1063-en.00001 - 11.0

Extended Safety Data Sheet

AMMONIA

Last data update : 2015-04-15

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

1.1. Product identifier

Product name : AMMONIA

CAS nr : 7664-41-7

EC Number : 231-635-3

REACH registration numbe : 01-2119488876-14

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

1.2.1 Relevant identified uses : Refrigerant

1.3. Details of the supplier of the safety data sheet : DEHON SERVICE
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Fax : +33 (0) 1 43 98 21 51

e-mail : ContactFDS@climalife.dehon.com

1.4 Emergency telephone number : EMERGENCY TELEPHONE NUMBER (24h/24) : + 33 (0) 1 72 11 00 03
Anti-poison Center : INRS/ORFILA (France) : +33 (0) 1 45 42 59 59
Anti-poison Centre (Spain) : +34 91 562 04 20
Anti-poison Centre (Belgium) : +32 70 245 245
Anti-poison Centre (Netherlands) : +31 30 274 8888
Anti-poison Centre (United Kingdom) : +44 870 600 6266
Poisons Information Centre (Hungary) : +36 80 201 199

SECTION 2 Hazards identification

2.1. Classification of the substance or mixture

2.1.1. Regulation (EC) No 1272/2008 (CLP)

Physical hazards : Flammable gases - Category 2 - Warning - (CLP : Flam. Gas 2) - H221
Gases under pressure - Liquefied gas (Press. Gas) - H280

Health hazards : Acute toxicity, Inhalation - Category 3 (Acute Tox. 3) - H331
Skin corrosion - Category 1B (Skin Corr. 1B) - H314

Environmental hazards : Hazardous to the aquatic environment - Acute hazard - Category 1 (Aquatic Acute 1) - H400

2.1.2 Directive EEC/67/548 or 1999/45/ CE : R10
T; R23
C; R34
N; R50

2.2. Label elements

Product identifier : Ammonia, anhydrous
CAS Number : 7664-41-7
EC Number : 231-635-3

Hazard pictograms

Signal words : Danger

Hazard statements : H280 : Contains gas under pressure; may explode if heated
H221 : Flammable gas
H314 : Causes severe skin burns and eye damage
H331 : Toxic if inhaled

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SECTION 2 Hazards identification (continued)

H400 : Very toxic to aquatic life

Precautionary statements :

• Prevention : P210 : Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
P273 : Avoid release to the environment

• Response : P304 + P340 : IF INHALED: Remove person to fresh air and keep comfortable for breathing.
P305 + P351 + P338 : IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
P303 + P361 + P353 : IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower P311 : Call a POISON CENTER or doctor/physician

• Storage : P403 + P233 : Store in a well-ventilated place. Keep container tightly closed

2.3. Other hazards : May form flammable/explosive vapour-air mixtures

SECTION 3 Composition/information on ingredients

SUBSTANCE

Substance name		Contents	CAS No	EC No	Index No	Ref REACH	Classification
Anhydrous ammonia	:	100 %	7664-41-7	231-635-3	007-001-00-5	01-2119488876-14	R10 T; R23 C; R34 N; R50 --- Acute Tox. 3 (Inhalation);H331 Skin Corr. 1B;H314 Flam. Gas 2;H221 Aquatic Acute 1;H400

SECTION 4 First aid measures

4.1. Description of first aid measures

Inhalation : Move the affected person away from the contaminated area and into the fresh air
Make the person rest

Skin contact : Immediately rinse with plenty of water (for at least 15 minutes)
If skin burns appear, call a doctor immediately

Eye contact : Rinse immediately with plenty of water (for at least 15 minutes)
Consult an eye specialist immediately

Ingestion : Not specifically applicable (gas)

Protection of first-aiders : Do not enter without an appropriate protective equipment
- self-contained breathing apparatus
- protective clothing

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

Acute symptoms : Irritation to throat and respiratory system
Watering of the eyes
Headaches
Nausea
Coughing
Vomiting

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

SECTION 5 Fire-fighting measures

5.1. Extinguishing media

Suitable extinguishing media : All extinguishing agents can be used
Prefer : Carbon dioxide (CO_2) ; Powders

5.2. Special hazards arising from the substance or mixture

Specific hazards : Gas/air mixtures are explosive

5.3. Advice for firefighters

Specific fire fighting methods : Cool down the containers exposed to heat with a water spray
Never introduce water or any aqueous agent into tanks or containers
Contain the extinguishing fluids by bunding (the product is hazardous for the environment)

Protection of fire-fighters : Self-contained breathing apparatus
Impermeable boots and protective equipment

SECTION 6 Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures :
Only qualified personnel equipped with suitable protective equipment may intervene
Evacuate the danger area.
Do not smoke
No flames, No sparks. Eliminate all sources of ignition
Mechanically ventilate the spillage area, whilst avoiding the formation of explosive concentrations.

6.2. Environmental precautions : Prevent the product from entering drains (risk of explosion)

6.3. Methods and material for containment and cleaning up

- Recovery : Spray with water

- Neutralization : Neutralize with :
- acidic solution.
Absorb with :
- dry sand.
- inert absorbent material.

- Disposal : Dispose of contaminated materials in accordance with current regulations

6.4 Reference to other sections : For further information refer to section 8 "Exposure controls/personal protection"

SECTION 7 Handling and storage

7.1. Precautions for safe handling

Technical measures : Special electrical equipment.
Material and equipment suitable for use under explosive conditions

Precautions : Work in a well-ventilated area
Avoid any direct contact with the product
Smoking is forbidden
Avoid the build-up of electrostatic charge

Industrial hygiene : Do not drink, eat or smoke in the workplace
Always wash hands after handling the product
Separate working clothes from town clothes

7.2. Conditions for safe storage, including any incompatibilities

Technical measures : Anti-corrosion electrical installations.

SECTION 7 Handling and storage (continued)

Storage conditions

- Recommended : Store :
- in a cool, well-ventilated area
- away from any source of ignition
- away from any source of heat
- away from direct sunlight

Incompatible products : Halogens
Oxidizing materials
Acids
Metals

Packaging materials

- Recommended : Ordinary steel

Further information : : In the presence of humidity corrodes copper, zinc and numerous alloys

7.3. Specific end use(s)

SECTION 8 Exposure controls/personal protection

8.1. Control parameters

Engineering measures : Ensure good ventilation of the work station

8.1.1. Occupational Exposure Limits : Anhydrous ammonia : France : LEP - VME (8h; mg/m³) : 7
Anhydrous ammonia : France : LEP - VME (8h; ppm) : 10
Anhydrous ammonia : France : LEP - VLE (15min; mg/m³) : 14
Anhydrous ammonia : France : LEP - VLE (15min; ppm) : 20
Anhydrous ammonia : Germany : MAK - TWA (8h; mg/m³) : 14
Anhydrous ammonia : Germany : MAK - TWA (8h; ppm) : 20
Anhydrous ammonia : Germany : MAK - STEL (15min; mg/m³) : 28
Anhydrous ammonia : Germany : MAK - STEL (15min; ppm) : 40
Anhydrous ammonia : Netherlands : MAC - TWA (8h; mg/m³) : 14
Anhydrous ammonia : Netherlands : MAC - STEL (15min; mg/m³) : 36
Anhydrous ammonia : Belgium : GWBB - TWA (8h; mg/m³) : 14
Anhydrous ammonia : Belgium : GWBB - TWA (8h; ppm) : 20
Anhydrous ammonia : Belgium : GWBB - STEL (15min; mg/m³) : 36
Anhydrous ammonia : Belgium : GWBB - STEL (15min; ppm) : 50

8.2. Exposure controls

Personal protection :

- Respiratory protection : If the occupational exposure limit is exceeded :
Mask with K canister

- Hand protection : Wear suitable gloves resistant to chemical penetration.
Butyl-rubber protective gloves
Protective gloves made of Viton

- Eye protection : Safety goggles
Face shield.

- Skin protection : Impermeable clothing

Collective emergency equipments : : Safety shower
Eye fountain

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SECTION 9 Physical and chemical properties

9.1. Information on basic physical and chemical properties

9.1.a. Appearance

Physical state	: Liquefied gas
Colour	: Colourless
9.1.b. Odour	: Pungent
9.1.c. Odour threshold	: 0.6 at 53 ppm
9.1.d. pH	: Not applicable
9.1.e. Melting point / Freezing point	: -77.7 °C
9.1.f. Initial boiling point - boiling range	: -33.4 °C
9.1.g. Flash point	: Not applicable
9.1.h. Evaporation rate	: Not determined.
9.1.i. Flammability	: Flammable gas.
9.1.j. Explosion limits (lower - upper)	
Explosion limits - lower	: 15.5 % (volume)
Explosion limits - upper	: 27 % (volume)
9.1.k. Vapour pressure	: 8,70 bar at 20 °C
9.1.l. Vapour density	: 0.597
9.1.m. Density	: Liquid product : 638 kg/dm³, at 0 °C
9.1.n. Solubility	
-in water	: Very soluble.
9.1.o. Partition coefficient : n-octanol / water	: 0.23 (log POW)
9.1.p. Auto-ignition temperature	: 651 °C
9.1.q. Thermal decomposition	: > 450°C
9.1.r. Viscosity	: Not applicable
9.1.s. Explosive Properties	: Not explosive material according to EC criteria Potential explosion hazard. (see section(s) : 10)
9.1.t. Oxidising properties	: Non oxidizing material according to EC criteria
9.2. Other information	
Critical temperature :	: +132.8 °C
Critical pressure :	: 114.4 bar

SECTION 10 Stability and reactivity

10.1. Reactivity	: Exothermic reaction with water. May explode under specific conditions.
10.2. Chemical stability	: Stable at ambient temperature and under normal conditions of use
10.3. Possibility of hazardous reactions	: Reacts violently with : - oxides and peroxides Danger of explosion on contact with : - Acetic aldehyde - Hypochlorous acid - halogens (F, Cl, Br, I)
10.4. Conditions to avoid	: Contains gas under pressure; may explode if heated.

SECTION 10 Stability and reactivity (continued)

10.5. Incompatible materials : - acids.
- certain plastics, rubbers and coatings
- gold, silver, mercury
In the presence of water, it attacks:
- copper and its alloys.
- zinc

10.6. Hazardous decomposition products : On combustion or on thermal decomposition (pyrolysis) releases :
Nitrogen
Hydrogen

SECTION 11 Toxicological information

11.1. Information on toxicological effects

Acute toxicity : Toxic by inhalation.
Risks of oedema and respiratory failure

On ingredients

Anhydrous ammonia : Rat inhalation LC50 [ppm/4h] : 2000
: Rat oral LD50 [mg/kg] : 350

Skin corrosion/irritation : Corrosive. Causes severe burns

Serious eye damage/irritation : Causes serious eye burns

Respiratory or skin sensitization : No sensitizing effect is known

Germ cell mutagenicity : No information available

Carcinogenicity : No information available

Reproductive toxicity : No information available

STOT-single exposure : Irritating to respiratory system.

STOT-repeated exposure : No information available

Aspiration hazard : No information available

SECTION 12 Ecological information

12.1. Toxicity : Very toxic to aquatic life

Effects on the aquatic environment

Anhydrous ammonia : 96 Hours - LC50 - Fish [mg/l] : 0.89

12.2. Persistence and degradability : Readily biodegradable

12.3. Bioaccumulative potential

Octanol/water partition coefficient : 0.23
Not potentially bioaccumulable.

12.4. Mobility in soil : Not specifically applicable (gas)

12.5. Results of PBT and vPvB assessment : This substance is considered not to be PBT and vPvB

12.6. Other adverse effects : -

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SECTION 13 Disposal considerations

13.1. Waste treatment methods

WASTE FROM PRODUCT :

Destruction/Disposal : Dispose of in accordance with relevant local regulations

CONTAMINATED PACKAGING :

Destruction/Disposal : Destroy at an authorised site

NOTE : The user's attention is drawn to the possible existence of specific european, national or local regulations regarding disposal

SECTION 14 Transport information

14.1. UN number : UN 1005

14.2. UN proper shipping name : AMMONIA, ANHYDROUS

14.3. Transport hazard class(es)

Rail/road (RID/ADR) : Class : 2

Sea transport : Class : 2.3
Subsidiary risk : 8

Air transport (OACI/IATA) : Class : 2.3
Subsidiary risk : 8

Hazard Label(s) : 2.3 + 8

14.4. Packing group : Not applicable

14.5. Environmental hazards : Environmentally hazardous material :YES
Marine pollutant : YES

14.6. Special precautions for user

Rail/road (RID/ADR) : Classification code : 2TC
Hazard identification number : 268
Tunnel restriction code : (C/D)

Sea transport : EmS Nr : F-C, S-U
Segregation group : 18 - alkalis

Air transport (OACI/IATA) : Passenger aircraft : FORBIDDEN
Cargo aircraft Only : FORBIDDEN.

NOTE : The above regulatory prescriptions are those valid on the date of publication of this sheet However, given the possible evolution of transport regulations for hazardous materials, in case the present sheet is dating back to more than 12 months ago, it would be advisable to check their validity with your commercial agency

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SECTION 15 Regulatory information

15.1. Safety, health and environmental regulations/legislation specific for the substance or mixture : Ensure all national/local regulations are observed.

* **France** : Classified Installations : applicable

Germany : : WGK (Water-endangermant class) : 2

US : NFPA Hazard Rating :
- Reactivity : 0
- Flammability : 1
- Health : 3

15.2. Chemical safety assessment : No information available

SECTION 16 Other information

Further information : Product for professional use only
For more information regarding the use of this product, please refer to our technical information or contact the sales department in your region
This safety data sheet has been written in conformity with the regulation (UE) 453/2010.

Text of R-Phrases in § 3 : R10 : Flammable
R23 : Toxic by inhalation.
R34 : Causes burns.
R50 : Very toxic to aquatic organisms.

Text of H-Phrases in § 3 : H221 - Flammable gas
H314 - Causes severe skin burns and eye damage
H331 - Toxic if inhaled
H400 - Very toxic to aquatic life

*** Update** : Modifications are indicated by an asterisk (*)

This sheet complements the technical sheets but does not replace them. The information given is based on our knowledge of the product, at the time of publication. It is given in good faith.
Besides, the attention of the user is drawn to the possible risks incurred by using the product for any other use than that for which it was intended.
In no way does this exempt the user from knowing and applying all the regulations controlling his activity. He alone will take on the responsibility for taking the precautions involved by the use of the product.
The aim of all the mandatory regulations mentionned is just to help the user to fulfil his obligations regarding the use of hazardous products.

This information must not be considered exhaustive. It does not exempt the user from ensuring that other obligations than those mentioned could apply, related to the storage and use of the product, this being his sole responsibility.

End of document

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Ammonia

Industrial use, Processing aid, an auxiliary agent in different processes

1 EXPOSURE SCENARIO

Title :
Industrial use, Processing aid, an auxiliary agent in different processes

List of all use descriptors related to the life cycle stage :

Sector of use (SU):
SU3: Industrial uses: Uses of substances as such or in preparations at industrial sites.

Process category (PROC):
PROC1: Use in closed process, no likelihood of exposure.
PROC2: Use in closed, continuous process with occasional controlled exposure (e.g. sampling).
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).
PROC13: Treatment of articles by dipping and pouring.

Environmental release category (ERC):
ERC4 : Industrial use of processing aids in processes and products, not becoming part of articles.
ERC5 : Industrial use resulting in inclusion into or onto a matrix.
ERC6b : Industrial use of reactive processing aids.
ERC7 : Industrial use of sub-stances in closed systems.

2 OPERATIONALCONDITIONS AND RISK MANAGEMENT MEASURES

2.1 Conditions affecting human health exposure

Product characteristic:
Physical Form (at time of use): Liquefied gas.
Concentration of the Substance in Mixture/Article: Covers concentrations up to 100%.

Frequency and duration of use/exposure:
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^2).
Breathing volume: 20 m^3/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.

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Technical conditions and measures for contributing scenario :	
Contributing scenario	**Technical conditions and measures**
PROC1: Use in closed process, no likelihood of exposure.	/
PROC2: Use in closed, continuous process with occasional controlled exposure (e.g. sampling).	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.
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	Ensure material transfers are under containment or extract ventilation.
PROC9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing).	Ensure material transfers are under containment or extract ventilation. Keep container tightly closed.
PROC13: Treatment of articles by dipping and pouring	/
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.	

2.2 Conditions affecting environmental exposure

Product characteristics : No data
Amounts used: Annual amount per site : 25,000 ton(s)/year
Other given operational conditions affecting environmental exposure: Number of emission: 330 days per year Release to air: 18 mg/m^3 (ERC4) Release to air: 9,45 mg/m^3 (ERC5) Release to air: 0,0189 mg/m^3 (ERC6a) Release to air: 0,945 mg/m^3 (ERC7)
Technical conditions and measures at process level (source) to prevent release: On-site wastewater treatment required. Efficient removal (~100%) of ammonia in STP (Sewage Treatment Plant) 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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Ammonia

Industrial use, Processing aid, an auxiliary agent in different processes

3 EXPOSURE ESTIMATION AND REFERENCE TO ITS SOURCE

3.1 Worker exposure

Route of exposure : Dermal :

Contributing scenario	Exposure Assessment Method	Specific conditions	Level of Exposure (mg/kg bw/d)	RCR
PROC1	ECETOC TRA	Outdoor, Systemic	0,34	0,05
PROC2	ECETOC TRA	Outdoor, Systemic	1,37	0,20
		Indoor with LEV, Systemic	0,14	0,02
PROC3	ECETOC TRA	Outdoor, Systemic	0,34	0,05
		Indoor with LEV, Systemic	0,03	0,01
PROC4 PROC8b PROC9	ECETOC TRA	Outdoor, Systemic, With gloves (90% protection)	0,69	0,10
		Indoor with LEV, Systemic	0,69	0,10
PROC5	ECETOC TRA	Outdoor, Systemic, With gloves (90% protection)	1,37	0,20
		Indoor with LEV, Systemic	0,07	0,01
PROC13	ECETOC TRA	Outdoor, Systemic, With gloves (90% protection)	1,37	0,20
		Indoor with LEV, Systemic	0,69	0,10

Route of exposure : Inhalation :

Contributing scenario	Exposure Assessment Method	Specific conditions	Level of Exposure (mg/m^3)	RCR
PROC1	ECETOC TRA	Outdoor, Systemic, Acute - local effects, Chronic -local effects	< 0,01	< 0,01
PROC2	ECETOC TRA	Outdoor, Systemic Inhalation	< 24,79	< 0,52
		Outdoor, Acute – local effects	< 24,79	< 0,69
		Outdoor, Chronic – local effects, With RPE (95% efficiency)	< 1,24	< 0,09
		Indoor with LEV, Systemic	< 3,54	< 0,07
		Indoor with LEV, Acute - local effects	< 3,54	< 0,10
		Indoor with LEV, Chronic - local effects	< 3,54	< 0,25
PROC3, PROC4	ECETOC TRA	Outdoor, Systemic, With RPE (95% efficiency)	< 2,48	< 0,05

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		Outdoor Acute – local effects, With RPE (95% efficiency)	< 2,48	< 0,07
		Outdoor Chronic – local effects, With RPE (95% efficiency)	< 2,48	< 0,18
		Indoor with LEV Systemic	< 7,08	< 0,15
		Indoor with LEV Acute - local effects	< 7,08	< 0,20
		Indoor with LEV hronic - local effects	< 7,08	< 0,51
PROC5, PROC13	ECETOC TRA	Outdoor Systemic, With RPE (95% efficiency)	< 6,20	< 0,13
		Outdoor Acute – local effects, With RPE (95% efficiency)	< 6,20	< 0,17
		Outdoor Chronic – local effects, With RPE (95% efficiency)	< 6,20	< 0,44
		Indoor with LEV Systemic	< 17,71	< 0,37
		Indoor with LEV Acute - local effects	< 17,71	< 0,49
		Indoor with LEV Chronic - local effects, With RPE (95% efficiency)	< 0,89	< 0,06
PROC8b	ECETOC TRA	Outdoor Systemic, With RPE (95% efficiency)	< 3,72	< 0,08
		Outdoor Acute – local effects, With RPE (95% efficiency)	< 3,72	< 0,10
		Outdoor Chronic – local effects, With RPE (95% efficiency)	< 3,72	< 0,27
		Indoor with LEV Systemic	< 3,19	< 0,07
		Indoor with LEV Acute - local effects	< 3,19	< 0,09
		Indoor with LEV Chronic - local effects	< 3,19	< 0,23
PROC9	ECETOC TRA	Outdoor Systemic, With RPE (95% efficiency)	< 4,96	< 0,10
		Outdoor Acute – local effects, With RPE (95% efficiency)	< 4,96	< 0,14
		Outdoor Chronic – local effects, With RPE (95% efficiency)	< 4,96	< 0,35
		Indoor with LEV, Systemic	< 14,17	< 0,30
		Indoor with LEV, Acute - local effects	< 14,17	< 0,39
		Indoor with LEV, Chronic - local effects, With RPE (95% efficiency)	< 0,71	< 0,05

LEV = Local Exhaust Ventilation. RPE = Respiratory Protective Equipment.

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Industrial use, Processing aid, an auxiliary agent in different processes

3.2 Environmental exposure

Contributing scenario	Exposure Assessment Method	Specific conditions	Compartment	Level of Exposure (µg/l)	RCR
ERC4	EUSES	Free ammonia	Fresh water	0,108	0,098
			Marine water	0,0231	0,021
ERC5			Fresh water	0,0558	0,051
			Marine water	0,0121	0,011
ERC6b			Fresh water	0,0017	0,0016
			Marine water	0,0002	0,0002
ERC7			Fresh water	0,0056	0,0051
			Marine water	0,0012	0,0011

4 GUIDANCE TO DU TO EVALUATE WHETHER HE WORKS INSIDE THE BOUNDARIES SET BY THE ES

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.

This exposure scenario is made based on information provided by our suppliers, at the time of publication. The information and recommendations are offered for the user's consideration and examination. Appropriate warnings and safe-handling procedures should be provided to handlers and users

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Ammonia
Professional use, Wide-dispersive uses

1 EXPOSURE SCENARIO

Title :
Professional use, Wide-dispersive uses

List of all use descriptors related to the life cycle stage :

Sector of use (SU):
SU22: Professional uses: Public domain (administration, education, entertainment, services, craftsmen).

Process category (PROC):
PROC1: Use in closed process, no likelihood of exposure.
PROC2: Use in closed, continuous process with occasional controlled exposure (e.g. sampling).
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).
PROC08a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities.
PROC08b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities.
PROC09: 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 category (ERC):
ERC8b : Wide dispersive indoor use of reactive substances in open systems
ERC8e : Wide dispersive outdoor use of reactive substances in open systems
ERC8f : Wide dispersive outdoor use resulting in inclusion into or onto a matrix
ERC9a : Wide dispersive indoor use of substances in closed systems
ERC9b : Wide dispersive outdoor use of substances in closed systems

2 OPERATIONALCONDITIONS AND RISK MANAGEMENT MEASURES

2.1 Conditions affecting human health exposure

Product characteristic:
Physical Form (at time of use): Liquefied gas.
Concentration of the Substance in Mixture/Article: Covers concentrations up to 100%.

Frequency and duration of use/exposure:
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^2).
Breathing volume: 20 m^3/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.

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Technical conditions and measures for contributing scenario :

Contributing scenario	Technical conditions and measures
PROC1	/
PROC2	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.
PROC3	/
PROC4	/
PROC5	/
PROC08a	Ensure material transfers are under containment or extract ventilation.
PROC08b	Ensure material transfers are under containment or extract ventilation.
PROC09	Ensure material transfers are under containment or extract ventilation. Keep container tightly closed.
PROC13	/
PROC15	**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.
PROC20	/

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.

2.2 Conditions affecting environmental exposure

Technical conditions and measures / Organizational measures
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:
Small level local emissions may be released to the STP (Sewage Treatment Plant) 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.

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3 EXPOSURE ESTIMATION AND REFERENCE TO ITS SOURCE

3.1 Worker exposure

Route of exposure : Dermal :

Contributing scenario	Exposure Assessment Method	Specific conditions	Level of Exposure (mg/kg bw/d)	RCR
PROC1	ECETOC TRA	Outdoor Indoor without LEV Systemic	0,34	0,05
PROC2	ECETOC TRA	Outdoor Indoor without LEV Systemic	1,37	0,20
		Indoor with LEV Systemic	0,14	0,02
PROC3, PROC15	ECETOC TRA	Outdoor Indoor without LEV Systemic	0,03	0,01
		Indoor with LEV Systemic	<1,24	< 0,09
PROC4, PROC8b, PROC9	ECETOC TRA	Outdoor Indoor without LEV Systemic, With gloves (90% protection)	0,69	0,10
		Indoor with LEV, Systemic	0,69	0,10
PROC5	ECETOC TRA	Outdoor Indoor without LEV Systemic With gloves (90% protection)	1,37	0,20
		Indoor with LEV Systemic	0,07	0,01
PROC8a	ECETOC TRA	Outdoor Indoor without LEV Systemic, With gloves (90% protection)	1,37	0,20
		Indoor with LEV Systemic	0,14	0,02
PROC13	ECETOC TRA	Outdoor Indoor without LEV Systemic, With gloves (90% protection)	1,37	0,20
		Indoor with LEV Systemic	0,69	0,10
PROC20	ECETOC TRA	Outdoor Indoor without LEV Systemic	1,71	0,25
		Indoor with LEV Systemic	0,14	0,02

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Route of exposure : Inhalation :

Contributing scenario	Exposure Assessment Method	Specific conditions	Level of Exposure (mg/m^3)	RCR
PROC1	ECETOC TRA	Outdoor Indoor without LEV Systemic Acute - local effects Chronic - local effects	< 0,01	< 0,01
PROC2	ECETOC TRA	Outdoor Indoor without LEV Systemic	< 35,42	< 0,74
		Outdoor Indoor without LEV Acute - local effects	< 35,42	< 0,98
		Outdoor Indoor without LEV Chronic – local effects, With RPE (95% efficiency)	< 1,77	< 0,13
		Indoor with LEV Systemic	< 3,54	< 0,07
		Indoor with LEV Acute - local effects	< 3,54	< 0,10
		Indoor with LEV Chronic - local effects	< 3,54	< 0,25
PROC3, PROC4	ECETOC TRA	Outdoor Indoor without LEV Systemic, With RPE (95% efficiency)	< 3,54	< 0,07
		Outdoor Indoor without LEV Acute – local effects, With RPE (95% efficiency)	< 3,54	< 0,10
		Outdoor Indoor without LEV Chronic – local effects, With RPE (95% efficiency)	< 3,54	< 0,25
		Indoor with LEV, Systemic	< 7,08	< 0,15
		Indoor with LEV, Acute - local effects	< 7,08	< 0,20
		Indoor with LEV, Chronic - local effects	< 7,08	< 0,51
PROC5, PROC8a, PROC13	ECETOC TRA	Outdoor Indoor without LEV Systemic, With RPE (95% efficiency)	< 8,85	< 0,19
		Outdoor Indoor without LEV Acute - local effects, With RPE (95% efficiency)	< 8,85	< 0,25
		Outdoor Indoor without LEV Chronic – local effects, With RPE (95% efficiency)	< 8,85	< 0,63
		Indoor with LEV Systemic	< 17,71	< 0,37
		Indoor with LEV Acute - local effects	< 17,71	< 0,49
		Indoor with LEV, Chronic - local effects, With RPE (95% efficiency)	< 0,89	< 0,06

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PROC8b	ECETOC TRA	Outdoor, Indoor without LEV, Systemic, With RPE (95% efficiency)	< 5,31 mg/m3	< 0,11
		Outdoor, Indoor without LEV, Acute – local effects, With RPE (95% efficiency)	< 5,31	< 0,15
		Outdoor, Indoor without LEV, Chronic – local effects, With RPE (95% efficiency)	< 5,31	< 0,38
		Indoor with LEV Systemic	< 3,19	< 0,07
		Indoor with LEV Acute - local effects	< 3,19	< 0,09
		Indoor with LEV Chronic - local effects	< 3,19	< 0,23
PROC9	ECETOC TRA	Outdoor Indoor without LEV Systemic, With RPE (95% efficiency)	< 7,08	< 0,15
		Outdoor Indoor without LEV, Acute – local effects, With RPE (95% efficiency)	< 7,08	< 0,20
		Outdoor Indoor without LEV Chronic - local effects, With RPE (95% efficiency)	< 7,08	< 0,51
		Indoor with LEV Systemic	< 14,17	< 0,30
		Indoor with LEV Acute - local effects	< 14,17	< 0,39
		Indoor with LEV Chronic - local effects, With RPE (95% efficiency)	< 0,71	< 0,05
PROC15	ECETOC TRA	Indoor without LEV, Systemic	< 35,42	< 0,74
		Indoor without LEV, Acute - local effects	< 35,42	< 0,98
		Indoor without LEV Chronic - local effects, With RPE (95% efficiency)	< 1,77	< 0,13
		Indoor with LEV Systemic	< 3,54	< 0,07
		Indoor with LEV Acute - local effects	< 3,54	< 0,10
		Indoor with LEV Chronic - local effects	< 3,54	< 0,25
PROC20	ECETOC TRA	Outdoor, Indoor without LEV, Systemic	< 35,42	< 0,74
		Outdoor, Indoor without LEV, Acute - local effects	< 35,42	< 0,98
		Outdoor Indoor without LEV, Chronic – local effects, With RPE (95% efficiency)	< 1,77	< 0,13
		Indoor with LEV Systemic	< 7,08	< 0,15
		Indoor with LEV Acute effects	< 7,08	< 0,20
		Indoor with LEV Long term	< 7,08	< 0,51

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LEV = Local Exhaust Ventilation. RPE = Respiratory Protective Equipment.

3.2 Environmental exposure

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4 GUIDANCE TO DU TO EVALUATE WHETHER HE WORKS INSIDE THE BOUNDARIES SET BY THE ES

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.

This exposure scenario is made based on information provided by our suppliers, at the time of publication. The information and recommendations are offered for the user's consideration and examination. Appropriate warnings and safe-handling procedures should be provided to handlers and users

End of document

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