

# SAFETY DATA SHEET

according to Regulation (EC) No. 1907/2006

## Ammonia

Version 6.0

Revision Date: 26.08.2015

Print Date 26.08.2015

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

#### 1.1 Product identifier

Trade name : Ammonia liquid, pure, Ammonia liquid, technical, Ammonia liquid

Registration number : 01-2119488876-14-0010, 01-2119488876-14-0031, 01-2119488876-14-0020, 01-2119488876-14-0104

Substance name : Ammonia, anhydrous

EC-No. : 231-635-3

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

Use of the Substance/Mixture : Manufacture, Import, Formulation, Distribution, Intermediate, Processing aid, Additive, Laboratory use, Water treatment chemical, Fertilizers, Treatment of gas (NOx and SOx reduction), Heat transfer fluids, Coatings and paints, thinners, paint removers, Washing and cleaning products, Cosmetics, personal care products

#### 1.3 Details of the supplier of the safety data sheet

Supplier : Borealis L.A.T GmbH  
St.-Peter-Strasse 25, 4021 Linz, Austria  
Telephone: +43 732 6915-0

E-mail address : [sds@borealisgroup.com](mailto:sds@borealisgroup.com)

#### 1.4 Emergency telephone number

+44 (0) 1235 239 670 (24h)

### SECTION 2: Hazards identification

#### 2.1 Classification of the substance or mixture

##### Classification (REGULATION (EC) No 1272/2008)

Flammable gases, Category 2	H221: Flammable gas.
Gases under pressure, Compressed gas	H280: Contains gas under pressure; may explode if heated.
Acute toxicity, Category 3	H331: Toxic if inhaled.
Skin corrosion, Category 1B	H314: Causes severe skin burns and eye damage.
Acute aquatic toxicity, Category 1	H400: Very toxic to aquatic life.
Chronic aquatic toxicity, Category 2	H411: Toxic to aquatic life with long lasting effects.

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### 2.2 Label elements

#### Labelling (REGULATION (EC) No 1272/2008)

Hazard pictograms :



Signal word : Danger

Hazard statements : H221 Flammable gas.  
H280 Contains gas under pressure; may explode if heated.  
H331 Toxic if inhaled.  
H314 Causes severe skin burns and eye damage.  
H400 Very toxic to aquatic life.  
H411 Toxic to aquatic life with long lasting effects.

Supplemental Hazard Statements : EUH071 Corrosive to the respiratory tract.

Precautionary statements : **Prevention:**  
P210 Keep away from open flames/hot surfaces.  
- No smoking.  
P260 Do not breathe dust/ fume/ gas/ mist/ vapours/ spray.  
P273 Avoid release to the environment.  
P280 Wear protective gloves/ protective clothing/ eye protection/ face protection.

#### **Response:**

P303 + P361 + P353 IF ON SKIN (or hair): Remove/ Take off immediately all contaminated clothing. Rinse skin with water/ shower.  
P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.  
P304 + P340 IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.  
P310 Immediately call a POISON CENTER or doctor/ physician.

#### **Storage:**

P403 Store in a well-ventilated place.

### 2.3 Other hazards

This substance is not considered to be persistent, bioaccumulating and toxic (PBT).  
This substance is not considered to be very persistent and very bioaccumulating (vPvB).

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### SECTION 3: Composition/information on ingredients

#### 3.1 Substances

Substance name : Ammonia, anhydrous

#### Hazardous components

Chemical Name	CAS-No. EC-No.	Concentration (%)
ammonia, anhydrous	7664-41-7 231-635-3	>= 99,2 - <= 100

### SECTION 4: First aid measures

#### 4.1 Description of first aid measures

General advice : Immediate medical attention is required.  
First aider needs to protect himself.  
Remove from exposure.

If inhaled : Move to fresh air.  
Victim to lie down in the recovery position, cover and keep him warm.  
Oxygen or artificial respiration if needed.

In case of skin contact : Take off contaminated clothing and shoes immediately.  
Wash off immediately with plenty of water.  
If clothing already frozen and stuck to the skin:  
Wash frost-bitten areas with plenty of lukewarm water.  
Immediate medical attention is required.

In case of eye contact : Rinse immediately with plenty of water, also under the eyelids,  
for at least 15 minutes.  
Wash off with:  
Calcium gluconate solution.  
(1%)  
Immediate medical attention is required.

If swallowed : Rinse mouth with water.  
If conscious, make the victim drink the following:  
Calcium gluconate solution.  
(1%)  
Never give anything by mouth to an unconscious person.  
Do NOT induce vomiting.

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

Symptoms : Symptoms of poisoning may not appear for several hours.  
Keep under medical supervision for at least 48 hours.

Skin contact may provoke the following symptoms:  
Frostbite

Inhalation may provoke the following symptoms:  
Risk of delayed pulmonary oedema.

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

Treatment : Treatment with calcium gluconate.  
Treat frost-bitten areas as needed.

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## SECTION 5: Firefighting measures

### 5.1 Extinguishing media

Suitable extinguishing media : Carbon dioxide (CO<sub>2</sub>)  
Dry chemical  
Water spray  
Foam

### 5.2 Special hazards arising from the substance or mixture

Specific hazards during firefighting : Vapours may form explosive mixtures with air.  
Incomplete combustion may produce:  
Nitrogen oxides (NO<sub>x</sub>)

### 5.3 Advice for firefighters

Special protective equipment for firefighters : Personal protection through wearing a tightly closed chemical protection suit and a self-contained breathing apparatus.

Further information : Cool containers/tanks with water spray.  
Collect contaminated fire extinguishing water separately. This must not be discharged into drains.  
Container may explode if heated.

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## SECTION 6: Accidental release measures

### 6.1 Personal precautions, protective equipment and emergency procedures

Personal precautions : Attempt to stop leakage without personal risk.

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Evacuate personnel to safe areas.  
Avoid inhalation of vapour or mist.  
Wear personal protective equipment.  
Ensure adequate ventilation.  
Suppress (knock down) gases/vapours/mists with water spray.

### 6.2 Environmental precautions

Environmental precautions : Prevent further leakage or spillage if safe to do so.  
Prevent product from entering environment and drains.  
Do not flush into surface water or sanitary sewer system.  
Local authorities should be advised if significant spillages cannot be contained.

### 6.3 Methods and material for containment and cleaning up

Methods for cleaning up : Ensure adequate ventilation.

Clean-up methods - small spillage  
Dilute with water.

Clean-up methods - large spillage  
Suitable material for dilution or neutralization  
Mono ammonium phosphate

Large spills should be collected mechanically (remove by pumping) for disposal.  
Keep in suitable, closed containers for disposal.  
Dispose of as hazardous waste in compliance with local and national regulations.

### 6.4 Reference to other sections

For personal protection see section 8.  
For disposal considerations see section 13.

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## SECTION 7: Handling and storage

### 7.1 Precautions for safe handling

Advice on safe handling : Keep container tightly closed.  
Ensure adequate ventilation.  
Handle with care.  
Keep out of the reach of children.  
Easy access to emergency shower and eye wash facility is required.

Wash hands before breaks and immediately after handling the product.  
Keep away from food, drink and animal feedingstuffs.

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Take off contaminated clothing and wash before reuse.  
Avoid contact with skin and eyes.

Advice on protection against fire and explosion : Keep away from sources of ignition - No smoking. To avoid ignition of vapours by static electricity discharge, all metal parts of the equipment must be grounded. Use explosion-proof equipment. The product is flammable but not readily ignited.

### 7.2 Conditions for safe storage, including any incompatibilities

Requirements for storage areas and containers : Keep containers tightly closed in a dry, cool and well-ventilated place. Keep locked up or in an area accessible only to qualified or authorised persons. Suitable materials for containers: Stainless steel

Advice on common storage : Keep away from food, drink and animal feedingstuffs. Do not store together with oxidizing and self-igniting products. Do not store near acids.

### 7.3 Specific end use(s)

Specific use(s) : Not applicable

## SECTION 8: Exposure controls/personal protection

### 8.1 Control parameters

#### Occupational Exposure Limits

Components	CAS-No.	Value type (Form of exposure)	Control parameters	Basis
ammonia, anhydrous	7664-41-7	TWA	20 ppm 14 mg/m <sup>3</sup>	2000/39/EC
Further information	Indicative			
		STEL	50 ppm 36 mg/m <sup>3</sup>	2000/39/EC
Further information	Indicative			

#### DNEL:

#### End Use: Workers

Exposure routes: Inhalation

Potential health effects: Systemic effects, Short- and long-term exposure  
Value: 47,6 mg/m<sup>3</sup>

Potential health effects: Local effects, Long-term exposure

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Value: 14 mg/m<sup>3</sup>

Potential health effects: Local effects, Short-term exposure

Value: 36 mg/m<sup>3</sup>

### End Use: Workers

Exposure routes: Skin contact

Potential health effects: Systemic, Short- and long-term exposure

Value: 68 mg/kg bw/d

Potential health effects: Local effects

Remarks: no data available, (corrosive)

### PNEC:

Fresh water

Value: 0,0011 mg/l

Free ammonia

Marine water

Value: 0,0011 mg/l

Free ammonia

Intermittent use/release

Value: 0,0068 mg/l

Free ammonia

## 8.2 Exposure controls

### Engineering measures

Avoid inhalation of vapour or mist.

Provide adequate ventilation.

### Personal protective equipment

Eye protection : Safety goggles  
Face-shield  
(EN 166)

Hand protection

Material : Viton (R)  
Break through time : 480 min

Material : butyl-rubber  
Break through time : 480 min

Remarks : The selected protective gloves have to satisfy the specifications of EU Directive 89/686/EEC and the standard EN 374 derived from it. Please observe the instructions

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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. Take note of the information given by the producer concerning permeability and break through times, and of special workplace conditions (mechanical strain, duration of contact).

Skin and body protection : Chemical resistant apron  
Butylrubber apron  
Wear butylrubber boots.

Respiratory protection : In the case of vapour formation use a respirator with an approved filter.  
(EN 141)  
(K or ABEK-filter)

Prolonged exposure:  
Lung governed demand self-contained open-circuit compressed air breathing apparatus with full face mask or mouthpiece assembly for escape (EN402)  
Short term exposure

Protective measures : Easy access to emergency shower and eye wash facility is required.

### Environmental exposure controls

General advice : Prevent further leakage or spillage if safe to do so. Prevent product from entering environment and drains. Do not flush into surface water or sanitary sewer system. Local authorities should be advised if significant spillages cannot be contained.

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## SECTION 9: Physical and chemical properties

### 9.1 Information on basic physical and chemical properties

Appearance : Liquefied gas

Colour : colourless

Odour : pungent

Odour Threshold : 5 - 25 ppm

pH : Not applicable (gaseous)



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Melting point	: -77,7 °C (1.013 hPa)
Boiling point	: -33,4 °C (1.013 hPa)
Flash point	: Not applicable, (inorganic)
Evaporation rate	: no data available
Flammability (solid, gas)	: Flammable.
Upper explosion limit	: 25 %(V)
Lower explosion limit	: 16 %(V)
Vapour pressure	: 857 kPa (20 °C)
Relative vapour density	: 0,59 (Air = 1.0)
Density	: 0,689 g/cm <sup>3</sup> (-33 °C, 1.013 hPa)
Solubility(ies)	
Water solubility	: 510 - 531 g/l (20 °C)
Solubility in other solvents	: Alcohol, Ether, Chloroform
Partition coefficient: n-octanol/water	: Not applicable (inorganic)
Auto-ignition temperature	: 651 °C
Decomposition temperature	: no data available
Viscosity	
Viscosity, dynamic	: 0,225 mPa.s (-33 °C)
Explosive properties	: Not explosive
Oxidizing properties	: The substance or mixture is not classified as oxidizing.

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### 9.2 Other information

Molecular weight : 17,03 g/mol

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## SECTION 10: Stability and reactivity

### 10.1 Reactivity

Stable under recommended storage conditions.

### 10.2 Chemical stability

No decomposition if stored and applied as directed.

### 10.3 Possibility of hazardous reactions

Hazardous reactions : Vapours may form explosive mixtures with air.  
Corrosive in contact with metals  
Reacts violently with:  
Strong acids  
Nitrogen oxides (NOx)

### 10.4 Conditions to avoid

Conditions to avoid : Keep away from heat and sources of ignition.

### 10.5 Incompatible materials

Materials to avoid : Copper  
Strong acids  
Lead  
Mercury  
Silver  
Zinc  
gold  
Hypochlorites

### 10.6 Hazardous decomposition products

Hydrogen, Nitrogen oxides (NOx)

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### SECTION 11: Toxicological information

#### 11.1 Information on toxicological effects

##### Acute toxicity

###### Product:

- Acute oral toxicity : LD50 (Rat, male): 350 mg/kg bw  
Method: OECD Test Guideline 401  
Test substance: ammonium hydroxide  
Remarks: Read-across (Analogy)
- Acute inhalation toxicity : LC50 (Rat, male): 9.850 mg/m<sup>3</sup>  
Exposure time: 1 h
- LC50 (Rat, female): 13.770 mg/m<sup>3</sup>  
Exposure time: 1 h
- Acute dermal toxicity : Remarks: study scientifically unjustified  
(corrosive)

##### Skin corrosion/irritation

###### Product:

Species: Rabbit  
Method: OECD Test Guideline 404  
Result: Causes burns.

##### Serious eye damage/eye irritation

###### Product:

Remarks: study scientifically unjustified  
(corrosive)

##### Respiratory or skin sensitisation

###### Product:

Remarks: study scientifically unjustified  
(corrosive)

##### Germ cell mutagenicity

###### Product:

Genotoxicity in vitro : Test Type: Ames test  
Method: OECD Test Guideline 471  
Result: negative

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Remarks: In vitro tests did not show mutagenic effects

Genotoxicity in vivo : Test Type: In vivo micronucleus test  
Species: Mouse  
Method: OECD Test Guideline 474  
Test substance: ammonium chloride  
Remarks: Read-across (Analogy)  
In vivo tests did not show mutagenic effects

### Carcinogenicity

#### Product:

Species: Rat  
Application Route: Oral  
Exposure time: 104 weeks  
Dose: 67 mg/kg bw/d  
Method: OECD Test Guideline 453  
Test substance: Ammonium sulphate  
Remarks: Read-across (Analogy)  
Animal testing did not show any carcinogenic effects.

### Reproductive toxicity

#### Product:

Effects on fertility : Species: Rat  
Application Route: Ingestion  
NOAEL: 408 mg/kg bw/d,  
Method: OECD Test Guideline 422  
Test substance: Diammonium phosphate  
Remarks: Read-across (Analogy)

Effects on foetal development : Species: Rabbit  
Application Route: Oral  
100 mg/kg  
1 mg/kg  
Test substance: Ammonium perchlorate  
Remarks: Read-across (Analogy)

Reproductive toxicity - Assessment : Animal testing did not show any effects on fertility.  
Animal testing did not show any effects on foetal development.

### STOT - single exposure

#### Product:

Assessment: May cause respiratory irritation.

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### STOT - repeated exposure

#### Product:

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

#### Product:

Species: Rat  
68 mg/kg bw/d  
Application Route: Oral  
Exposure time: 35 d  
Method: OECD Test Guideline 422  
Test substance: Diammonium phosphate  
Remarks: Read-across (Analogy)

Species: Rat, male  
Application Route: Inhalation  
Exposure time: 50 d

### Aspiration toxicity

#### Product:

No aspiration toxicity classification

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## SECTION 12: Ecological information

### 12.1 Toxicity

#### Product:

Toxicity to fish : LC50 (pink salmon (*Oncorhynchus gorbuscha*)): 0,068 mg NH3/l  
Exposure time: 96 h  
Test Type: Short term  
Test substance: Ammonium sulphate  
Remarks: Read-across (Analogy)  
Fresh water

Toxicity to daphnia and other aquatic invertebrates : LC50 (*Daphnia magna* (Water flea)): 101 mg NH3/l  
Exposure time: 48 h  
Test Type: Short term  
Method: ASTM E 729-80

Toxicity to algae : EC50 (*Chlorella vulgaris* (Fresh water algae)): 2700 mg NH3/l

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	Exposure time: 18 d
	Test Type: static test
	Test substance: Ammonium sulphate
	Remarks: Read-across (Analogy)
Toxicity to fish (Chronic toxicity)	: LOEC: 0,022 mg NH <sub>3</sub> /l Exposure time: 73 d Species: Oncorhynchus mykiss (rainbow trout) Test Type: flow-through test Test substance: ammonium chloride Remarks: Read-across (Analogy) Fresh water
Toxicity to daphnia and other aquatic invertebrates (Chronic toxicity)	: NOEC: 0,79 mg NH <sub>3</sub> /l Exposure time: 96 h Species: Daphnia magna (Water flea) Test Type: flow-through test Test substance: ammonium chloride Method: EPA OPPTS 850.1300 Remarks: Read-across (Analogy) Fresh water
Ecotoxicology Assessment Acute aquatic toxicity	: Very toxic to aquatic life.
Chronic aquatic toxicity	: Toxic to aquatic life with long lasting effects.

### 12.2 Persistence and degradability

#### Product:

Biodegradability : Remarks: Degradation in water:  
Readily biodegradable

### 12.3 Bioaccumulative potential

#### Product:

Bioaccumulation : Remarks: Does not bioaccumulate.

### 12.4 Mobility in soil

#### Product:

Mobility : Remarks: After release, adsorbs onto soil.

### 12.5 Results of PBT and vPvB assessment

#### Product:

Assessment : This substance is not considered to be persistent,

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bioaccumulating and toxic (PBT).. This substance is not considered to be very persistent and very bioaccumulating (vPvB)..

### 12.6 Other adverse effects

#### **Product:**

Additional ecological information

: Remarks: Very toxic to aquatic life.  
Toxic to aquatic life with long lasting effects.  
In the aqueous environment, ammonia is present predominantly as ammonium ion (NH<sub>4</sub><sup>+</sup>) or as ammonia (NH<sub>3</sub>); the relative proportions are dependent on pH. Toxicity to aquatic organisms is attributed to un-ionised ammonia (NH<sub>3</sub>).  
Do not allow product to reach ground water, water bodies or sewage system.

## SECTION 13: Disposal considerations

### 13.1 Waste treatment methods

Product : Dispose of as hazardous waste in compliance with local and national regulations.  
Do not dispose of together with household waste.  
Do not allow product to reach ground water, water bodies or sewage system.

European waste code:  
06 02 03 (ammonium hydroxide)

Contaminated packaging : Empty remaining contents.  
Dispose of contents/ container to an approved waste disposal plant.

## SECTION 14: Transport information

### 14.1 UN number

ADR : UN 1005  
IMDG : UN 1005

### 14.2 UN proper shipping name

ADR : AMMONIA, ANHYDROUS

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**IMDG** : AMMONIA, ANHYDROUS

### 14.3 Transport hazard class(es)

**ADR** : 2  
**IMDG** : 2.3  
Subsidiary hazard class : 8

### 14.4 Packing group

**ADR**  
Packing group : Not assigned by regulation  
Hazard Identification Number : 268  
**Labels** : 2.3 (8)  
Tunnel restriction code : C/D  
**IMDG**  
Packing group : Not assigned by regulation  
**EmS Code** : F-C, S-U

### 14.5 Environmental hazards

**ADR**  
Environmentally hazardous : yes

**IMDG**  
Marine pollutant : yes

### 14.6 Special precautions for user

Remarks : No specific instructions needed.

### 14.7 Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code

Remarks : Not applicable  
Bulk shipping (gas):, Ammonia, anhydrous  
Ship type : 2P/2G

## SECTION 15: Regulatory information

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

Seveso III: Directive 2012/18/EU of the European Parliament and of the Council on the control of major-accident hazards involving dangerous substances.

Category		Quantity 1	Quantity 2
P2	FLAMMABLE GASES	10 t	50 t
E1	ENVIRONMENTAL	100 t	200 t



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HAZARDS  
Anhydrous Ammonia 50 t 200 t

Other regulations : Take note of Dir 94/33/EC on the protection of young people at work.

### 15.2 Chemical Safety Assessment

A Chemical Safety Assessment has been carried out for this substance.

## SECTION 16: Other information

### Further information

- Training advice : Provide adequate information, instruction and training for operators., Regular trainings of all employees which are involved in the transport of dangerous goods (according to chapter 1.3 ADR).
- Other information : Issued according to Regulation (EC) No 1907/2006, Annex II, and its amendments.  
Changes since the last version are highlighted in the margin.  
This version replaces all previous versions.
- Issuer : Borealis, Group Product Stewardship / Maarit Vakkala
- Sources of key data used to compile the Safety Data Sheet : Chemical Safety Report, Anhydrous Ammonia. FARM REACH Consortium, 2012

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### Disclaimer

To the best of our knowledge, the information contained herein is accurate and reliable as of the date of publication; however we do not assume any liability whatsoever for the accuracy and completeness of such information.

**Borealis makes no warranties which extend beyond the description contained herein. Nothing herein shall constitute any warranty of merchantability or fitness for a particular purpose.**

**It is the customer's responsibility to inspect and test our products in order to satisfy itself as to the suitability of the products for the customer's particular purpose. The customer is responsible for the appropriate, safe and legal use, processing and handling of our products.**

No liability can be accepted in respect of the use of Borealis' products in conjunction with other materials. The information contained herein relates exclusively to our products when not used in conjunction with any third party materials.

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### Identified uses:

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#### Use: Manufacture, (Manufacture / Import)

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- Main User Groups : **SU 3:** Industrial uses: Uses of substances as such or in preparations at industrial sites
- Process categories : **PROC1:** Use in closed process, no likelihood of exposure  
**PROC2:** Use in closed, continuous process with occasional controlled exposure  
**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

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#### Use: Distribution, Formulation, (Formulation of aqueous solution, Distribution, heat transfer fluid (e.g refrigeration, cooling/heating systems))

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- Process categories : **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)  
**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
- Environmental Release Categories : **ERC2:** Formulation of preparations

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#### Use: Industrial use, Use as an intermediate, (Intermediate)

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**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)  
**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
- Environmental Release Categories : **ERC6a:** Industrial use resulting in manufacture of another substance (use of intermediates)

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**Use:** Industrial use, Processing aid, an auxiliary agent in different processes, (Processing aid, additive, coatings and paints, thinners, paint removers, treatment of gas (NO<sub>x</sub> and SO<sub>x</sub> reduction), water treatment chemical, washing and cleaning products, cosmetics, personal care products)

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**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)  
**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)  
**PROC13:** Treatment of articles by dipping and pouring

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Environmental Release Categories : **ERC4, ERC5, ERC6b, ERC7:** Industrial use of processing aids in processes and products, not becoming part of articles, Industrial use resulting in inclusion into or onto a matrix, Industrial use of reactive processing aids, Industrial use of substances in closed systems

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**Use: Professional use, Wide-dispersive uses, (Formulation of mixtures, heat transfer fluid (e.g refrigeration, cooling/heating systems), water treatment chemical, washing and cleaning products, processing aid, additive, coatings and paints, thinners, paint removers, laboratory use, fertilizers), Manufacture**

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Main User Groups : **SU 22:** Professional uses: Public domain (administration, education, entertainment, services, craftsmen)

Process categories : **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)  
**PROC13:** Treatment of articles by dipping and pouring  
**PROC15:** Use as laboratory reagent  
**PROC20:** Heat and pressure transfer fluids in dispersive, professional use but closed systems

Environmental Release Categories : **ERC8b, ERC8e, ERC8f, ERC9a, ERC9b:** Wide dispersive indoor use of reactive substances in open systems, Wide dispersive outdoor use of reactive substances in open systems, Wide dispersive outdoor use resulting in inclusion into or onto a matrix, Wide dispersive indoor use of substances in closed systems, Wide dispersive outdoor use of substances in closed systems

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**Use: Consumer use, Wide-dispersive uses, (<25% aqueous solution)**

- 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  
**PC31:** Polishes and wax blends  
**PC35:** Washing and cleaning products (including solvent based products)  
**PC39:** Cosmetics, personal care products
- Environmental Release Categories : **ERC8b, ERC8e, ERC9a, ERC9b:** Wide dispersive indoor use of reactive substances in open systems, Wide dispersive outdoor use of reactive substances in open systems, Wide dispersive indoor use of substances in closed systems, Wide dispersive outdoor use of substances in closed systems

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### 1. Short title of Exposure Scenario: Manufacture, (Manufacture / Import)

Main User Groups : **SU 3:** Industrial uses: Uses of substances as such or in preparations at industrial sites

Process categories : **PROC1:** Use in closed process, no likelihood of exposure  
**PROC2:** Use in closed, continuous process with occasional controlled exposure  
**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

### 2.1 Contributing scenario controlling environmental exposure for: ERC1: Manufacture of substances

#### Amount used

Annual amount per site : 950,000 ton(s)/year

#### Other given operational conditions affecting environmental exposure

Number of emission days per year : 330  
Release to air: : 36,1 mg/m<sup>3</sup>

#### Technical conditions and measures / Organizational measures

Remarks : On-site wastewater treatment required., Efficient removal (~100%) of ammonia in STP by nitrification to nitrate followed by denitrification resulting in the release of nitrogen gas., Sludges from on-site effluent treatment:, Can be landfilled or incinerated, when in compliance with local regulations.

### 2.2 Contributing scenario controlling worker exposure for: General measures PROC1, PROC2, PROC8b, PROC15: Use in closed process, no likelihood of exposure, Use in closed, continuous process with occasional controlled exposure, Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at dedicated facilities, Use as laboratory reagent

#### Product characteristics

Concentration of the Substance in Mixture/Article : Covers concentrations up to 100%.

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Physical Form (at time of use) : gaseous

### Frequency and duration of use

Frequency of use : 220 days/year

Remarks : Covers daily exposures up to 12 hours (unless stated differently).

### Human factors not influenced by risk management

Dermal exposure : Palms of both hands (480 cm<sup>2</sup>)

Breathing volume : 20 m<sup>3</sup>/day

### Technical conditions and measures

Provide a good standard of general or controlled ventilation. Handle substance within a closed system. Automate activity where possible.

### Organisational measures to prevent /limit releases, dispersion and exposure

Ensure operatives are trained to minimise exposures., Regularly inspect, test and maintain all control measures.

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

Where there is potential for exposure:, Wear personal protective equipment.

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## 2.3 Contributing scenario controlling worker exposure for: PROC1: Use in closed process, no likelihood of exposure

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Remarks : See 2.2 "Contributing scenario controlling worker exposure for: General measures"

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## 2.4 Contributing scenario controlling worker exposure for: PROC2: Use in closed, continuous process with occasional controlled exposure

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### Technical conditions and measures

Sample via a closed loop or other system to avoid exposure. Ensure samples are obtained under containment or extract ventilation. Segregate the activity away from other operations.

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## 2.5 Contributing scenario controlling worker exposure for: PROC8b: Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at dedicated facilities

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### Technical conditions and measures

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Ensure material transfers are under containment or extract ventilation.

### 2.6 Contributing scenario controlling worker exposure for: PROC15: Use as laboratory reagent

#### Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

#### Technical conditions and measures

Provide a good standard of general ventilation. Natural ventilation is from doors, windows etc. Controlled ventilation means air is supplied or removed by a powered fan.

### 3. Exposure estimation and reference to its source

#### Environment

Contributing Scenario	Exposure Assessment Method	Specific conditions	Compartment	Value type	Level of Exposure	RCR
ERC1	EUSES	Free ammonia	Fresh water		0,133µg/l	0,121
Remarks:		LEV = Local Exhaust Ventilation. RPE = Respiratory Protective Equipment.				
		Free ammonia	Marine water		0,0315µg/l	0,029

#### Workers

Contributing Scenario	Exposure Assessment Method	Specific conditions	Value type	Level of Exposure	RCR
PROC1	ECETOC TRA	Outdoor, Systemic	Dermal	0,34 mg/kg bw/d	0,005
	ECETOC TRA	Outdoor, Systemic	Inhalation	< 0,01 mg/m <sup>3</sup>	< 0,001
		Outdoor, Acute - local effects, Chronic - local effects	Inhalation	< 0,01 mg/m <sup>3</sup>	< 0,01
PROC2	ECETOC TRA	Outdoor, Systemic	Dermal	1,37 mg/kg bw/d	0,02
		Indoor with LEV, Systemic	Dermal	0,14 mg/kg bw/d	0,002
	ECETOC TRA	Outdoor, Systemic	Inhalation	< 24,79 mg/m <sup>3</sup>	< 0,52
		Outdoor, Acute - local effects	Inhalation	< 24,79 mg/m <sup>3</sup>	< 0,69
		Outdoor, Chronic - local effects, With RPE (95% efficiency)	Inhalation	< 1,24 mg/m <sup>3</sup>	< 0,09
		Indoor with LEV, Systemic	Inhalation	< 3,54 mg/m <sup>3</sup>	< 0,07

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		Indoor with LEV, Acute - local effects	Inhalation	< 3,54 mg/m <sup>3</sup>	< 0,10
		Indoor with LEV, Chronic - local effects	Inhalation	< 3,54 mg/m <sup>3</sup>	< 0,25
PROC8b	ECETOC TRA	Outdoor, Systemic	Dermal	6,86 mg/kg bw/d	0,101
		Indoor with LEV, Systemic	Dermal	0,69 mg/kg bw/d	0,01
	ECETOC TRA	Outdoor, Systemic, With RPE (95% efficiency)	Inhalation	< 3,72 mg/m <sup>3</sup>	< 0,08
		Outdoor, Acute - local effects, With RPE (95% efficiency)	Inhalation	< 3,72 mg/m <sup>3</sup>	< 0,10
		Outdoor, Chronic - local effects, With RPE (95% efficiency)	Inhalation	< 3,72 mg/m <sup>3</sup>	< 0,27
		Indoor with LEV, Systemic	Inhalation	< 3,19 mg/m <sup>3</sup>	< 0,07
		Indoor with LEV, Acute - local effects	Inhalation	< 3,19 mg/m <sup>3</sup>	< 0,09
		Indoor with LEV, Chronic - local effects	Inhalation	< 3,19 mg/m <sup>3</sup>	< 0,23
PROC15	ECETOC TRA	Indoor without LEV, Systemic	Dermal	0,34 mg/kg bw/d	0,005
		Indoor with LEV, Systemic	Dermal	0,03 mg/kg bw/d	0,001
	ECETOC TRA	Indoor without LEV, Systemic	Inhalation	< 35,42 mg/m <sup>3</sup>	< 0,74
		Indoor without LEV, Acute - local effects	Inhalation	< 35,42 mg/m <sup>3</sup>	< 0,98
		Indoor without LEV, Chronic - local effects, With RPE (95% efficiency)	Inhalation	< 1,77 mg/m <sup>3</sup>	< 0,13
		Indoor with LEV, Systemic	Inhalation	< 3,54 mg/m <sup>3</sup>	< 0,07
		Indoor with LEV, Acute - local effects	Inhalation	< 3,54 mg/m <sup>3</sup>	< 0,10
		Indoor with LEV, Chronic - local effects	Inhalation	< 3,54 mg/m <sup>3</sup>	< 0,25

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

The safety data sheet at hand provides the user with risk management measures and operational conditions which enables him to work safely with the substance / mixture. If other risk management

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measures / operational conditions are adopted, the user has to ensure, that the risks are managed to at least equivalent levels.

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### 1. Short title of Exposure Scenario: Distribution, Formulation, (Formulation of aqueous solution, Distribution, heat transfer fluid (e.g refrigeration, cooling/heating systems))

Main User Groups	: <b>SU 3:</b> Industrial uses: Uses of substances as such or in preparations at industrial sites
Process categories	: <b>PROC1:</b> Use in closed process, no likelihood of exposure <b>PROC2:</b> Use in closed, continuous process with occasional controlled exposure <b>PROC3:</b> Use in closed batch process (synthesis or formulation) <b>PROC5:</b> Mixing or blending in batch processes for formulation of preparations and articles (multistage and/ or significant contact) <b>PROC8a:</b> Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at non-dedicated facilities <b>PROC8b:</b> Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at dedicated facilities <b>PROC9:</b> Transfer of substance or preparation into small containers (dedicated filling line, including weighing) <b>PROC15:</b> Use as laboratory reagent
Environmental Release Categories	: <b>ERC2:</b> Formulation of preparations

### 2.1 Contributing scenario controlling environmental exposure for: ERC2: Formulation of preparations

#### Amount used

Annual amount per site : 1000,000 ton(s)/year

#### Other given operational conditions affecting environmental exposure

Number of emission days per year : 330  
Release to air: : 19 mg/m<sup>3</sup>

#### Technical conditions and measures / Organizational measures

Remarks : On-site wastewater treatment required., Efficient removal (~100%) of ammonia in STP by nitrification to nitrate followed by denitrification resulting in the release of nitrogen gas., Sludges from on-site effluent treatment:, Can be landfilled or incinerated, when in compliance with local regulations.

### 2.2 Contributing scenario controlling worker exposure for: General measures

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**PROC1, PROC2, PROC3, PROC5, PROC8a, PROC8b, PROC9, PROC15: Use in closed process, no likelihood of exposure, Use in closed, continuous process with occasional controlled exposure, Use in closed batch process (synthesis or formulation), Mixing or blending in batch processes for formulation of preparations and articles (multistage and/ or significant contact), Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at non-dedicated facilities, Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at dedicated facilities, Transfer of substance or preparation into small containers (dedicated filling line, including weighing), Use as laboratory reagent**

### Product characteristics

Concentration of the Substance in Mixture/Article : Covers concentrations up to 100%.

Physical Form (at time of use) : Liquefied gas

### Frequency and duration of use

Frequency of use : 220 days/year

Remarks : Covers daily exposures up to 12 hours (unless stated differently).

### Human factors not influenced by risk management

Dermal exposure : Palms of both hands (480 cm<sup>2</sup>)

Breathing volume : 20 m<sup>3</sup>/day

### Technical conditions and measures

Provide a good standard of general or controlled ventilation. Handle substance within a closed system. Automate activity where possible.

### Organisational measures to prevent /limit releases, dispersion and exposure

Ensure operatives are trained to minimise exposures., Regularly inspect, test and maintain all control measures.

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

Where there is potential for exposure:, Wear personal protective equipment.

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## 2.3 Contributing scenario controlling worker exposure for: PROC1: Use in closed process, no likelihood of exposure

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Remarks : See 2.2 "Contributing scenario controlling worker exposure for: General measures"

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### 2.4 Contributing scenario controlling worker exposure for: PROC2: Use in closed, continuous process with occasional controlled exposure

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#### Technical conditions and measures

Sample via a closed loop or other system to avoid exposure. Ensure samples are obtained under containment or extract ventilation. Segregate the activity away from other operations.

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### 2.5 Contributing scenario controlling worker exposure for: PROC3: Use in closed batch process (synthesis or formulation)

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Remarks : See 2.2 "Contributing scenario controlling worker exposure for: General measures"

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### 2.6 Contributing scenario controlling worker exposure for: PROC5: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/ or significant contact)

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Remarks : See 2.2 "Contributing scenario controlling worker exposure for: General measures"

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### 2.7 Contributing scenario controlling worker exposure for: PROC8a, PROC8b: Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at non-dedicated facilities, Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at dedicated facilities

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#### Technical conditions and measures

Ensure material transfers are under containment or extract ventilation.

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### 2.8 Contributing scenario controlling worker exposure for: PROC9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing)

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#### Technical conditions and measures

Ensure material transfers are under containment or extract ventilation. Keep container tightly closed.

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### 2.9 Contributing scenario controlling worker exposure for: PROC15: Use as laboratory reagent

#### Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

#### Technical conditions and measures

Provide a good standard of general ventilation. Natural ventilation is from doors, windows etc. Controlled ventilation means air is supplied or removed by a powered fan.

### 3. Exposure estimation and reference to its source

#### Environment

Contributing Scenario	Exposure Assessment Method	Specific conditions	Compartment	Value type	Level of Exposure	RCR
ERC2	EUSES	Free ammonia	Fresh water		0,0497µg/l	0,045
Remarks:		LEV = Local Exhaust Ventilation. RPE = Respiratory Protective Equipment.				
		Free ammonia	Marine water		0,0120µg/l	0,011

#### Workers

Contributing Scenario	Exposure Assessment Method	Specific conditions	Value type	Level of Exposure	RCR
PROC1	ECETOC TRA	Outdoor, Systemic	Dermal	0,34 mg/kg bw/d	0,005
	ECETOC TRA	Outdoor, Systemic, Acute - local effects, Chronic - local effects	Inhalation	< 0,01 mg/m <sup>3</sup>	< 0,01
PROC2	ECETOC TRA	Outdoor, Systemic	Dermal	1,37 mg/kg bw/d	0,02
		Indoor with LEV, Systemic	Dermal	0,14 mg/kg bw/d	0,002
	ECETOC TRA	Outdoor, Systemic	Inhalation	< 24,79 mg/m <sup>3</sup>	< 0,52
		Outdoor, Acute - local effects	Inhalation	< 24,79 mg/m <sup>3</sup>	< 0,69
		Outdoor, Chronic - local effects, With RPE (95% efficiency)	Inhalation	< 1,24 mg/m <sup>3</sup>	< 0,09
		Indoor with LEV, Systemic	Inhalation	< 3,54 mg/m <sup>3</sup>	< 0,07
		Indoor with LEV, Acute - local effects	Inhalation	< 3,54 mg/m <sup>3</sup>	< 0,10
		Indoor with LEV, Chronic - local effects	Inhalation	< 3,54 mg/m <sup>3</sup>	< 0,25

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PROC3	ECETOC TRA	Outdoor, Systemic	Dermal	0,34 mg/kg bw/d	0,005
		Indoor with LEV, Systemic	Dermal	0,03 mg/kg bw/d	0,001
	ECETOC TRA	Outdoor, Systemic, With RPE (95% efficiency)	Inhalation	< 2,48 mg/m <sup>3</sup>	< 0,05
		Outdoor, Acute - local effects, With RPE (95% efficiency)	Inhalation	< 2,48 mg/m <sup>3</sup>	< 0,07
		Outdoor, Chronic - local effects, With RPE (95% efficiency)	Inhalation	< 2,48 mg/m <sup>3</sup>	< 0,18
		Indoor with LEV, Systemic	Inhalation	< 7,08 mg/m <sup>3</sup>	< 0,15
		Indoor with LEV, Acute - local effects	Inhalation	< 7,08 mg/m <sup>3</sup>	< 0,20
		Indoor with LEV, Chronic - local effects	Inhalation	< 7,08 mg/m <sup>3</sup>	< 0,51
PROC5	ECETOC TRA	Outdoor, Systemic	Dermal	13,71 mg/kg bw/d	0,202
		Indoor with LEV, Systemic	Dermal	0,07 mg/kg bw/d	0,001
	ECETOC TRA	Outdoor, Systemic, With RPE (95% efficiency)	Inhalation	< 6,20 mg/m <sup>3</sup>	< 0,13
		Outdoor, Acute - local effects, With RPE (95% efficiency)	Inhalation	< 6,20 mg/m <sup>3</sup>	< 0,17
		Outdoor, Chronic - local effects, With RPE (95% efficiency)	Inhalation	< 6,20 mg/m <sup>3</sup>	< 0,44
		Indoor with LEV, Systemic	Inhalation	< 17,71 mg/m <sup>3</sup>	< 0,37
		Indoor with LEV, Acute - local effects	Inhalation	< 17,71 mg/m <sup>3</sup>	< 0,49
		Indoor with LEV, Chronic - local effects, With RPE (95% efficiency)	Inhalation	< 0,89 mg/m <sup>3</sup>	< 0,06
PROC8a	ECETOC TRA	Outdoor, Systemic, With gloves (90% protection)	Dermal	13,71 mg/kg bw/d	0,202
		Indoor with LEV, Systemic	Dermal	0,14 mg/kg bw/d	0,002
	ECETOC TRA	Outdoor, Systemic, With RPE (95% efficiency)	Inhalation	< 6,20 mg/m <sup>3</sup>	< 0,13
		Outdoor, Acute - local effects, With RPE (95% efficiency)	Inhalation	< 6,20 mg/m <sup>3</sup>	< 0,17
		Outdoor, Chronic - local effects, With RPE (95% efficiency)	Inhalation	< 6,20 mg/m <sup>3</sup>	< 0,44



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		Indoor with LEV, Systemic	Inhalation	< 17,71 mg/m <sup>3</sup>	< 0,37
		Indoor with LEV, Acute - local effects	Inhalation	< 17,71 mg/m <sup>3</sup>	< 0,49
		Indoor with LEV, Chronic - local effects, With RPE (95% efficiency)	Inhalation	< 0,89 mg/m <sup>3</sup>	< 0,06
PROC8b	ECETOC TRA	Outdoor, Systemic, With gloves (90% protection)	Dermal	0,69 mg/kg bw/d	0,101
		Indoor with LEV, Systemic	Dermal	0,69 mg/kg bw/d	0,01
	ECETOC TRA	Outdoor, Systemic, With RPE (95% efficiency)	Inhalation	< 3,72 mg/m <sup>3</sup>	< 0,08
		Outdoor, Acute - local effects, With RPE (95% efficiency)	Inhalation	< 3,72 mg/m <sup>3</sup>	< 0,10
		Outdoor, Chronic - local effects, With RPE (95% efficiency)	Inhalation	< 3,72 mg/m <sup>3</sup>	< 0,27
		Indoor with LEV, Systemic	Inhalation	< 3,19 mg/m <sup>3</sup>	< 0,07
		Indoor with LEV, Acute - local effects	Inhalation	< 3,19 mg/m <sup>3</sup>	< 0,09
		Indoor with LEV, Chronic - local effects	Inhalation	< 3,19 mg/m <sup>3</sup>	< 0,23
PROC9	ECETOC TRA	Outdoor, Indoor without LEV	Dermal	6,86 mg/kg bw/day	0,101
		Indoor with LEV	Dermal	0,69 mg/kg bw/day	0,01
	ECETOC TRA	Outdoor, Systemic, With RPE (95% efficiency)	Inhalation	< 4,96 mg/m <sup>3</sup>	< 0,10
		Outdoor, Acute - local effects, With RPE (95% efficiency)	Inhalation	< 4,96 mg/m <sup>3</sup>	< 0,14
		Outdoor, Chronic - local effects, With RPE (95% efficiency)	Inhalation	< 4,96 mg/m <sup>3</sup>	< 0,35
		Indoor with LEV, Systemic	Inhalation	< 14,17 mg/m <sup>3</sup>	< 0,30
		Indoor with LEV, Acute - local effects	Inhalation	< 14,17 mg/m <sup>3</sup>	< 0,39
		Indoor with LEV, Chronic - local effects, With RPE (95% efficiency)	Inhalation	< 0,71 mg/m <sup>3</sup>	< 0,05
PROC15	ECETOC TRA	Indoor without LEV, Systemic	Dermal	0,34 mg/kg bw/d	0,005
		Indoor with LEV, Systemic	Dermal	0,03 mg/kg bw/d	0,001

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	ECETOC TRA	Indoor without LEV, Systemic	Inhalation	< 35,42 mg/m <sup>3</sup>	< 0,74
		Indoor without LEV, Acute - local effects	Inhalation	< 35,42 mg/m <sup>3</sup>	< 0,98
		Indoor without LEV, Chronic - local effects, With RPE (95% efficiency)	Inhalation	< 1,77 mg/m <sup>3</sup>	< 0,13
		Indoor with LEV, Systemic	Inhalation	< 3,54 mg/m <sup>3</sup>	< 0,07
		Indoor with LEV, Acute - local effects	Inhalation	< 3,54 mg/m <sup>3</sup>	< 0,10
		Indoor with LEV, Chronic - local effects	Inhalation	< 3,54 mg/m <sup>3</sup>	< 0,25

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

The safety data sheet at hand provides the user with risk management measures and operational conditions which enables him to work safely with the substance / mixture. If other risk management measures / operational conditions are adopted, the user has to ensure, that the risks are managed to at least equivalent levels.

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### 1. Short title of Exposure Scenario: Industrial use, Use as an intermediate, (Intermediate)

Main User Groups	: <b>SU 3:</b> Industrial uses: Uses of substances as such or in preparations at industrial sites
Process categories	: <b>PROC1:</b> Use in closed process, no likelihood of exposure <b>PROC2:</b> Use in closed, continuous process with occasional controlled exposure <b>PROC3:</b> Use in closed batch process (synthesis or formulation) <b>PROC4:</b> Use in batch and other process (synthesis) where opportunity for exposure arises <b>PROC5:</b> Mixing or blending in batch processes for formulation of preparations and articles (multistage and/ or significant contact) <b>PROC8b:</b> Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at dedicated facilities <b>PROC9:</b> Transfer of substance or preparation into small containers (dedicated filling line, including weighing) <b>PROC15:</b> Use as laboratory reagent
Environmental Release Categories	: <b>ERC6a:</b> Industrial use resulting in manufacture of another substance (use of intermediates)

### 2.1 Contributing scenario controlling environmental exposure for: ERC6a: Industrial use resulting in manufacture of another substance (use of intermediates)

#### Amount used

Annual amount per site : 800,000 ton(s)/year

#### Other given operational conditions affecting environmental exposure

Number of emission days per year : 330  
Release to air: : 30,5 mg/m<sup>3</sup>

#### Technical conditions and measures / Organizational measures

Remarks : On-site wastewater treatment required., Efficient removal (~100%) of ammonia in STP by nitrification to nitrate followed by denitrification resulting in the release of nitrogen gas., Sludges from on-site effluent treatment:, Can be landfilled or incinerated, when in compliance with local regulations.

### 2.2 Contributing scenario controlling worker exposure for: General measures

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**PROC1, PROC2, PROC3, PROC4, PROC5, PROC8b, PROC9, PROC15: Use in closed process, no likelihood of exposure, Use in closed, continuous process with occasional controlled exposure, Use in closed batch process (synthesis or formulation), Use in batch and other process (synthesis) where opportunity for exposure arises, Mixing or blending in batch processes for formulation of preparations and articles (multistage and/ or significant contact), Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at dedicated facilities, Transfer of substance or preparation into small containers (dedicated filling line, including weighing), Use as laboratory reagent**

### Product characteristics

Concentration of the Substance in Mixture/Article : Covers concentrations up to 100%.

Physical Form (at time of use) : Liquefied gas

### Frequency and duration of use

Frequency of use : 220 days/year  
Remarks : Covers daily exposures up to 12 hours (unless stated differently).

### Human factors not influenced by risk management

Dermal exposure : Palms of both hands (480 cm<sup>2</sup>)  
Breathing volume : 20 m<sup>3</sup>/day

### Technical conditions and measures

Provide a good standard of general or controlled ventilation. Handle substance within a closed system. Store substance within a closed system. Transfer via enclosed lines. Automate activity where possible.

### Organisational measures to prevent /limit releases, dispersion and exposure

Ensure operatives are trained to minimise exposures., Regularly inspect, test and maintain all control measures.

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

Where there is potential for exposure:, Wear personal protective equipment.

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### 2.3 Contributing scenario controlling worker exposure for: PROC1: Use in closed process, no likelihood of exposure

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Remarks : See 2.2 "Contributing scenario controlling worker exposure for: General measures"

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### 2.4 Contributing scenario controlling worker exposure for: PROC2: Use in closed, continuous process with occasional controlled exposure

#### Technical conditions and measures

Sample via a closed loop or other system to avoid exposure. Ensure samples are obtained under containment or extract ventilation. Segregate the activity away from other operations.

### 2.5 Contributing scenario controlling worker exposure for: PROC3, PROC4: Use in closed batch process (synthesis or formulation), Use in batch and other process (synthesis) where opportunity for exposure arises

Remarks : See 2.2 "Contributing scenario controlling worker exposure for: General measures"

### 2.6 Contributing scenario controlling worker exposure for: PROC5: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/ or significant contact)

Remarks : See 2.2 "Contributing scenario controlling worker exposure for: General measures"

### 2.7 Contributing scenario controlling worker exposure for: PROC8b: Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at dedicated facilities

#### Technical conditions and measures

Ensure material transfers are under containment or extract ventilation.

### 2.8 Contributing scenario controlling worker exposure for: PROC9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing)

#### Technical conditions and measures

Ensure material transfers are under containment or extract ventilation. Keep container tightly closed.

### 2.9 Contributing scenario controlling worker exposure for: PROC15: Use as laboratory reagent

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### Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

### Technical conditions and measures

Provide a good standard of general ventilation. Natural ventilation is from doors, windows etc. Controlled ventilation means air is supplied or removed by a powered fan.

## 3. Exposure estimation and reference to its source

### Environment

Contributing Scenario	Exposure Assessment Method	Specific conditions	Compartment	Value type	Level of Exposure	RCR
ERC6a	EUSES	Free ammonia	Fresh water		0,0837µg/l	0,076
Remarks:		LEV = Local Exhaust Ventilation. RPE = Respiratory Protective Equipment.				
		Free ammonia	Marine water		0,0205µg/l	0,019

### Workers

Contributing Scenario	Exposure Assessment Method	Specific conditions	Value type	Level of Exposure	RCR
PROC1	ECETOC TRA	Outdoor, Systemic	Dermal	0,34 mg/kg bw/d	0,005
	ECETOC TRA	Outdoor, Systemic, Acute - local effects, Chronic - local effects	Inhalation	< 0,01 mg/m <sup>3</sup>	< 0,01
PROC2	ECETOC TRA	Outdoor, Systemic	Dermal	1,37 mg/kg bw/d	0,02
		Indoor with LEV, Systemic	Dermal	0,14 mg/kg bw/d	0,002
	ECETOC TRA	Outdoor, Systemic	Inhalation	< 24,79 mg/m <sup>3</sup>	< 0,52
		Outdoor, Acute - local effects	Inhalation	< 24,79 mg/m <sup>3</sup>	< 0,69
		Outdoor, Chronic - local effects, With RPE (95% efficiency)	Inhalation	< 1,24 mg/m <sup>3</sup>	< 0,09
		Indoor with LEV, Systemic	Inhalation	< 3,54 mg/m <sup>3</sup>	< 0,07
		Indoor with LEV, Acute - local effects	Inhalation	< 3,54 mg/m <sup>3</sup>	< 0,10
		Indoor with LEV, Chronic - local effects	Inhalation	< 3,54 mg/m <sup>3</sup>	< 0,25
PROC3	ECETOC TRA	Outdoor, Systemic	Dermal	0,34 mg/kg bw/d	0,005
		Indoor with LEV, Systemic	Dermal	0,03 mg/kg bw/d	0,001
PROC4	ECETOC TRA	Outdoor, Systemic	Dermal	6,86 mg/kg bw/d	0,101

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		Indoor with LEV, Systemic	Dermal	0,69 mg/kg bw/d	0,01
PROC3, PROC4	ECETOC TRA	Outdoor, Systemic, With RPE (95% efficiency)	Inhalation	< 2,48 mg/m <sup>3</sup>	< 0,05
		Outdoor, Acute - local effects, With RPE (95% efficiency)	Inhalation	< 2,48 mg/m <sup>3</sup>	< 0,07
		Outdoor, Chronic - local effects, With RPE (95% efficiency)	Inhalation	< 2,48 mg/m <sup>3</sup>	< 0,18
		Indoor with LEV, Systemic	Inhalation	< 7,08 mg/m <sup>3</sup>	< 0,15
		Indoor with LEV, Acute - local effects	Inhalation	< 7,08 mg/m <sup>3</sup>	< 0,20
		Indoor with LEV, Chronic - local effects	Inhalation	< 7,08 mg/m <sup>3</sup>	< 0,51
PROC5	ECETOC TRA	Outdoor, Systemic	Dermal	13,71 mg/kg bw/d	0,202
		Indoor with LEV, Systemic	Dermal	0,07 mg/kg bw/d	0,001
	ECETOC TRA	Outdoor, Systemic, With RPE (95% efficiency)	Inhalation	< 6,20 mg/m <sup>3</sup>	< 0,13
		Outdoor, Acute - local effects, With RPE (95% efficiency)	Inhalation	< 6,20 mg/m <sup>3</sup>	< 0,17
		Outdoor, Chronic - local effects, With RPE (95% efficiency)	Inhalation	< 6,20 mg/m <sup>3</sup>	< 0,44
		Indoor with LEV, Systemic	Inhalation	< 17,71 mg/m <sup>3</sup>	< 0,37
		Indoor with LEV, Acute - local effects	Inhalation	< 17,71 mg/m <sup>3</sup>	< 0,49
		Indoor with LEV, Chronic - local effects, With RPE (95% efficiency)	Inhalation	< 0,89 mg/m <sup>3</sup>	< 0,06
PROC8b	ECETOC TRA	Outdoor, Systemic	Dermal	6,86 mg/kg bw/d	0,101
		Indoor with LEV, Systemic	Dermal	0,69 mg/kg bw/d	0,01
	ECETOC TRA	Outdoor, Systemic, With RPE (95% efficiency)	Inhalation	< 3,72 mg/m <sup>3</sup>	< 0,08
		Outdoor, Acute - local effects, With RPE (95% efficiency)	Inhalation	< 3,72 mg/m <sup>3</sup>	< 0,10
		Outdoor, Chronic - local effects, With RPE (95% efficiency)	Inhalation	< 3,72 mg/m <sup>3</sup>	< 0,27
		Indoor with LEV, Systemic	Inhalation	< 3,19 mg/m <sup>3</sup>	< 0,07

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		Indoor with LEV, Acute - local effects	Inhalation	< 3,19 mg/m <sup>3</sup>	< 0,09
		Indoor with LEV, Chronic - local effects	Inhalation	< 3,19 mg/m <sup>3</sup>	< 0,23
PROC9	ECETOC TRA	Outdoor, Systemic	Dermal	6,86 mg/kg bw/day	0,101
		Indoor with LEV, Systemic	Dermal	0,69 mg/kg bw/day	0,01
	ECETOC TRA	Outdoor, Systemic, With RPE (95% efficiency)	Inhalation	< 4,96 mg/m <sup>3</sup>	< 0,10
		Outdoor, Acute - local effects, With RPE (95% efficiency)	Inhalation	< 4,96 mg/m <sup>3</sup>	< 0,14
		Outdoor, Chronic - local effects, With RPE (95% efficiency)	Inhalation	< 4,96 mg/m <sup>3</sup>	< 0,35
		Indoor with LEV, Systemic	Inhalation	< 14,17 mg/m <sup>3</sup>	< 0,30
		Indoor with LEV, Acute - local effects	Inhalation	< 14,17 mg/m <sup>3</sup>	< 0,39
		Indoor with LEV, Chronic - local effects, With RPE (95% efficiency)	Inhalation	< 0,71 mg/m <sup>3</sup>	< 0,05
PROC15	ECETOC TRA	Indoor without LEV, Systemic	Dermal	0,34 mg/kg bw/d	0,005
		Indoor with LEV, Systemic	Dermal	0,03 mg/kg bw/d	0,001
	ECETOC TRA	Indoor without LEV, Systemic	Inhalation	< 35,42 mg/m <sup>3</sup>	< 0,74
		Indoor without LEV, Acute - local effects	Inhalation	< 35,42 mg/m <sup>3</sup>	< 0,98
		Indoor without LEV, Chronic - local effects, With RPE (95% efficiency)	Inhalation	< 1,77 mg/m <sup>3</sup>	< 0,13
		Indoor with LEV, Systemic	Inhalation	< 3,54 mg/m <sup>3</sup>	< 0,07
		Indoor with LEV, Acute - local effects	Inhalation	< 3,54 mg/m <sup>3</sup>	< 0,10
		Indoor with LEV, Chronic - local effects	Inhalation	< 3,54 mg/m <sup>3</sup>	< 0,25

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



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The safety data sheet at hand provides the user with risk management measures and operational conditions which enables him to work safely with the substance / mixture. If other risk management measures / operational conditions are adopted, the user has to ensure, that the risks are managed to at least equivalent levels.

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**1. Short title of Exposure Scenario:** Industrial use, Processing aid, an auxiliary agent in different processes, (Processing aid, additive, coatings and paints, thinners, paint removers, treatment of gas (NO<sub>x</sub> and SO<sub>x</sub> reduction), water treatment chemical, washing and cleaning products, cosmetics, personal care products)

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

**2.1 Contributing scenario controlling environmental exposure for: ERC4, ERC5, ERC6b, ERC7: Industrial use of processing aids in processes and products, not becoming part of articles, Industrial use resulting in inclusion into or onto a matrix, Industrial use of reactive processing aids, Industrial use of substances in closed systems**

### Amount used

Annual amount per site : 25,000 ton(s)/year

### Other given operational conditions affecting environmental exposure

Number of emission days per year : 330  
Release to air: : 18 mg/m<sup>3</sup>  
Remarks : (ERC4)

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Release to air: : 9,45 mg/m<sup>3</sup>  
Remarks : (ERC5)  
Release to air: : 0,0189 mg/m<sup>3</sup>  
Remarks : (ERC6b)  
Release to air: : 0,945 mg/m<sup>3</sup>  
Remarks : (ERC7)

### Technical conditions and measures / Organizational measures

Remarks : On-site wastewater treatment required., Efficient removal (~100%) of ammonia in STP by nitrification to nitrate followed by denitrification resulting in the release of nitrogen gas., Sludges from on-site effluent treatment., Can be landfilled or incinerated, when in compliance with local regulations.

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**2.2 Contributing scenario controlling worker exposure for: General measures PROC1, PROC2, PROC3, PROC4, PROC5, PROC8b, PROC9, PROC13: Use in closed process, no likelihood of exposure, Use in closed, continuous process with occasional controlled exposure, Use in closed batch process (synthesis or formulation), Use in batch and other process (synthesis) where opportunity for exposure arise s, Mixing or blending in batch processes for formulation of preparations and articles (multistage and/ or significant contact), Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at dedicated facilities, Transfer of substance or preparation into small containers (dedicated filling line, including weighing), Treatment of articles by dipping and pouring**

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### Product characteristics

Concentration of the Substance in Mixture/Article : Covers concentrations up to 100%.

Physical Form (at time of use) : Liquefied gas

### Frequency and duration of use

Frequency of use : 220 days/year  
Remarks : Covers daily exposures up to 12 hours (unless stated differently).

### Human factors not influenced by risk management

Dermal exposure : Palms of both hands (480 cm<sup>2</sup>)  
Breathing volume : 20 m<sup>3</sup>/day

### Technical conditions and measures

Provide a good standard of general or controlled ventilation. Handle substance within a closed system. Store substance within a closed system. Transfer via enclosed lines. Automate activity where possible.

### Organisational measures to prevent /limit releases, dispersion and exposure

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Ensure operatives are trained to minimise exposures., Regularly inspect, test and maintain all control measures.

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

Where there is potential for exposure:, Wear personal protective equipment.

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### 2.3 Contributing scenario controlling worker exposure for: PROC1: Use in closed process, no likelihood of exposure

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Remarks : See 2.2 "Contributing scenario controlling worker exposure for: General measures"

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### 2.4 Contributing scenario controlling worker exposure for: PROC2: Use in closed, continuous process with occasional controlled exposure

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#### Technical conditions and measures

Sample via a closed loop or other system to avoid exposure. Ensure samples are obtained under containment or extract ventilation. Segregate the activity away from other operations.

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### 2.5 Contributing scenario controlling worker exposure for: PROC3, PROC4: Use in closed batch process (synthesis or formulation), Use in batch and other process (synthesis) where opportunity for exposure arises

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Remarks : See 2.2 "Contributing scenario controlling worker exposure for: General measures"

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### 2.6 Contributing scenario controlling worker exposure for: PROC5: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/ or significant contact)

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Remarks : See 2.2 "Contributing scenario controlling worker exposure for: General measures"

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### 2.7 Contributing scenario controlling worker exposure for: PROC8b: Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at dedicated facilities

#### Technical conditions and measures

Ensure material transfers are under containment or extract ventilation.

### 2.8 Contributing scenario controlling worker exposure for: PROC9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing)

#### Technical conditions and measures

Ensure material transfers are under containment or extract ventilation. Keep container tightly closed.

### 2.9 Contributing scenario controlling worker exposure for: PROC13: Treatment of articles by dipping and pouring

Remarks : See 2.2 "Contributing scenario controlling worker exposure for: General measures"

## 3. Exposure estimation and reference to its source

### Environment

Contributing Scenario	Exposure Assessment Method	Specific conditions	Compartment	Value type	Level of Exposure	RCR
ERC4	EUSES	Free ammonia	Fresh water		0,108µg/l	0,098
Remarks:		LEV = Local Exhaust Ventilation. RPE = Respiratory Protective Equipment.				
			Marine water		0,0231µg/l	0,021
ERC5			Fresh water		0,0558µg/l	0,051
			Marine water		0,0121µg/l	0,011
ERC6b			Fresh water		0,0017µg/l	0,0016
			Marine water		0,0002µg/l	0,0002
ERC7			Fresh water		0,0056µg/l	0,0051
			Marine water		0,0012µg/l	0,0011

### Workers

Contributing Scenario	Exposure Assessment Method	Specific conditions	Value type	Level of Exposure	RCR
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PROC1	ECETOC TRA	Outdoor, Indoor without LEV	Dermal	0,34 mg/kg bw/day	0,005
	ECETOC TRA	Outdoor, Systemic, Acute - local effects, Chronic - local effects	Inhalation	< 0,01 mg/m <sup>3</sup>	< 0,01
PROC2	ECETOC TRA	Outdoor, Indoor without LEV	Dermal	1,37 mg/kg bw/day	0,02
		Indoor with LEV	Dermal	0,14 mg/kg bw/day	0,002
	ECETOC TRA	Outdoor, Systemic	Inhalation	< 24,79 mg/m <sup>3</sup>	< 0,52
		Outdoor, Acute - local effects	Inhalation	< 24,79 mg/m <sup>3</sup>	< 0,69
		Outdoor, Chronic - local effects, With RPE (95% efficiency)	Inhalation	< 1,24 mg/m <sup>3</sup>	< 0,09
		Indoor with LEV, Systemic	Inhalation	< 3,54 mg/m <sup>3</sup>	< 0,07
		Indoor with LEV, Acute - local effects	Inhalation	< 3,54 mg/m <sup>3</sup>	< 0,10
		Indoor with LEV, Chronic - local effects	Inhalation	< 3,54 mg/m <sup>3</sup>	< 0,25
PROC3	ECETOC TRA	Outdoor, Indoor without LEV	Dermal	0,34 mg/kg bw/day	0,005
		Indoor with LEV	Dermal	0,03 mg/kg bw/day	0,001
PROC4	ECETOC TRA	Outdoor, Indoor without LEV	Dermal	6,86 mg/kg bw/day	0,101
		Indoor with LEV	Dermal	0,69 mg/kg bw/day	0,01
PROC3, PROC4	ECETOC TRA	Outdoor, Systemic, With RPE (95% efficiency)	Inhalation	< 2,48 mg/m <sup>3</sup>	< 0,05
		Outdoor, Acute - local effects, With RPE (95% efficiency)	Inhalation	< 2,48 mg/m <sup>3</sup>	< 0,07
		Outdoor, Chronic - local effects, With RPE (95% efficiency)	Inhalation	< 2,48 mg/m <sup>3</sup>	< 0,18
		Indoor with LEV, Systemic	Inhalation	< 7,08 mg/m <sup>3</sup>	< 0,15
		Indoor with LEV, Acute - local effects	Inhalation	< 7,08 mg/m <sup>3</sup>	< 0,20
		Indoor with LEV, Chronic - local effects	Inhalation	< 7,08 mg/m <sup>3</sup>	< 0,51
PROC5	ECETOC TRA	Outdoor, Indoor without LEV	Dermal	13,71 mg/kg bw/day	0,202
		Indoor with LEV	Dermal	0,07 mg/kg bw/day	0,001
	ECETOC TRA	Outdoor, Systemic, With	Inhalation	< 6,20 mg/m <sup>3</sup>	< 0,13

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		RPE (95% efficiency) Outdoor, Acute - local effects, With RPE (95% efficiency)	Inhalation	< 6,20 mg/m <sup>3</sup>	< 0,17
		Outdoor, Chronic - local effects, With RPE (95% efficiency)	Inhalation	< 6,20 mg/m <sup>3</sup>	< 0,44
		Indoor with LEV, Systemic	Inhalation	< 17,71 mg/m <sup>3</sup>	< 0,37
		Indoor with LEV, Acute - local effects	Inhalation	< 17,71 mg/m <sup>3</sup>	< 0,49
		Indoor with LEV, Chronic - local effects, With RPE (95% efficiency)	Inhalation	< 0,89 mg/m <sup>3</sup>	< 0,06
PROC8b	ECETOC TRA	Outdoor, Indoor without LEV	Dermal	6,86 mg/kg bw/day	0,101
		Indoor with LEV	Dermal	0,69 mg/kg bw/day	0,01
	ECETOC TRA	Outdoor, Systemic, With RPE (95% efficiency)	Inhalation	< 3,72 mg/m <sup>3</sup>	< 0,08
		Outdoor, Acute - local effects, With RPE (95% efficiency)	Inhalation	< 3,72 mg/m <sup>3</sup>	< 0,10
		Outdoor, Chronic - local effects, With RPE (95% efficiency)	Inhalation	< 3,72 mg/m <sup>3</sup>	< 0,27
		Indoor with LEV, Systemic	Inhalation	< 3,19 mg/m <sup>3</sup>	< 0,07
		Indoor with LEV, Acute - local effects	Inhalation	< 3,19 mg/m <sup>3</sup>	< 0,09
		Indoor with LEV, Chronic - local effects	Inhalation	< 3,19 mg/m <sup>3</sup>	< 0,23
PROC9	ECETOC TRA	Outdoor, Indoor without LEV	Dermal	6,86 mg/kg bw/day	0,101
		Indoor with LEV	Dermal	0,69 mg/kg bw/day	0,01
	ECETOC TRA	Outdoor, Systemic, With RPE (95% efficiency)	Inhalation	< 4,96 mg/m <sup>3</sup>	< 0,10
		Outdoor, Acute - local effects, With RPE (95% efficiency)	Inhalation	< 4,96 mg/m <sup>3</sup>	< 0,14
		Outdoor, Chronic - local effects, With RPE (95% efficiency)	Inhalation	< 4,96 mg/m <sup>3</sup>	< 0,35
		Indoor with LEV, Systemic	Inhalation	< 14,17 mg/m <sup>3</sup>	< 0,30
		Indoor with LEV, Acute - local effects	Inhalation	< 14,17 mg/m <sup>3</sup>	< 0,39

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		Indoor with LEV, Chronic - local effects, With RPE (95% efficiency)	Inhalation	< 0,71 mg/m <sup>3</sup>	< 0,05
PROC13	ECETOC TRA	Outdoor, Indoor without LEV	Dermal	13,71 mg/kg bw/day	0,202
		Indoor with LEV	Dermal	0,69 mg/kg bw/day	0,01
	ECETOC TRA	Outdoor, Systemic, With RPE (95% efficiency)	Inhalation	6,20 mg/m <sup>3</sup>	0,13
		Outdoor, Acute - local effects, With RPE (95% efficiency)	Inhalation	6,20 mg/m <sup>3</sup>	0,17
		Outdoor, Chronic - local effects, With RPE (95% efficiency)	Inhalation	6,20 mg/m <sup>3</sup>	0,44
		Indoor with LEV, Systemic	Inhalation	17,71 mg/m <sup>3</sup>	0,37
		Indoor with LEV, Acute - local effects	Inhalation	17,71 mg/m <sup>3</sup>	0,49
		Indoor with LEV, Chronic - local effects, With RPE (95% efficiency)	Inhalation	0,89 mg/m <sup>3</sup>	0,06

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

The safety data sheet at hand provides the user with risk management measures and operational conditions which enables him to work safely with the substance / mixture. If other risk management measures / operational conditions are adopted, the user has to ensure, that the risks are managed to at least equivalent levels.



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**1. Short title of Exposure Scenario: Professional use, Wide-dispersive uses, (Formulation of mixtures, heat transfer fluid (e.g refrigeration, cooling/heating systems), water treatment chemical, washing and cleaning products, processing aid, additive, coatings and paints, thinners, paint removers, laboratory use, fertilizers), Manufacture**

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- Main User Groups : **SU 22:** Professional uses: Public domain (administration, education, entertainment, services, craftsmen)
- Process categories : **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)  
**PROC13:** Treatment of articles by dipping and pouring  
**PROC15:** Use as laboratory reagent  
**PROC20:** Heat and pressure transfer fluids in dispersive, professional use but closed systems
- Environmental Release Categories : **ERC8b, ERC8e, ERC8f, ERC9a, ERC9b:** Wide dispersive indoor use of reactive substances in open systems, Wide dispersive outdoor use of reactive substances in open systems, Wide dispersive outdoor use resulting in inclusion into or onto a matrix, Wide dispersive indoor use of substances in closed systems, Wide dispersive outdoor use of substances in closed systems

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**2.1 Contributing scenario controlling environmental exposure for: ERC8b, ERC8e, ERC8f, ERC9a, ERC9b: Wide dispersive indoor use of reactive substances in open systems, Wide dispersive outdoor use of reactive substances in open systems, Wide dispersive outdoor use resulting in inclusion into or onto a matrix, Wide dispersive indoor use of substances in closed systems, Wide dispersive outdoor use of substances in closed systems**

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### Technical conditions and measures / Organizational measures

Remarks : The likelihood that workers or the general public or the environment are exposed to the substance under normal or reasonably foreseeable conditions of use is negligible., Closed systems are employed in order to prevent unintended emissions., Professional workers should be informed in order to prevent accidental release.

### Conditions and measures related to municipal sewage treatment plant

Remarks : Small level local emissions may be released to the STP where removal is expected to be efficient due to readily biodegradable nature of low concentration ammonia solutions., Solutions with high pH-value must be neutralized before discharge.

**2.2 Contributing scenario controlling worker exposure for: General measures PROC1, PROC2, PROC3, PROC4, PROC5, PROC8a, PROC8b, PROC9, PROC13, PROC15, PROC20: Use in closed process, no likelihood of exposure, Use in closed, continuous process with occasional controlled exposure, Use in closed batch process (synthesis or formulation), Use in batch and other process (synthesis) where opportunity for exposure arises, Mixing or blending in batch processes for formulation of preparations and articles (multistage and/ or significant contact), Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at non-dedicated facilities, Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at dedicated facilities, Transfer of substance or preparation into small containers (dedicated filling line, including weighing), Treatment of articles by dipping and pouring, Use as laboratory reagent, Heat and pressure transfer fluids in dispersive, professional use but closed systems**

### Product characteristics

Concentration of the Substance in Mixture/Article : Covers concentrations up to 100%.

Physical Form (at time of use) : Liquefied gas

### Frequency and duration of use

Frequency of use : 220 days/year

Remarks : Covers daily exposures up to 8 hours (unless stated differently).

### Human factors not influenced by risk management

Dermal exposure : Palms of both hands (480 cm<sup>2</sup>)

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Breathing volume : 10 m3/day

### Technical conditions and measures

Provide a good standard of general or controlled ventilation. Handle substance within a closed system. Store substance within a closed system. Transfer via enclosed lines. Automate activity where possible.

### Organisational measures to prevent /limit releases, dispersion and exposure

Provide specific activity training to operators to minimise exposures., Regularly inspect, test and maintain all control measures.

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

Where there is potential for exposure:, Wear personal protective equipment.

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### 2.3 Contributing scenario controlling worker exposure for: PROC1: Use in closed process, no likelihood of exposure

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Remarks : See 2.2 "Contributing scenario controlling worker exposure for: General measures"

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### 2.4 Contributing scenario controlling worker exposure for: PROC2: Use in closed, continuous process with occasional controlled exposure

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#### Technical conditions and measures

Sample via a closed loop or other system to avoid exposure. Ensure samples are obtained under containment or extract ventilation. Segregate the activity away from other operations.

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### 2.5 Contributing scenario controlling worker exposure for: PROC3, PROC4: Use in closed batch process (synthesis or formulation), Use in batch and other process (synthesis) where opportunity for exposure arises

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Remarks : See 2.2 "Contributing scenario controlling worker exposure for: General measures"

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### 2.6 Contributing scenario controlling worker exposure for: PROC5: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/ or significant contact)

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Remarks : See 2.2 "Contributing scenario controlling worker exposure

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for: General measures"

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### 2.7 Contributing scenario controlling worker exposure for: PROC8a, PROC8b: Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at non-dedicated facilities, Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at dedicated facilities

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#### Technical conditions and measures

Ensure material transfers are under containment or extract ventilation.

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### 2.8 Contributing scenario controlling worker exposure for: PROC9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing)

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#### Technical conditions and measures

Ensure material transfers are under containment or extract ventilation. Keep container tightly closed.

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### 2.9 Contributing scenario controlling worker exposure for: PROC13: Treatment of articles by dipping and pouring

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Remarks : See 2.2 "Contributing scenario controlling worker exposure for: General measures"

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### 2.10 Contributing scenario controlling worker exposure for: PROC15: Use as laboratory reagent

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#### Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

#### Technical conditions and measures

Provide a good standard of general ventilation. Natural ventilation is from doors, windows etc. Controlled ventilation means air is supplied or removed by a powered fan.

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### 2.11 Contributing scenario controlling worker exposure for: PROC11: Non industrial spraying

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Remarks : See 2.2 "Contributing scenario controlling worker exposure for: General measures"

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### 3. Exposure estimation and reference to its source

#### Workers

Contributing Scenario	Exposure Assessment Method	Specific conditions	Value type	Level of Exposure	RCR
PROC1	ECETOC TRA	Outdoor, Indoor without LEV	Dermal	0,34 mg/kg bw/day	0,005
	ECETOC TRA	Outdoor, Indoor without LEV, Systemic, Acute - local effects, Chronic - local effects	Inhalation	< 0,01 mg/m <sup>3</sup>	< 0,01
PROC2	ECETOC TRA	Outdoor, Systemic	Dermal	1,37 mg/kg bw/day	0,02
		Indoor with LEV, Systemic	Dermal	0,14 mg/kg bw/day	0,002
	ECETOC TRA	Outdoor, Systemic	Inhalation	< 24,79 mg/m <sup>3</sup>	< 0,52
		Outdoor, Acute - local effects	Inhalation	< 24,79 mg/m <sup>3</sup>	< 0,69
		Outdoor, Chronic - local effects, With RPE (95% efficiency)	Inhalation	< 1,24 mg/m <sup>3</sup>	< 0,09
		Indoor with LEV, Systemic	Inhalation	< 3,54 mg/m <sup>3</sup>	< 0,07
		Indoor with LEV, Acute - local effects	Inhalation	< 3,54 mg/m <sup>3</sup>	< 0,10
		Indoor with LEV, Chronic - local effects	Inhalation	< 3,54 mg/m <sup>3</sup>	< 0,25
PROC3	ECETOC TRA	Outdoor, Systemic	Dermal	0,34 mg/kg bw/day	0,005
		Indoor with LEV, Systemic	Dermal	0,03 mg/kg bw/day	0,001
PROC4	ECETOC TRA	Outdoor, Systemic	Dermal	6,86 mg/kg bw/day	0,101
		Indoor with LEV, Systemic	Dermal	0,69 mg/kg bw/day	0,01
PROC3, PROC4	ECETOC TRA	Outdoor, Systemic, With RPE (95% efficiency)	Inhalation	< 2,48 mg/m <sup>3</sup>	< 0,05
		Outdoor, Acute - local effects, With RPE (95% efficiency)	Inhalation	< 2,48 mg/m <sup>3</sup>	< 0,07
		Outdoor, Chronic - local effects, With RPE (95%)	Inhalation	< 2,48 mg/m <sup>3</sup>	< 0,18

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		efficiency)			
		Indoor with LEV, Systemic	Inhalation	< 7,08 mg/m <sup>3</sup>	< 0,15
		Indoor with LEV, Acute - local effects	Inhalation	< 7,08 mg/m <sup>3</sup>	< 0,20
		Indoor with LEV, Chronic - local effects	Inhalation	< 7,08 mg/m <sup>3</sup>	< 0,51
PROC5	ECETOC TRA	Outdoor, Systemic	Dermal	13,71 mg/kg bw/day	0,202
		Indoor with LEV, Systemic	Dermal	0,07 mg/kg bw/day	0,001
	ECETOC TRA	Outdoor, Systemic, With RPE (95% efficiency)	Inhalation	< 6,20 mg/m <sup>3</sup>	< 0,13
		Outdoor, Acute - local effects, With RPE (95% efficiency)	Inhalation	< 6,20 mg/m <sup>3</sup>	< 0,17
		Outdoor, Chronic - local effects, With RPE (95% efficiency)	Inhalation	< 6,20 mg/m <sup>3</sup>	< 0,44
		Indoor with LEV, Systemic	Inhalation	< 17,71 mg/m <sup>3</sup>	< 0,37
		Indoor with LEV, Acute - local effects	Inhalation	< 17,71 mg/m <sup>3</sup>	< 0,49
		Indoor with LEV, Chronic - local effects, With RPE (95% efficiency)	Inhalation	< 0,89 mg/m <sup>3</sup>	< 0,06
PROC8a	ECETOC TRA	Outdoor, Systemic	Dermal	13,71 mg/kg bw/day	0,202
		Indoor with LEV, Systemic	Dermal	0,14 mg/kg bw/day	0,002
PROC8b	ECETOC TRA	Outdoor, Systemic, With gloves (90% protection)	Dermal	6,86 mg/kg bw/day	0,101
		Indoor with LEV, Systemic	Dermal	0,69 mg/kg bw/day	0,01
PROC8b	ECETOC TRA	Outdoor, Systemic, With RPE (95% efficiency)	Inhalation	< 3,72 mg/m <sup>3</sup>	< 0,08
		Outdoor, Acute - local effects, With RPE (95% efficiency)	Inhalation	< 3,72 mg/m <sup>3</sup>	< 0,10
		Outdoor, Chronic - local effects, With RPE (95% efficiency)	Inhalation	< 3,72 mg/m <sup>3</sup>	< 0,27
		Indoor with LEV, Systemic	Inhalation	< 3,19 mg/m <sup>3</sup>	< 0,07
		Indoor with LEV, Acute - local effects	Inhalation	< 3,19 mg/m <sup>3</sup>	< 0,09
		Indoor with LEV, Chronic - local effects	Inhalation	< 3,19 mg/m <sup>3</sup>	< 0,23

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PROC8a	ECETOC TRA	Outdoor, Systemic, With RPE (95% efficiency)	Inhalation	< 6,20 mg/m <sup>3</sup>	< 0,13
		Outdoor, Acute - local effects, With RPE (95% efficiency)	Inhalation	< 6,20 mg/m <sup>3</sup>	< 0,17
		Outdoor, Chronic - local effects, With RPE (95% efficiency)	Inhalation	< 6,20 mg/m <sup>3</sup>	< 0,44
		Indoor with LEV, Systemic	Inhalation	< 17,71 mg/m <sup>3</sup>	< 0,37
		Indoor with LEV, Acute - local effects	Inhalation	< 17,71 mg/m <sup>3</sup>	< 0,49
		Indoor with LEV, Chronic - local effects, With RPE (95% efficiency)	Inhalation	< 0,89 mg/m <sup>3</sup>	< 0,06
PROC9	ECETOC TRA	Outdoor, Systemic, With gloves (90% protection)	Dermal	0,69 mg/kg bw/day	0,10
		Indoor with LEV, Systemic	Dermal	0,69 mg/kg bw/day	0,10
	ECETOC TRA	Outdoor, Systemic, With RPE (95% efficiency)	Inhalation	< 4,96 mg/m <sup>3</sup>	< 0,10
		Outdoor, Chronic - local effects, With RPE (95% efficiency)	Inhalation	< 4,96 mg/m <sup>3</sup>	< 0,14
		Outdoor, Acute - local effects, With RPE (95% efficiency)	Inhalation	< 4,96 mg/m <sup>3</sup>	< 0,35
		Indoor with LEV, Systemic	Inhalation	< 14,17 mg/m <sup>3</sup>	< 0,30
		Indoor with LEV, Acute - local effects	Inhalation	< 14,17 mg/m <sup>3</sup>	< 0,39
		Indoor with LEV, Chronic - local effects, With RPE (95% efficiency)	Inhalation	< 0,71 mg/m <sup>3</sup>	< 0,05
PROC13	ECETOC TRA	Outdoor, Systemic	Dermal	13,71 mg/kg bw/day	0,202
		Indoor with LEV, Systemic	Dermal	0,69 mg/kg bw/day	0,01
	ECETOC TRA	Outdoor, Systemic, With RPE (95% efficiency)	Inhalation	< 6,20 mg/m <sup>3</sup>	< 0,13
		Outdoor, Acute - local effects, With RPE (95% efficiency)	Inhalation	< 6,20 mg/m <sup>3</sup>	< 0,17
		Outdoor, Chronic - local effects, With RPE (95% efficiency)	Inhalation	< 6,20 mg/m <sup>3</sup>	< 0,44
		Indoor with LEV, Systemic	Inhalation	< 17,71 mg/m <sup>3</sup>	< 0,37

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		Indoor with LEV, Acute - local effects	Inhalation	< 17,71 mg/m <sup>3</sup>	< 0,49
		Indoor with LEV, Chronic - local effects, With RPE (95% efficiency)	Inhalation	< 0,89 mg/m <sup>3</sup>	< 0,06
PROC15	ECETOC TRA	Outdoor, Systemic	Dermal	0,34 mg/kg bw/day	0,005
		Indoor with LEV, Systemic	Dermal	0,03 mg/kg bw/day	0,001
	ECETOC TRA	Indoor without LEV, Systemic	Inhalation	< 35,42 mg/m <sup>3</sup>	< 0,74
		Indoor without LEV, Acute - local effects	Inhalation	< 35,42 mg/m <sup>3</sup>	< 0,98
		Indoor without LEV, Chronic - local effects, With RPE (95% efficiency)	Inhalation	< 1,77 mg/m <sup>3</sup>	< 0,13
		Indoor with LEV, Systemic	Inhalation	< 3,54 mg/m <sup>3</sup>	< 0,07
		Indoor with LEV, Acute - local effects	Inhalation	< 3,54 mg/m <sup>3</sup>	< 0,10
		Indoor with LEV, Chronic - local effects	Inhalation	< 3,54 mg/m <sup>3</sup>	< 0,25
PROC20	ECETOC TRA	Outdoor, Systemic	Dermal	1,71 mg/kg bw/day	0,025
		Indoor with LEV, Systemic	Dermal	0,14 mg/kg bw/day	0,002
	ECETOC TRA	Outdoor, Systemic	Inhalation	< 24,79 mg/m <sup>3</sup>	< 0,52
		Outdoor, Acute - local effects	Inhalation	< 24,79 mg/m <sup>3</sup>	< 0,69
		Outdoor, Chronic - local effects, With RPE (95% efficiency)	Inhalation	< 1,24 mg/m <sup>3</sup>	< 0,09
		Indoor with LEV, Systemic	Inhalation	< 7,08 mg/m <sup>3</sup>	< 0,15
		Indoor with LEV, Acute - local effects	Inhalation	< 7,08 mg/m <sup>3</sup>	< 0,20
		Indoor with LEV, Chronic - local effects	Inhalation	< 7,08 mg/m <sup>3</sup>	< 0,51

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

The safety data sheet at hand provides the user with risk management measures and operational conditions which enables him to work safely with the substance / mixture. If other risk management



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measures / operational conditions are adopted, the user has to ensure, that the risks are managed to at least equivalent levels.

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### 1. Short title of Exposure Scenario: Consumer use, Wide-dispersive uses, (<25% aqueous solution)

- 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  
**PC31:** Polishes and wax blends  
**PC35:** Washing and cleaning products (including solvent based products)  
**PC39:** Cosmetics, personal care products
- Environmental Release Categories : **ERC8b, ERC8e, ERC9a, ERC9b:** Wide dispersive indoor use of reactive substances in open systems, Wide dispersive outdoor use of reactive substances in open systems, Wide dispersive indoor use of substances in closed systems, Wide dispersive outdoor use of substances in closed systems

### 2.1 Contributing scenario controlling environmental exposure for: ERC8b, ERC8e, ERC9a, ERC9b: Wide dispersive indoor use of reactive substances in open systems, Wide dispersive outdoor use of reactive substances in open systems, Wide dispersive indoor use of substances in closed systems, Wide dispersive outdoor use of substances in closed systems

- Remarks : Not applicable

### 2.2 Contributing scenario controlling consumer exposure for: PC9a: Coatings and paints, thinners, paint removers

#### Product characteristics

- Concentration of the Substance in Mixture/Article : Covers concentrations up to 0,05%., (NH<sub>3</sub>)

#### Frequency and duration of use

- Frequency of use : 1 times / month

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### 2.4 Contributing scenario controlling consumer exposure for: PC35: Washing and cleaning products (including solvent based products)

#### Product characteristics

Concentration of the Substance in Mixture/Article : Covers concentrations up to 0,125%., (NH3)

#### Frequency and duration of use

Frequency of use : 104 times / year

### 2.5 Contributing scenario controlling consumer exposure for: PC39: Cosmetics, personal care products

#### Product characteristics

Concentration of the Substance in Mixture/Article : Covers concentrations up to 4%., (NH3)

#### Frequency and duration of use

Frequency of use : 1 times / month

### 3. Exposure estimation and reference to its source

#### Consumers

Contributing Scenario	Exposure Assessment Method	Specific conditions	Value type	Level of Exposure	RCR
PC9a	ECETOC TRA	Applying paint with brush and roller			
		Acute effects, Systemic	Dermal	0,03 mg/kg bw/d	0,00044

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		Acute - local effects Spraying paint	Inhalation	7 mg/m <sup>3</sup>	0,97
		Acute effects, Systemic	Dermal	0,013 mg/kg bw/d	0,00019
		Acute - local effects Applying general coatings	Inhalation	0,67 mg/m <sup>3</sup>	0,09
		Acute effects, Systemic	Dermal	0,0021 mg/kg bw/d	0,00031
		Acute - local effects Applying paint remover	Inhalation	6,7 mg/m <sup>3</sup>	0,93
		Acute effects, Systemic	Dermal	0,0042 mg/kg bw/d	0,00062
		Acute - local effects	Inhalation	3,2 mg/m <sup>3</sup>	0,44
PC35	ECETOC TRA	Acute effects, Systemic	Dermal	0,41 mg/kg bw/d	0,006
		Long term, Systemic	Dermal	0,12 mg/kg bw/d	0,002
		Acute - local effects	Inhalation	3,3 mg/m <sup>3</sup>	0,46
		Systemic	Inhalation	0,16 mg/m <sup>3</sup>	0,0067
		Chronic - local effects	Inhalation	0,16 mg/m <sup>3</sup>	0,06
PC39	ECETOC TRA	Applying hair dye			
		Acute effects, Systemic	Dermal	67 mg/kg bw/d	0,99
		Long term, Systemic	Dermal	2,203 mg/kg bw/d	0,0324

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

The safety data sheet at hand provides the user with risk management measures and operational conditions which enables him to work safely with the substance / mixture. If other risk management measures / operational conditions are adopted, the user has to ensure, that the risks are managed to at least equivalent levels.