reagent
Environmental Release Categories	ERC1: Manufacture of substances
Activity	Manufacture of substance or use as an intermediate, process chemical or extracting agent. Includes recycling/recovery, material transfers, storage, maintenance and loading (including marine vessel/barge, road/rail car and bulk container).

2.1 Contributing scenario controlling environmental exposure for: ERC1

Amount used	Annual amount per site	950000 tonnes
	Amounts used in the EU (tonnes/year)	6,5 Million tonnes/year
Environment factors not influenced by risk management	Flow rate of receiving surface water	18.000 m3/d
	Dilution Factor (River)	10
Other given operational conditions affecting environmental exposure	Number of emission days per year	330
	Emission or Release Factor: Air	140000 kg/day
	Indoor use.	
Technical conditions and measures at process level (source) to prevent release Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil Organizational measures to prevent/limit release from the site	Air	Exhaust air purification with scrubber
	Water	Wastewaters are generally treated on site by chemical and/or biological methods before release to the municipal STP or to the environment., Do not release wastewater directly into environment., All contaminated waste water must be processed in an industrial or municipal wastewater treatment plant that incorporates both primary and secondary treatments. (Degradation effectiveness: 100 %)
	All production steps are enclosed and the level of containment is high	
Conditions and measures related to sewage treatment plant	Type of Sewage Treatment Plant	On-site waste water treatment

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	Sludge Treatment	Do not apply industrial sludge to natural soils., Do not apply STP sludge on agricultural soil, All sludge is collected and incinerated or sent to landfill.
Conditions and measures related to external treatment of waste for disposal	Waste treatment	Solid wastes should be disposed of via landfill or incineration
Conditions and measures related to external recovery of waste	Recovery Methods	There is no envisaged external recovery of waste.

2.2 Contributing scenario controlling worker exposure for: PROC1, PROC2, PROC8b, PROC15

Product characteristics	Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 % (unless stated differently).
	Physical Form (at time of use)	gaseous
	Vapour pressure	8600 hPa
Frequency and duration of use	Frequency of use	220 days/year
	Avoid carrying out operation for more than 4 hours.	
Human factors not influenced by risk management	Breathing volume	10 m ³ /8 hours
	Exposed skin surface	480 cm ²
Other operational conditions affecting workers exposure	Indoor	
Technical conditions and measures to control dispersion from source towards the worker	Provide local exhaust ventilation (LEV).(except PROC1)	
	Handle substance within a closed system. Transfer via enclosed lines. Pipelines and vessels are sealed and insulated Store substance within a closed system. Provide extraction ventilation at points where emissions occur.	
Organisational measures to prevent /limit releases, dispersion and exposure	Ensure operatives are trained to minimise exposures. Employees must be trained in the proper use of PPE, and when to use it Ensure control measures are regularly inspected and maintained. Exposure and biological monitoring of operators is regularly performed Monitor effectiveness of control measures	
Conditions and measures related to personal protection, hygiene and health evaluation	Wear chemically resistant gloves (tested to EN374) in combination with specific activity training. (Efficiency: 90 %)	
	Wear respiratory protection (Efficiency: 95 %)	
	Wear suitable protective clothing, aprons, shield and suits	

3. Exposure estimation and reference to its source

Environment					
EUSES 2.1					
Contributing Scenario	Specific conditions	Compartment	Value	Level of Exposure	RCR
ERC1	Highest exposure	Fresh water	PEC	0,000133mg/l	0,121
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ERC1	Highest exposure	Marine water	PEC	0,0000315mg/l	0,029
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Workers

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Contributing Scenario	Specific conditions	Exposure routes	Level of Exposure	RCR
PROC1	Indoor use., with gloves, (90% efficiency), liquid, Gaseous form	worker dermal, short and long term - systemic	0,03mg/kg bw/day	0,01
PROC2	Indoor use., with gloves, (90% efficiency), liquid, Gaseous form	worker dermal, short and long term - systemic	0,01mg/kg bw/day	0,02
PROC8b	Indoor use., with gloves, (90% efficiency), liquid, Gaseous form	worker dermal, short and long term - systemic	0,07mg/kg bw/day	0,01
PROC15	Indoor use., with gloves, (90% efficiency), liquid, Gaseous form	worker dermal, short and long term - systemic	< 0,01mg/kg bw/day	0,01
PROC1	Indoor use., without respiratory protection, without local exhaust ventilation, liquid, Gaseous form	Worker - inhalative, short-term - local and systemic	0,01mg/m ³	< 0,001
PROC2	Indoor use., with local exhaust ventilation, with RPE (95%), during 1 - 4 hours, liquid, Gaseous form	worker inhalation, acute and long term - systemic	0,11mg/m ³	0
PROC2	Indoor use., with local exhaust ventilation, with RPE (95%), during 1 - 4 hours, liquid, Gaseous form	Worker - inhalative, long-term - local	0,11mg/m ³	0,01
PROC2	Indoor use., with local exhaust ventilation, with RPE (95%), during 1 - 4 hours, liquid, Gaseous form	Worker - inhalative, short-term - local	0,11mg/m ³	< 0,01
PROC8b	Indoor use., with local exhaust ventilation, with RPE (95%), during 1 - 4 hours, liquid, Gaseous form	worker inhalation, acute and long term - systemic	0,10mg/m ³	0,00
PROC8b	Indoor use., with local exhaust ventilation, with	Worker - inhalative, short-term - local	0,10mg/m ³	< 0,01

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	RPE (95%), during 1 - 4 hours, liquid, Gaseous form			
PROC8b	Indoor use., with local exhaust ventilation, with RPE (95%), during 1 - 4 hours, liquid, Gaseous form	Worker - inhalative, long-term - local	0,10mg/m ³	0,01
PROC15	Indoor use., with local exhaust ventilation, with RPE (95%), during 1 - 4 hours, liquid, Gaseous form	worker inhalation, acute and long term - systemic	0,11mg/m ³	0
PROC15	Indoor use., with local exhaust ventilation, with RPE (95%), during 1 - 4 hours, liquid, Gaseous form	Worker - inhalative, short-term - local	0,11mg/m ³	< 0,01
PROC15	Indoor use., with local exhaust ventilation, with RPE (95%), during 1 - 4 hours, liquid, Gaseous form	Worker - inhalative, long-term - local	0,11mg/m ³	0,01

4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario

Environment

Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures.

Health

Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.

For further information on the assessment method, see: <http://www.ecetoc.org/tra>

Additional good practice advice beyond the REACH Chemical Safety Assessment

Assumes a good basic standard of occupational hygiene is implemented.

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1. Short title of Exposure Scenario 2: Use as an intermediate

Main User Groups	SU 3: Industrial uses: Uses of substances as such or in preparations at industrial sites
Process categories	<p>PROC1: Use in closed process, no likelihood of exposure PROC2: Use in closed, continuous process with occasional controlled exposure PROC3: Use in closed batch process (synthesis or formulation) PROC4: Use in batch and other process (synthesis) where opportunity for exposure arises PROC5: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact) PROC8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities PROC8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities PROC9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing) PROC15: Use as laboratory reagent</p>
Environmental Release Categories	ERC6a: Industrial use resulting in manufacture of another substance (use of intermediates)
Activity	Use of substance as an intermediate (not related to Strictly Controlled Conditions). Includes recycling/recovery, material transfers, storage, sampling, associated laboratory activities, maintenance and loading (including marine vessel/barge, road/rail car and bulk container).

2.1 Contributing scenario controlling environmental exposure for: ERC6a

Readily biodegradable.

Amount used	Annual amount per site	800000 ton(s)/year
	Amounts used in the EU (tonnes/year)	3,8 Million tonnes/year
Environment factors not influenced by risk management	Flow rate of receiving surface water	18.000 m3/d
	Dilution Factor (River)	10
	Dilution Factor (Coastal Areas)	10
Other given operational conditions affecting environmental exposure	Number of emission days per year	330
	Emission or Release Factor: Air	105000 kg/day
	Indoor use.	
Technical conditions and measures at process level (source) to prevent release Technical onsite conditions and	Air	Exhaust air purification with scrubber
	Water	Wastewaters are generally treated on site by chemical and/or biological methods before release

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measures to reduce or limit discharges, air emissions and releases to soil
Organizational measures to prevent/limit release from the site

	to the municipal STP or to the environment., Do not release wastewater directly into environment., All contaminated waste water must be processed in an industrial or municipal wastewater treatment plant that incorporates both primary and secondary treatments. (Degradation effectiveness: 100 %)
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All production steps are enclosed and the level of containment is high

Conditions and measures related to sewage treatment plant

Type of Sewage Treatment Plant	On-site waste water treatment
Sludge Treatment	Do not apply industrial sludge to natural soils., Do not apply STP sludge on agricultural soil, All sludge is collected and incinerated or sent to landfill.
Type of Sewage Treatment Plant	Domestic sewage treatment plant
Flow rate of sewage treatment plant effluent	2.000 m3/d
Percentage removed from waste water	100 %

Conditions and measures related to external treatment of waste for disposal

Waste treatment	Solid wastes should be disposed of via landfill or incineration
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Conditions and measures related to external recovery of waste

Recovery Methods	There is no envisaged external recovery of waste.
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2.2 Contributing scenario controlling worker exposure for: PROC1, PROC2, PROC3, PROC4, PROC5, PROC8a, PROC8b, PROC9, PROC15

Product characteristics

Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 % (unless stated differently).
Physical Form (at time of use)	liquid, gaseous
Vapour pressure	8600 hPa

Frequency and duration of use

Frequency of use	220 days/year
Avoid carrying out operation for more than 4 hours.	

Human factors not influenced by risk management

Breathing volume	10 m3/8 hours
Exposed skin surface	480 cm ²

Other operational conditions affecting workers exposure

Indoor

Technical conditions and measures to control dispersion from source towards the worker

Provide local exhaust ventilation (LEV).(except PROC1)
Handle substance within a closed system.
Transfer via enclosed lines.
Pipelines and vessels are sealed and insulated
Store substance within a closed system.

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	Provide extraction ventilation at points where emissions occur.
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Organisational measures to prevent /limit releases, dispersion and exposure	Ensure operatives are trained to minimise exposures. Employees must be trained in the proper use of PPE, and when to use it Ensure control measures are regularly inspected and maintained. Exposure and biological monitoring of operators is regularly performed Monitor effectiveness of control measures
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Conditions and measures related to personal protection, hygiene and health evaluation	Wear chemically resistant gloves (tested to EN374) in combination with specific activity training. (Efficiency: 90 %)
	Wear respiratory protection (Efficiency: 95 %)
	Wear suitable protective clothing, aprons, shield and suits

2.3 Contributing scenario controlling worker exposure for: PROC1, PROC2, PROC3, PROC4, PROC5, PROC8a, PROC8b, PROC9, PROC15

Activity	application as solution
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Product characteristics	Concentration of the Substance in Mixture/Article	Covers the percentage of the substance in the product up to 25 %.
	Physical Form (at time of use)	Aqueous solution
	Vapour pressure	287 hPa

Frequency and duration of use	Frequency of use	220 days/year
	Avoid carrying out operation for more than 4 hours.	

Human factors not influenced by risk management	Breathing volume	10 m3/8 hours
	Exposed skin surface	480 cm ²

Technical conditions and measures to control dispersion from source towards the worker	Provide local exhaust ventilation (LEV).(except PROC1)	
	Handle substance within a closed system.	
	Transfer via enclosed lines.	
	Pipelines and vessels are sealed and insulated	
	Store substance within a closed system.	
Provide extraction ventilation at points where emissions occur.		

Organisational measures to prevent /limit releases, dispersion and exposure	Ensure operatives are trained to minimise exposures. Employees must be trained in the proper use of PPE, and when to use it Ensure control measures are regularly inspected and maintained. Exposure and biological monitoring of operators is regularly performed Monitor effectiveness of control measures
---	--

Conditions and measures related to personal protection, hygiene and health evaluation	Wear chemically resistant gloves (tested to EN374) in combination with specific activity training. (Efficiency: 90 %)
	Wear respiratory protection (Efficiency: 95 %)
	Wear suitable protective clothing, aprons, shield and suits

3. Exposure estimation and reference to its source

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Contributing Scenario	Specific conditions	Compartment	Value	Level of Exposure	RCR
ERC6a	Highest exposure	Fresh water	PEC	0,00219mg/l	0,076
ERC6a	Highest exposure	Marine water	PEC	0,0000205mg/l	0,019

Workers

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Contributing Scenario	Specific conditions	Exposure routes	Level of Exposure	RCR
PROC1	Indoor use., with gloves, (90% efficiency), without local exhaust ventilation, liquid, Gaseous form	worker dermal, short and long term - systemic	0,03mg/kg bw/day	0,01
PROC2, PROC3, PROC5, PROC8a, PROC15	Indoor use., with gloves, (90% efficiency), with local exhaust ventilation, liquid, Gaseous form	worker dermal, short and long term - systemic	0,01mg/kg bw/day	< 0,01
PROC4, PROC8b, PROC9	Indoor use., with gloves, (90% efficiency), with local exhaust ventilation, liquid, Gaseous form	worker dermal, short and long term - systemic	0,07mg/kg bw/day	0,01
PROC1	Indoor use., without local exhaust ventilation, without respiratory protection, liquid, Gaseous form	worker inhalation, acute and long term - systemic	0,01mg/m ³	< 0,01
PROC1	Indoor use., without local exhaust ventilation, without respiratory protection, liquid, Gaseous form	Worker - inhalative, short-term - local	0,01mg/m ³	< 0,01
PROC1	Indoor use., without local exhaust ventilation, without respiratory protection, liquid, Gaseous form	Worker - inhalative, long-term - local	0,01mg/m ³	< 0,01
PROC2, PROC3, PROC4, PROC5, PROC8b, PROC15	Highest exposure, Indoor use., with RPE (95%), with local exhaust ventilation, during 1 - 4 hours, liquid, Gaseous form	worker inhalation, acute and long term - systemic	0,21mg/m ³	0
PROC5, PROC8a, PROC9	Highest exposure, Indoor use., with RPE (95%), with local exhaust	worker inhalation, acute and long term - systemic	0,53mg/m ³	0,01

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	ventilation, during 1 - 4 hours, liquid, Gaseous form			
Relevant for all PROCs	Highest exposure, Indoor use., with RPE (95%), with local exhaust ventilation, during 1 - 4 hours, liquid, Gaseous form	Worker - inhalative, short-term - local	0,53mg/m ³	0,01
PROC2, PROC8b, PROC15	Highest exposure, Indoor use., with RPE (95%), with local exhaust ventilation, during 1 - 4 hours, liquid, Gaseous form	Worker - inhalative, long-term - local	0,11mg/m ³	0,01
PROC3, PROC4	Indoor use., with RPE (95%), with local exhaust ventilation, during 1 - 4 hours, liquid, Gaseous form	Worker - inhalative, long-term - local	0,21mg/m ³	0,02
PROC5, PROC8a	Indoor use., with RPE (95%), with local exhaust ventilation, during 1 - 4 hours, liquid, Gaseous form	Worker - inhalative, long-term - local	0,53mg/m ³	0,04
PROC9	Indoor use., with RPE (95%), with local exhaust ventilation, during 1 - 4 hours, liquid, Gaseous form	Worker - inhalative, long-term - local	0,43mg/m ³	0,03
PROC1	Indoor use., with gloves, (90% efficiency), without local exhaust ventilation, Aqueous form, Concentrations >= 0% - <= 25%	worker dermal, short and long term - systemic	0,03mg/kg bw/day	0,01
PROC2, PROC3, PROC5, PROC8a, PROC15	Indoor use., with gloves, (90% efficiency), with local exhaust ventilation, Aqueous form, Concentrations >= 0% - <= 25%	worker dermal, short and long term - systemic	0,01mg/kg bw/day	< 0,01
PROC4, PROC8b, PROC9	Indoor use., with gloves, (90% efficiency), with local exhaust ventilation, Aqueous form, Concentrations >= 0% -	worker dermal, short and long term - systemic	0,07mg/kg bw/day	0,01

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	<= 25%			
PROC1	Indoor use., without local exhaust ventilation, without respiratory protection, Aqueous form, Concentrations >= 0% - <= 25%	worker inhalation, acute and long term - systemic	0,01mg/m ³	< 0,01
PROC1	Indoor use., without local exhaust ventilation, without respiratory protection, Aqueous form, Concentrations >= 0% - <= 25%	Worker - inhalative, short-term - local	0,01mg/m ³	< 0,01
PROC1	Indoor use., without local exhaust ventilation, without respiratory protection, Aqueous form, Concentrations >= 0% - <= 25%	Worker - inhalative, long-term - local	0,01mg/m ³	< 0,01
PROC2, PROC3, PROC4, PROC5, PROC8b, PROC15	Highest exposure, Indoor use., with RPE (95%), with local exhaust ventilation, during 1 - 4 hours, Aqueous form, Concentrations >= 0% - <= 25%	worker inhalation, acute and long term - systemic	0,21mg/m ³	0
PROC5, PROC8a, PROC9	Highest exposure, Indoor use., with RPE (95%), with local exhaust ventilation, during 1 - 4 hours	worker inhalation, acute and long term - systemic	0,53mg/m ³	0,01
Relevant for all PROCs	Highest exposure, Indoor use., with RPE (95%), with local exhaust ventilation, during 1 - 4 hours, Aqueous form, Concentrations >= 0% - <= 25%	Worker - inhalative, short-term - local	0,53mg/m ³	0,01
PROC2, PROC8b, PROC15	Highest exposure, Indoor use., with RPE (95%), with local exhaust ventilation, during 1 - 4 hours, Aqueous form, Concentrations >= 0% - <= 25%	Worker - inhalative, long-term - local	0,11mg/m ³	0,01
PROC3, PROC4	Indoor use., with RPE (95%), with local exhaust	Worker - inhalative, long-term - local	0,21mg/m ³	0,02

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	ventilation, during 1 - 4 hours, Aqueous form, Concentrations $\geq 0\%$ - $\leq 25\%$			
PROC5, PROC8a	Indoor use., with RPE (95%), with local exhaust ventilation, during 1 - 4 hours, Aqueous form, Concentrations $\geq 0\%$ - $\leq 25\%$	Worker - inhalative, long-term - local	0,53mg/m ³	0,04
PROC9	Indoor use., with RPE (95%), with local exhaust ventilation, during 1 - 4 hours, Aqueous form, Concentrations $\geq 0\%$ - $\leq 25\%$	Worker - inhalative, long-term - local	0,43mg/m ³	0,03

4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario

Environment

Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures.

Health

Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.

For further information on the assessment method, see: <http://www.ecetoc.org/tra>

Additional good practice advice beyond the REACH Chemical Safety Assessment

Assumes a good basic standard of occupational hygiene is implemented.

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1. Short title of Exposure Scenario 3: Formulation & (re)packing of substances and mixtures

Main User Groups	SU 3: Industrial uses: Uses of substances as such or in preparations at industrial sites
Process categories	<p>PROC1: Use in closed process, no likelihood of exposure PROC2: Use in closed, continuous process with occasional controlled exposure PROC3: Use in closed batch process (synthesis or formulation) PROC4: Use in batch and other process (synthesis) where opportunity for exposure arises PROC5: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact) PROC8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities PROC8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities PROC9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing) PROC15: Use as laboratory reagent</p>
Environmental Release Categories	ERC2: Formulation of preparations
Activity	Formulation, mixing/ blending in batch or continuous processes, pelleting, compression, transfer and packaging, Loading (including marine vessel/barge, rail/road car and IBC loading) including its distribution

2.1 Contributing scenario controlling environmental exposure for: ERC2

Readily biodegradable.

Amount used	Annual amount per site	1 Million tonnes/year
	Amounts used in the EU (tonnes/year)	3,8 Million tonnes/year
Environment factors not influenced by risk management	Flow rate of receiving surface water	18.000 m3/d
	Dilution Factor (River)	10
	Dilution Factor (Coastal Areas)	10
Other given operational conditions affecting environmental exposure	Number of emission days per year	330
	Emission or Release Factor: Air	74000 kg/day
	Emission or Release Factor: Water	2 %
	Indoor use.	
Technical conditions and measures at process level (source) to prevent release	Air	Exhaust air purification with scrubber
	Water	Wastewaters are generally treated on site by

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Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil
Organizational measures to prevent/limit release from the site

chemical and/or biological methods before release to the municipal STP or to the environment., Do not release wastewater directly into environment., All contaminated waste water must be processed in an industrial or municipal wastewater treatment plant that incorporates both primary and secondary treatments. (Degradation effectiveness: 100 %)

All production steps are enclosed and the level of containment is high

Conditions and measures related to sewage treatment plant

Type of Sewage Treatment Plant	On-site waste water treatment
Sludge Treatment	Do not apply industrial sludge to natural soils., Do not apply STP sludge on agricultural soil, All sludge is collected and incinerated or sent to landfill.
Type of Sewage Treatment Plant	Domestic sewage treatment plant
Flow rate of sewage treatment plant effluent	2.000 m3/d
Percentage removed from waste water	100 %

Conditions and measures related to external treatment of waste for disposal

Waste treatment
Solid wastes should be disposed of via landfill or incineration

Conditions and measures related to external recovery of waste

Recovery Methods
There is no envisaged external recovery of waste.

2.2 Contributing scenario controlling worker exposure for: PROC1, PROC2, PROC3, PROC4, PROC5, PROC8a, PROC8b, PROC9, PROC15

Product characteristics

Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 % (unless stated differently).
Physical Form (at time of use)	liquid, gaseous
Vapour pressure	8600 hPa

Frequency and duration of use

Frequency of use	220 days/year
Avoid carrying out operation for more than 4 hours.	

Human factors not influenced by risk management

Breathing volume	10 m3/8 hours
Exposed skin surface	480 cm ²

Technical conditions and measures to control dispersion from source towards the worker

Provide local exhaust ventilation (LEV).(except PROC1)
Handle substance within a closed system.
Transfer via enclosed lines.
Pipelines and vessels are sealed and insulated
Store substance within a closed system.
Provide extraction ventilation at points where emissions occur.

Organisational measures to

Ensure operatives are trained to minimise exposures.

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prevent /limit releases, dispersion and exposure

Employees must be trained in the proper use of PPE, and when to use it
Ensure control measures are regularly inspected and maintained.
Exposure and biological monitoring of operators is regularly performed
Monitor effectiveness of control measures

Conditions and measures related to personal protection, hygiene and health evaluation

Wear chemically resistant gloves (tested to EN374) in combination with specific activity training. (Efficiency: 90 %)
Wear respiratory protection (Efficiency: 95 %)
Wear suitable protective clothing, aprons, shield and suits

2.3 Contributing scenario controlling worker exposure for: PROC1, PROC2, PROC3, PROC4, PROC5, PROC8a, PROC8b, PROC9, PROC15

Activity	application as solution	
Product characteristics	Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 25 %.
	Physical Form (at time of use)	Aqueous solution
	Vapour pressure	287 hPa
Frequency and duration of use	Frequency of use	220 days/year
	Avoid carrying out operation for more than 4 hours.	
Human factors not influenced by risk management	Breathing volume	10 m ³ /8 hours
	Exposed skin surface	480 cm ²
Other operational conditions affecting workers exposure	Indoor	
Technical conditions and measures to control dispersion from source towards the worker	Provide local exhaust ventilation (LEV).(except PROC1)	
	Handle substance within a closed system. Transfer via enclosed lines. Pipelines and vessels are sealed and insulated Store substance within a closed system. Provide extraction ventilation at points where emissions occur.	
Organisational measures to prevent /limit releases, dispersion and exposure	Ensure operatives are trained to minimise exposures. Employees must be trained in the proper use of PPE, and when to use it Ensure control measures are regularly inspected and maintained. Exposure and biological monitoring of operators is regularly performed Monitor effectiveness of control measures	
Conditions and measures related to personal protection, hygiene and health evaluation	Wear chemically resistant gloves (tested to EN374) in combination with specific activity training. (Efficiency: 90 %)	
	Wear respiratory protection (Efficiency: 95 %)	
	Wear suitable protective clothing, aprons, shield and suits	

3. Exposure estimation and reference to its source

Environment

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Contributing Scenario	Specific conditions	Compartment	Value	Level of Exposure	RCR
ERC2	Highest exposure	Fresh water	PEC	0,00013mg/l	0,045
ERC2	Highest exposure	Marine water	PEC	0,0000120mg/l	0,011

Workers

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Contributing Scenario	Specific conditions	Exposure routes	Level of Exposure	RCR
PROC1	Indoor use., with gloves, (90% efficiency), without local exhaust ventilation, liquid, Gaseous form	worker dermal, short and long term - systemic	0,03mg/kg bw/day	0,01
PROC2, PROC3, PROC5, PROC8a, PROC15	Indoor use., with gloves, (90% efficiency), with local exhaust ventilation, liquid, Gaseous form	worker dermal, short and long term - systemic	0,01mg/kg bw/day	< 0,01
PROC4, PROC8b, PROC9	Indoor use., with gloves, (90% efficiency), with local exhaust ventilation, liquid, Gaseous form	worker dermal, short and long term - systemic	0,07mg/kg bw/day	0,01
PROC1	Indoor use., without local exhaust ventilation, without respiratory protection, liquid, Gaseous form	worker inhalation, acute and long term - systemic	0,01mg/m ³	< 0,01
PROC1	Indoor use., without local exhaust ventilation, without respiratory protection, liquid, Gaseous form	Worker - inhalative, short-term - local	0,01mg/m ³	< 0,01
PROC1	Indoor use., without local exhaust ventilation, without respiratory protection, liquid, Gaseous form	Worker - inhalative, long-term - local	0,01mg/m ³	< 0,01
PROC2, PROC3, PROC4, PROC5, PROC8b, PROC15	Highest exposure, Indoor use., with RPE (95%), with local exhaust ventilation, during 1 - 4 hours, liquid, Gaseous form	worker inhalation, acute and long term - systemic	0,21mg/m ³	0
PROC5, PROC8a, PROC9	Highest exposure, Indoor use., with RPE (95%), with local exhaust	worker inhalation, acute and long term - systemic	0,53mg/m ³	0,01

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	ventilation, during 1 - 4 hours, liquid, Gaseous form			
Relevant for all PROCs	Highest exposure, Indoor use., with RPE (95%), with local exhaust ventilation, during 1 - 4 hours, liquid, Gaseous form	Worker - inhalative, short-term - local	0,53mg/m ³	0,01
PROC2, PROC8b, PROC15	Highest exposure, Indoor use., with RPE (95%), with local exhaust ventilation, during 1 - 4 hours	Worker - inhalative, long-term - local	0,11mg/m ³	0,01
PROC3, PROC4	Indoor use., with RPE (95%), with local exhaust ventilation, during 1 - 4 hours, liquid, Gaseous form	Worker - inhalative, long-term - local	0,21mg/m ³	0,02
PROC5, PROC8a	Indoor use., with RPE (95%), with local exhaust ventilation, during 1 - 4 hours, liquid, Gaseous form	Worker - inhalative, long-term - local	0,53mg/m ³	0,04
PROC9	Indoor use., with RPE (95%), with local exhaust ventilation, during 1 - 4 hours, liquid, Gaseous form	Worker - inhalative, long-term - local	0,43mg/m ³	0,03
PROC1	Indoor use., with gloves, (90% efficiency), without local exhaust ventilation, Aqueous form, Concentrations >= 0% - <= 25%	worker dermal, short and long term - systemic	0,03mg/kg bw/day	0,01
PROC2, PROC3, PROC5, PROC8a, PROC15	Indoor use., with gloves, (90% efficiency), with local exhaust ventilation, Aqueous form, Concentrations >= 0% - <= 25%	worker dermal, short and long term - systemic	0,01mg/kg bw/day	< 0,01
PROC4, PROC8b, PROC9	Indoor use., with gloves, (90% efficiency), with local exhaust ventilation, Aqueous form, Concentrations >= 0% - <= 25%	worker dermal, short and long term - systemic	0,07mg/kg bw/day	0,01

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PROC1	Indoor use., without local exhaust ventilation, without respiratory protection, Aqueous form, Concentrations >= 0% - <= 25%	worker inhalation, acute and long term - systemic	0,01mg/m ³	< 0,01
PROC1	Indoor use., without local exhaust ventilation, without respiratory protection, Aqueous form, Concentrations >= 0% - <= 25%	Worker - inhalative, short-term - local	0,01mg/m ³	< 0,01
PROC1	Indoor use., without local exhaust ventilation, without respiratory protection, Aqueous form, Concentrations >= 0% - <= 25%	Worker - inhalative, long-term - local	0,01mg/m ³	< 0,01
PROC2, PROC3, PROC4, PROC5, PROC8b, PROC15	Highest exposure, Indoor use., with RPE (95%), with local exhaust ventilation, during 1 - 4 hours, Aqueous form, Concentrations >= 0% - <= 25%	worker inhalation, acute and long term - systemic	0,21mg/m ³	0
PROC5, PROC8a, PROC9	Highest exposure, Indoor use., with RPE (95%), with local exhaust ventilation, during 1 - 4 hours, Aqueous form, Concentrations >= 0% - <= 25%	worker inhalation, acute and long term - systemic	0,53mg/m ³	0,01
Relevant for all PROCs	Highest exposure, Indoor use., with RPE (95%), with local exhaust ventilation, during 1 - 4 hours, Aqueous form, Concentrations >= 0% - <= 25%	Worker - inhalative, short-term - local	0,53mg/m ³	0,01
PROC2, PROC8b, PROC15	Highest exposure, Indoor use., with RPE (95%), with local exhaust ventilation, during 1 - 4 hours, Aqueous form, Concentrations >= 0% - <= 25%	Worker - inhalative, long-term - local	0,11mg/m ³	0,01
PROC3, PROC4	Indoor use., with RPE	Worker - inhalative, long-	0,21mg/m ³	0,02

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	(95%), with local exhaust ventilation, during 1 - 4 hours, Aqueous form, Concentrations $\geq 0\%$ - $\leq 25\%$	term - local		
PROC5, PROC8a	Indoor use., with RPE (95%), with local exhaust ventilation, during 1 - 4 hours, Aqueous form, Concentrations $\geq 0\%$ - $\leq 25\%$	Worker - inhalative, long-term	0,53mg/m ³	0,04
PROC9	Indoor use., with RPE (95%), with local exhaust ventilation, during 1 - 4 hours, Aqueous form, Concentrations $\geq 0\%$ - $\leq 25\%$	Worker - inhalative, long-term	0,43mg/m ³	0,03

4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario

Environment

Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures.

Health

Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.

For further information on the assessment method, see: <http://www.ecetoc.org/tra>

Additional good practice advice beyond the REACH Chemical Safety Assessment

Assumes a good basic standard of occupational hygiene is implemented.

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1. Short title of Exposure Scenario 4: Industrial use

Main User Groups	SU 3: Industrial uses: Uses of substances as such or in preparations at industrial sites
Process categories	<p>PROC1: Use in closed process, no likelihood of exposure PROC2: Use in closed, continuous process with occasional controlled exposure PROC3: Use in closed batch process (synthesis or formulation) PROC4: Use in batch and other process (synthesis) where opportunity for exposure arises PROC5: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact) PROC7: Industrial spraying PROC8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities PROC8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities PROC9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing) PROC10: Roller application or brushing PROC13: Treatment of articles by dipping and pouring PROC15: Use as laboratory reagent PROC19: Hand-mixing with intimate contact and only PPE available</p>
Environmental Release Categories	<p>ERC4: Industrial use of processing aids in processes and products, not becoming part of articles ERC5: Industrial use resulting in inclusion into or onto a matrix ERC6b: Industrial use of reactive processing aids ERC7: Industrial use of substances in closed systems</p>

2.1 Contributing scenario controlling environmental exposure for: ERC4, ERC5, ERC6b, ERC7

Readily biodegradable.

Amount used	Annual amount per site	25000 ton(s)/year
	Amounts used in the EU (tonnes/year)	354000 ton(s)/year
Environment factors not influenced by risk management	Flow rate of receiving surface water	18.000 m3/d
	Dilution Factor (River)	10
Other given operational conditions affecting environmental exposure	Number of emission days per year	330
	Emission or Release Factor: Air	70000 kg/day
	Indoor use.	
Technical conditions and measures at process level (source) to prevent release Technical onsite conditions and	Air	Exhaust air purification with scrubber
	Water	Wastewaters are generally treated on site by chemical and/or biological methods before release

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measures to reduce or limit discharges, air emissions and releases to soil Organizational measures to prevent/limit release from the site		to the municipal STP or to the environment., Do not release wastewater directly into environment., All contaminated waste water must be processed in an industrial or municipal wastewater treatment plant that incorporates both primary and secondary treatments. (Degradation effectiveness: 100 %)
	All production steps are enclosed and the level of containment is high	
Conditions and measures related to sewage treatment plant	Type of Sewage Treatment Plant	On-site waste water treatment
	Sludge Treatment	Do not apply industrial sludge to natural soils., Do not apply STP sludge on agricultural soil, All sludge is collected and incinerated or sent to landfill.
Conditions and measures related to external treatment of waste for disposal	Waste treatment	Solid wastes should be disposed of via landfill or incineration
Conditions and measures related to external recovery of waste	Recovery Methods	There is no envisaged external recovery of waste.

2.2 Contributing scenario controlling worker exposure for: PROC1, PROC2, PROC3, PROC4, PROC5, PROC8a, PROC8b, PROC9, PROC13, PROC15

Product characteristics	Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 % (unless stated differently).
	Physical Form (at time of use)	liquid, gaseous
	Vapour pressure	8600 hPa
Frequency and duration of use	Frequency of use	220 days/year
	Avoid carrying out operation for more than 4 hours.	
Human factors not influenced by risk management	Breathing volume	10 m ³ /8 hours
	Exposed skin surface	480 cm ²
Other operational conditions affecting workers exposure	Indoor	
Technical conditions and measures to control dispersion from source towards the worker	Provide local exhaust ventilation (LEV).(except PROC1)	
	Handle substance within a closed system. Transfer via enclosed lines. Pipelines and vessels are sealed and insulated Store substance within a closed system. Provide extraction ventilation at points where emissions occur.	
Organisational measures to prevent /limit releases, dispersion and exposure	Ensure operatives are trained to minimise exposures. Employees must be trained in the proper use of PPE, and when to use it Ensure control measures are regularly inspected and maintained. Exposure and biological monitoring of operators is regularly performed Monitor effectiveness of control measures	
Conditions and measures related	Wear chemically resistant gloves (tested to EN374) in combination with specific	

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to personal protection, hygiene and health evaluation

- activity training. (Efficiency: 90 %)
- Wear respiratory protection (Efficiency: 95 %)
- Wear suitable protective clothing, aprons, shield and suits

2.3 Contributing scenario controlling worker exposure for: PROC1, PROC2, PROC3, PROC4, PROC5, PROC7, PROC8a, PROC8b, PROC9, PROC10, PROC13, PROC15, PROC19

Activity	application as solution	
Product characteristics	Concentration of the Substance in Mixture/Article	Covers the percentage of the substance in the product up to 25 %.
	Physical Form (at time of use)	Aqueous solution
	Vapour pressure	287 hPa
Frequency and duration of use	Frequency of use	220 days/year
	Avoid carrying out operation for more than 4 hours.	
Human factors not influenced by risk management	Breathing volume	10 m ³ /8 hours
	Exposed skin surface	480 cm ²
Other operational conditions affecting workers exposure	Indoor	
	Limit the substance content in the mixture to 10 %.(PROC19)	
Technical conditions and measures to control dispersion from source towards the worker	Provide local exhaust ventilation (LEV).(except PROC1)	
	Handle substance within a closed system. Transfer via enclosed lines. Pipelines and vessels are sealed and insulated Store substance within a closed system. Provide extraction ventilation at points where emissions occur.	
Organisational measures to prevent /limit releases, dispersion and exposure	Ensure operatives are trained to minimise exposures. Employees must be trained in the proper use of PPE, and when to use it Ensure control measures are regularly inspected and maintained. Exposure and biological monitoring of operators is regularly performed Monitor effectiveness of control measures	
Conditions and measures related to personal protection, hygiene and health evaluation	Wear chemically resistant gloves (tested to EN374) in combination with specific activity training. (Efficiency: 90 %)	
	Wear respiratory protection (Efficiency: 95 %)	
	Wear suitable protective clothing, aprons, shield and suits	

3. Exposure estimation and reference to its source

Environment

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Contributing Scenario	Specific conditions	Compartment	Value	Level of Exposure	RCR
ERC4	Highest exposure	Fresh water	PEC	0,000108mg/l	0,098
ERC4	Highest exposure	Marine water	PEC	0,0000231mg/l	0,021

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ERC5	Highest exposure	Fresh water	PEC	0,0000558mg/l	0,051
ERC5	Highest exposure	Marine water	PEC	0,0000121mg/l	0,011
ERC6b	Highest exposure	Fresh water	PEC	< 0,000001mg/l	0,0001
ERC6b	Highest exposure	Marine water	PEC	< 0,000001mg/l	0,0002
ERC7	Highest exposure	Fresh water	PEC	< 0,000001mg/l	0,005
ERC7	Highest exposure	Marine water	PEC	< 0,000001mg/l	0,0011

Workers

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Contributing Scenario	Specific conditions	Exposure routes	Level of Exposure	RCR
PROC1	Indoor use., with gloves, (90% efficiency), without local exhaust ventilation	worker dermal, short and long term - systemic	0,03mg/kg bw/day	0,01
PROC2, PROC3, PROC5, PROC8a, PROC15	Indoor use., with gloves, (90% efficiency), with local exhaust ventilation	worker dermal, short and long term - systemic	0,01mg/kg bw/day	< 0,01
PROC4, PROC8b, PROC9	Indoor use., with gloves, (90% efficiency), with local exhaust ventilation	worker dermal, short and long term - systemic	0,07mg/kg bw/day	0,01
PROC1	Indoor use., without local exhaust ventilation, without respiratory protection, liquid, Gaseous form	worker inhalation, acute and long term - systemic	0,01mg/m ³	< 0,01
PROC1	Indoor use., without local exhaust ventilation, without respiratory protection, liquid, Gaseous form	Worker - inhalative, short-term - local	0,01mg/m ³	< 0,01
PROC1	Indoor use., without local exhaust ventilation, without respiratory protection, liquid, Gaseous form	Worker - inhalative, long-term - local	0,01mg/m ³	< 0,01
PROC2, PROC3, PROC4, PROC8b, PROC15	Highest exposure, Indoor use., with RPE (95%), with local exhaust ventilation, during 1 - 4	worker inhalation, acute and long term - systemic	0,21mg/m ³	0

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	hours, liquid, Gaseous form			
PROC5, PROC8a, PROC9, PROC13	Highest exposure, Indoor use., with RPE (95%), with local exhaust ventilation, during 1 - 4 hours, liquid, Gaseous form	worker inhalation, acute and long term - systemic	0,53mg/m ³	0,01
Relevant for all PROCs	Highest exposure, Indoor use., with RPE (95%), with local exhaust ventilation, during 1 - 4 hours, liquid, Gaseous form	Worker - inhalative, short-term - local	0,53mg/m ³	0,01
PROC2, PROC8b, PROC15	Highest exposure, Indoor use., with RPE (95%), with local exhaust ventilation, during 1 - 4 hours, liquid, Gaseous form	Worker - inhalative, long-term - local	0,11mg/m ³	0,01
PROC3, PROC4	Indoor use., with RPE (95%), with local exhaust ventilation, during 1 - 4 hours, liquid, Gaseous form	Worker - inhalative, long-term - local	0,21mg/m ³	0,02
PROC5, PROC8a, PROC13	Indoor use., with RPE (95%), with local exhaust ventilation, during 1 - 4 hours, liquid, Gaseous form	Worker - inhalative, long-term - local	0,53mg/m ³	0,04
PROC9	Indoor use., with RPE (95%), with local exhaust ventilation, during 1 - 4 hours, liquid, Gaseous form	Worker - inhalative, long-term - local	0,43mg/m ³	0,03
PROC19	Reduced concentration, 10% w/w, with gloves, (90% efficiency)	worker dermal, short and long term - systemic	1,41mg/kg bw/day	0,2
PROC2, PROC8b, PROC15	Highest exposure, Indoor use., with RPE (95%), with local exhaust ventilation, during 1 - 4 hours, Aqueous form, Concentrations >= 0% - <= 25%	worker inhalation, acute and long term - systemic	0,13mg/m ³	0
PROC3, PROC4	Indoor use., with RPE (95%), with local exhaust	worker inhalation, acute and long term - systemic	0,26mg/m ³	0,01

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	ventilation, during 1 - 4 hours, Aqueous form, Concentrations $\geq 0\%$ - $\leq 25\%$			
PROC5, PROC7, PROC8a, PROC9, PROC10, PROC13	Highest exposure, Indoor use., with RPE (95%), with local exhaust ventilation, during 1 - 4 hours, Aqueous form, Concentrations $\geq 0\%$ - $\leq 25\%$	worker inhalation, acute and long term - systemic	0,66mg/m ³	0,01
PROC1, PROC2, PROC3, PROC4, PROC8b, PROC9, PROC15	Highest exposure, Indoor use., with RPE (95%), with local exhaust ventilation, during 1 - 4 hours, Aqueous form, Concentrations $\geq 0\%$ - $\leq 25\%$	Worker - inhalative, short-term - local	0,53mg/m ³	0,01
PROC5, PROC7, PROC8a, PROC10, PROC13	Indoor use., with RPE (95%), with local exhaust ventilation, during 1 - 4 hours, Aqueous form, Concentrations $\geq 0\%$ - $\leq 25\%$	Worker - inhalative, short-term - local	0,66mg/m ³	0,02
PROC2, PROC8b, PROC15	Highest exposure, Indoor use., with RPE (95%), with local exhaust ventilation, during 1 - 4 hours, Aqueous form, Concentrations $\geq 0\%$ - $\leq 25\%$	Worker - inhalative, long-term - local	0,13mg/m ³	0,01
PROC3, PROC4	Indoor use., with RPE (95%), with local exhaust ventilation, during 1 - 4 hours, Aqueous form, Concentrations $\geq 0\%$ - $\leq 25\%$	Worker - inhalative, long-term - local	0,26mg/m ³	0,02
PROC5, PROC7, PROC8a, PROC10, PROC13	Indoor use., with RPE (95%), with local exhaust ventilation, during 1 - 4 hours, Aqueous form, Concentrations $\geq 0\%$ - $\leq 25\%$	Worker - inhalative, long-term - local	0,66mg/m ³	0,05
PROC9	Indoor use., with RPE (95%), with local exhaust ventilation, during 1 - 4 hours, Aqueous form,	Worker - inhalative, long-term - local	0,53mg/m ³	0,04

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	Concentrations $\geq 0\%$ - $\leq 25\%$			
PROC19	Indoor use., with RPE (95%), with local exhaust ventilation, during 1 - 4 hours, Aqueous form, Reduced concentration, (max. 10% solution)	worker inhalation, acute and long term - systemic	6,56mg/m ³	0,14
PROC19	Indoor use., with RPE (95%), with local exhaust ventilation, during 1 - 4 hours, Aqueous form, Reduced concentration, (max. 10% solution)	Worker - inhalative, short-term - local	6,56mg/m ³	0,18
PROC19	Indoor use., with RPE (95%), with local exhaust ventilation, during 1 - 4 hours, Aqueous form, Reduced concentration, (max. 10% solution)	Worker - inhalative, long-term	6,56mg/m ³	0,47

4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario

Environment

Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures.

Health

Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.

For further information on the assessment method, see: <http://www.ecetoc.org/tra>

Additional good practice advice beyond the REACH Chemical Safety Assessment

Assumes a good basic standard of occupational hygiene is implemented.

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1. Short title of Exposure Scenario 5: Professional use

Main User Groups	SU 22: Professional uses: Public domain (administration, education, entertainment, services, craftsmen)
Process categories	<p>PROC1: Use in closed process, no likelihood of exposure</p> <p>PROC2: Use in closed, continuous process with occasional controlled exposure</p> <p>PROC3: Use in closed batch process (synthesis or formulation)</p> <p>PROC4: Use in batch and other process (synthesis) where opportunity for exposure arises</p> <p>PROC5: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact)</p> <p>PROC8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities</p> <p>PROC8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities</p> <p>PROC9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing)</p> <p>PROC10: Roller application or brushing</p> <p>PROC11: Non industrial spraying</p> <p>PROC13: Treatment of articles by dipping and pouring</p> <p>PROC15: Use as laboratory reagent</p> <p>PROC19: Hand-mixing with intimate contact and only PPE available</p> <p>PROC20: Heat and pressure transfer fluids in dispersive, professional use but closed systems</p>
Environmental Release Categories	<p>ERC8b: Wide dispersive indoor use of reactive substances in open systems</p> <p>ERC8e: Wide dispersive outdoor use of reactive substances in open systems</p> <p>ERC9a: Wide dispersive indoor use of substances in closed systems</p> <p>ERC9b: Wide dispersive outdoor use of substances in closed systems</p>

2.1 Contributing scenario controlling environmental exposure for: ERC8b, ERC8e, ERC9a, ERC9b

Readily biodegradable.

Frequency and duration of use	Continuous exposure	Dispersive use.
Technical conditions and measures at process level (source) to prevent release Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil Organizational measures to prevent/limit release from the site	Air	Exhaust air purification with scrubber
	Water	Ensure proper process control to avoid excess waste discharge (temperature, concentration, pH, time)., All contaminated waste water must be processed in an industrial or municipal wastewater treatment plant that incorporates both primary and secondary treatments.
Conditions and measures related to sewage treatment plant	Type of Sewage Treatment Plant	On-site waste water treatment, or, Municipal sewage treatment plant
	Percentage removed from waste water	90 %

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2.2 Contributing scenario controlling worker exposure for: PROC1, PROC2, PROC3, PROC4, PROC5, PROC8a, PROC8b, PROC9, PROC10, PROC11, PROC13, PROC15, PROC19, PROC20

Product characteristics	Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 % (unless stated differently).
	Physical Form (at time of use)	liquid, gaseous
	Vapour pressure	8600 hPa
Frequency and duration of use	Frequency of use	220 days/year
	Avoid carrying out operation for more than 4 hours.	
Human factors not influenced by risk management	Breathing volume	10 m ³ /8 hours
	Exposed skin surface	480 cm ²
Technical conditions and measures to control dispersion from source towards the worker	Provide local exhaust ventilation (LEV).(except PROC1)	
	Handle substance within a closed system. Transfer via enclosed lines. Pipelines and vessels are sealed and insulated Store substance within a closed system. Provide extraction ventilation at points where emissions occur.	
Organisational measures to prevent /limit releases, dispersion and exposure	Ensure operatives are trained to minimise exposures. Employees must be trained in the proper use of PPE, and when to use it Ensure control measures are regularly inspected and maintained. Exposure and biological monitoring of operators is regularly performed Monitor effectiveness of control measures	
	Wear chemically resistant gloves (tested to EN374) in combination with specific activity training. (Efficiency: 90 %) Wear respiratory protection (Efficiency: 95 %) Wear suitable protective clothing, aprons, shield and suits	

2.3 Contributing scenario controlling worker exposure for: PROC1, PROC2, PROC3, PROC4, PROC5, PROC8a, PROC8b, PROC9, PROC10, PROC11, PROC13, PROC15, PROC19, PROC20

Activity	application as solution	
Product characteristics	Concentration of the Substance in Mixture/Article	Covers the percentage of the substance in the product up to 25 %.
	Physical Form (at time of use)	Aqueous solution
	Vapour pressure	287 hPa
Frequency and duration of use	Frequency of use	220 days/year
	Avoid carrying out operation for more than 4 hours.	
Human factors not influenced by risk management	Breathing volume	10 m ³ /8 hours
	Exposed skin surface	480 cm ²
Technical conditions and measures to control dispersion from source towards the worker	Provide local exhaust ventilation (LEV).(except PROC1)	
	Handle substance within a closed system. Transfer via enclosed lines.	

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	<p>Pipelines and vessels are sealed and insulated Store substance within a closed system. Provide extraction ventilation at points where emissions occur.</p>
Organisational measures to prevent /limit releases, dispersion and exposure	<p>Ensure operatives are trained to minimise exposures. Employees must be trained in the proper use of PPE, and when to use it Ensure control measures are regularly inspected and maintained. Exposure and biological monitoring of operators is regularly performed Monitor effectiveness of control measures</p>
Conditions and measures related to personal protection, hygiene and health evaluation	Wear chemically resistant gloves (tested to EN374) in combination with specific activity training. (Efficiency: 90 %)
	Wear respiratory protection (Efficiency: 95 %)
	Wear suitable protective clothing, aprons, shield and suits

3. Exposure estimation and reference to its source

Environment

Used EUSES model. The use is assessed to be safe.

Workers

ECETOC TRA

Contributing Scenario	Specific conditions	Exposure routes	Level of Exposure	RCR
PROC1	Indoor use., with gloves, (90% efficiency), without local exhaust ventilation	worker dermal, short and long term - systemic	0,03mg/kg bw/day	0,01
PROC2, PROC3, PROC5, PROC8a, PROC15, PROC20	Indoor use., with gloves, (90% efficiency), with local exhaust ventilation	worker dermal, short and long term - systemic	0,01mg/kg bw/day	< 0,01
PROC4, PROC8b, PROC9, PROC13	Indoor use., with gloves, (90% efficiency), with local exhaust ventilation	worker dermal, short and long term - systemic	0,07mg/kg bw/day	0,01
PROC11	Indoor use., with gloves, (90% efficiency), with local exhaust ventilation	worker dermal, short and long term - systemic	0,21mg/kg bw/day	0,03
PROC10	Indoor use., with gloves, (90% efficiency), with local exhaust ventilation	worker dermal, short and long term - systemic	0,14mg/kg bw/day	0,02
PROC19	Indoor use., with gloves, (90% efficiency), with local exhaust ventilation, 10% dermal uptake	worker dermal, short and long term - systemic	1,41mg/kg bw/day	0,2
PROC2,	Highest exposure, Indoor	worker inhalation, acute	0,13mg/m ³	0

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PROC15, PROC8b	use., with local exhaust ventilation, with RPE (95%), during 1 - 4 hours, liquid, Gaseous form	and long term - systemic		
PROC2, PROC15, PROC8b	Highest exposure, Indoor use., with local exhaust ventilation, with RPE (95%), during 1 - 4 hours, liquid, Gaseous form	Worker - inhalative, short-term - local	0,13mg/m ³	< 0,01
PROC2, PROC15, PROC8b	Highest exposure, Indoor use., with local exhaust ventilation, with RPE (95%), during 1 - 4 hours, liquid, Gaseous form	Worker - inhalative, long-term - local	0,13mg/m ³	0,01
PROC3, PROC4, PROC20	Highest exposure, Indoor use., with local exhaust ventilation, with RPE (95%), during 1 - 4 hours, liquid, Gaseous form	worker inhalation, acute and long term - systemic	0,26mg/m ³	0,01
PROC3, PROC4, PROC20	Highest exposure, Indoor use., with local exhaust ventilation, with RPE (95%), during 1 - 4 hours, liquid, Gaseous form	Worker - inhalative, short-term - local	0,26mg/m ³	0,01
PROC3, PROC4, PROC20	Highest exposure, Indoor use., with local exhaust ventilation, with RPE (95%), during 1 - 4 hours, liquid, Gaseous form	Worker - inhalative, long-term - local	0,26mg/m ³	0,02
PROC5, PROC8a, PROC13	Indoor use., with local exhaust ventilation, with RPE (95%), during 1 - 4 hours, liquid, Gaseous form	worker inhalation, acute and long term - systemic	0,53mg/m ³	0,01
PROC5, PROC8a, PROC13	Indoor use., with local exhaust ventilation, with RPE (95%), during 1 - 4 hours, liquid, Gaseous form	Worker - inhalative, short-term - local	0,53mg/m ³	0,01
PROC5, PROC8a, PROC13	Indoor use., with local exhaust ventilation, with RPE (95%), during 1 - 4 hours, liquid, Gaseous form	Worker - inhalative, long-term - local	0,53mg/m ³	0,04
PROC9	Indoor use., with local exhaust ventilation, with RPE (95%), during 1 - 4	worker inhalation, acute and long term - systemic	0,43mg/m ³	0,01

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	hours, liquid, Gaseous form			
PROC9	Indoor use., with local exhaust ventilation, with RPE (95%), during 1 - 4 hours, liquid, Gaseous form	Worker - inhalative, short-term - local	0,43mg/m ³	0,01
PROC9	Indoor use., with local exhaust ventilation, with RPE (95%), during 1 - 4 hours, liquid, Gaseous form	Worker - inhalative, long-term - local	0,43mg/m ³	0,03
PROC5, PROC8a, PROC10, PROC13	Indoor use., with local exhaust ventilation, with RPE (95%), during 1 - 4 hours, Concentrations >= 0% - <= 25%	worker inhalation, acute and long term - systemic	0,66mg/m ³	0,01
PROC5, PROC8a, PROC10, PROC13	Indoor use., with local exhaust ventilation, with RPE (95%), during 1 - 4 hours, Concentrations >= 0% - <= 25%	Worker - inhalative, short-term - local	0,66mg/m ³	0,02
PROC5, PROC8a, PROC10, PROC13	Indoor use., with local exhaust ventilation, with RPE (95%), during 1 - 4 hours, Concentrations >= 0% - <= 25%	Worker - inhalative, long-term - local	0,66mg/m ³	0,05
PROC9	Indoor use., with local exhaust ventilation, with RPE (95%), during 1 - 4 hours, Concentrations >= 0% - <= 25%	worker inhalation, acute and long term - systemic	0,53mg/m ³	0,01
PROC9	Indoor use., with local exhaust ventilation, with RPE (95%), during 1 - 4 hours, Concentrations >= 0% - <= 25%	Worker - inhalative, short-term - local	0,53mg/m ³	0,01
PROC9	Indoor use., with local exhaust ventilation, with RPE (95%), during 1 - 4 hours, Concentrations >= 0% - <= 25%	Worker - inhalative, long-term - local	0,53mg/m ³	0,04
PROC11	Indoor use., with local exhaust ventilation, with RPE (95%), during 1 - 4 hours, Concentrations >= 0% - <= 25%	worker inhalation, acute and long term - systemic	5,26mg/m ³	0,11

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PROC11	Indoor use., with local exhaust ventilation, with RPE (95%), during 1 - 4 hours, Concentrations >= 0% - <= 25%	Worker - inhalative, short-term - local	5,26mg/m ³	0,15
PROC11	Indoor use., with local exhaust ventilation, with RPE (95%), during 1 - 4 hours, Concentrations >= 0% - <= 25%	Worker - inhalative, long-term - local	5,26mg/m ³	0,38
PROC19	Indoor use., with local exhaust ventilation, with RPE (95%), during 1 - 4 hours, Concentrations >= 0% - <= 25%	worker inhalation, acute and long term - systemic	6,56mg/m ³	0,14
PROC19	Indoor use., with local exhaust ventilation, with RPE (95%), during 1 - 4 hours, Concentrations >= 0% - <= 25%	Worker - inhalative, short-term - local	6,56mg/m ³	0,18
PROC19	Indoor use., with local exhaust ventilation, with RPE (95%), during 1 - 4 hours, Concentrations >= 0% - <= 25%	Worker - inhalative, long-term - local	6,56mg/m ³	0,47

4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario

Environment

The product is not expected to harm the environment when used properly according to directions

Health

Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.

For further information on the assessment method, see: <http://www.ecetoc.org/tra>

Additional good practice advice beyond the REACH Chemical Safety Assessment

Assumes a good basic standard of occupational hygiene is implemented.

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1. Short title of Exposure Scenario 6: Consumer use

Main User Groups	SU 21: Consumer uses: Private households (= general public = consumers)
Chemical product category	PC9a: Coatings and paints, thinners, paint removers PC16: Heat transfer fluids PC35: Washing and cleaning products (including solvent based products) PC39: Cosmetics, personal care products
Environmental Release Categories	ERC8b: Wide dispersive indoor use of reactive substances in open systems ERC8e: Wide dispersive outdoor use of reactive substances in open systems ERC9a: Wide dispersive indoor use of substances in closed systems ERC9b: Wide dispersive outdoor use of substances in closed systems
Activity	Note: this Exposure Scenario is only relevant for an appropriated use according to the quality grade of the substance delivered

2.1 Contributing scenario controlling environmental exposure for: ERC8b, ERC8e, ERC9a, ERC9b

No exposure assessment presented for the environment.

2.2 Contributing scenario controlling consumer exposure for: PC9a, PC39

Product characteristics	Concentration of the Substance in Mixture/Article	Covers concentrations up to 0,15%
	Physical Form (at time of use)	Aqueous solution
Frequency and duration of use	Frequency of use	1 times/month
	Single exposure	
Conditions and measures related to protection of consumer (e.g. behavioural advice, personal protection and hygiene)	Consumer Measures	Wear suitable gloves. Use suitable eye protection.

2.3 Contributing scenario controlling consumer exposure for: PC16

Product characteristics	Concentration of the Substance in Mixture/Article	Covers concentrations up to 0,05%
	Physical Form (at time of use)	Aqueous solution
Frequency and duration of use	Single exposure(Closed system PC16)	
Conditions and measures related to protection of consumer (e.g. behavioural advice, personal protection and hygiene)	Consumer Measures	Wear suitable gloves. Use suitable eye protection.

2.4 Contributing scenario controlling consumer exposure for: PC35

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Product characteristics	Concentration of the Substance in Mixture/Article	Covers concentrations up to 4%
	Physical Form (at time of use)	Aqueous solution
Frequency and duration of use	Frequency of use	1 Times per week
	Single exposure	
Conditions and measures related to protection of consumer (e.g. behavioural advice, personal protection and hygiene)	Consumer Measures	Wear suitable gloves. Use suitable eye protection.

3. Exposure estimation and reference to its source

Environment

No exposure assessment presented for the environment.

Consumers

Consumers

The ConsExpo model has been used to estimate consumer exposures unless otherwise indicated. Predicted exposures are not expected to exceed the applicable exposure limits when the operational conditions/risk management measures given in section 2 are implemented.

4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario

Health

The ConsExpo model has been used to estimate consumer exposures unless otherwise indicated.

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