

according to the REACH Regulation (EC) 1907/2006 amended by Regulation (EU) 2020/878 Version: 10.0 Revision date: 23/12/2022 Supersedes version of: 29/08/2018

MSDS.002

# ammonia, anhydrous

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

1.1. Product identifier	
Product form	: Substance
Trade name	: Anhydrous ammonia
	Anhydrous ammonia 2.5
	Anhydrous ammonia 2.7
	Anhydrous ammonia 3.8
	Anhydrous ammonia 4.0
	Anhydrous ammonia 5.0
	Anhydrous ammonia 5.5
SDS code	: MSDS.002
Other means of identification	: ammonia, anhydrous
	CAS-No. : 7664-41-7
	EC-No. : 231-635-3
	EC Index-No. : 007-001-00-5
REACH registration No	: 01-2119488876-14
Chemical formula	: NH3
1.2. Relevant identified uses of the subs	tance or mixture and uses advised against
Relevant identified uses	: See the list of identified uses and exposure scenarios in the annex of the safety data sheet.
	Perform risk assessment prior to use.
Uses advised against	Consumer use.
-	Uses other than those listed above are not supported, contact your supplier for more information on other
	uses.
1.3. Details of the supplier of the safety	data sheet
Sapio Produzione Idrogeno Ossigeno Srl	
Via S. Pellico, 48	
20900 Monza	
T +39 039 836068	
www.sapio.it	
E-mail address of competent person responsible	for the SDS · sds@sanio.it
- mail address of competent person responsible	

: +39 0295705444 (24/7)

## 1.4. Emergency telephone number

Emergency telephone number

## **SECTION 2: Hazards identification**

## 2.1. Classification of the substance or mixture

Classification according to Regulation (EC) No. 1272/2008 [CLP]			
Physical hazards	Flammable gases, Category 2	H221	
	Gases under pressure: Liquefied gas	H280	
Health hazards	Skin corrosion/irritation, Category 1, Sub-Category 1B	H314	
	Serious eye damage/eye irritation, Category 1	H318	
	Acute toxicity (inhalation:gas) Category 3	H331	
Environmental hazards	Hazardous to the aquatic environment – Acute Hazard, Category 1	H400	
	Hazardous to the aquatic environment – Chronic Hazard, Category 2	H411	

## 2.2. Label elements

## Labelling according to Regulation (EC) No. 1272/2008 [CLP]

Hazard pictograms (CLP)	
Circul word (OLD)	GHS04 GHS05 GHS06 GHS09
Signal word (CLP)	: Danger
Hazard statements (CLP)	: H221 - Flammable gas. H280 - Contains gas under pressure; may explode if heated.
	H314 - Causes severe skin burns and eve damage.
	H331 - Toxic if inhaled.
	H410 - Very toxic to aquatic life with long lasting effects.
	EUH071 - Corrosive to the respiratory tract.



according to the REACH Regulation (EC) 1907/2006 amended by Regulation (EU) 2020/878 Version: 10.0 Revision date: 23/12/2022 Supersedes version of: 29/08/2018

## MSDS.002

	ammonia, anhydrous
Precautionary statements (CLP)	
- Prevention	<ul> <li>P210 - Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.</li> <li>P260 - Do not breathe gas, vapours.</li> <li>P273 - Avoid release to the environment.</li> <li>P200 - Wire supressing for environment.</li> </ul>
- Response	<ul> <li>P280 - Wear eye protection, face protection, protective clothing, protective gloves.</li> <li>P303+P361+P353+P315 - IF ON SKIN : (or hair) Take off immediately all contaminated clothing. Rinse skin with water or shower. Get immediate medical advice.</li> <li>P304+P340+P315 - IF INHALED : Remove person to fresh air and keep comfortable for breathing. Get immediate medical advice.</li> <li>P305+P351+P338+P315 - IF IN EYES : Rinse cautiously with water for several minutes. Remove contact</li> </ul>
- Storage	lenses, if present and easy to do. Continue rinsing. Get immediate medical advice. P377 - Leaking gas fire: Do not extinguish, unless leak can be stopped safely. P381 - In case of leakage, eliminate all ignition sources. : P403 - Store in a well-ventilated place.
2.3. Other hazards	P405 - Store locked up.
	Not classified as PBT or vPvB.
	The substance/mixture has no endocrine disrupting properties.



according to the REACH Regulation (EC) 1907/2006 amended by Regulation (EU) 2020/878

Version: 10.0 Revision date: 23/12/2022 Supersedes version of: 29/08/2018

**MSDS.002** 

# ammonia, anhydrous

## **SECTION 3: Composition/information on ingredients**

## 3.1. Substances

Name	Product identifier	%	Classification according to Regulation (EC) No. 1272/2008 [CLP]
ammonia, anhydrous	CAS-No.: 7664-41-7 EC-No.: 231-635-3 EC Index-No.: 007-001-00-5 REACH registration No: 01-2119488876-14	100	Flam. Gas 2, H221 Press. Gas (Liq.), H280 Skin Corr. 1B, H314 Eye Dam. 1, H318 Acute Tox. 3 (Inhalation:gas), H331 Aquatic Acute 1, H400 Aquatic Chronic 2, H411

Contains no other components or impurities which will influence the classification of the product. Not applicable

3.2. Mixtures

**SECTION 4: First aid measures** 4.1. Description of first aid measures Inhalation : Remove victim to uncontaminated area wearing self contained breathing apparatus. Keep victim warm and rested. Call a doctor. Perform cardiopulmonary resuscitation if breathing stopped. Skin contact Remove contaminated clothing. Drench affected area with water for at least 15 minutes. In case of frostbite spray with water for at least 15 minutes. Apply a sterile dressing. Obtain medical assistance Eye contact Immediately flush eyes thoroughly with water for at least 15 minutes. Ingestion Ingestion is not considered a potential route of exposure. 4.2. Most important symptoms and effects, both acute and delayed Prolonged exposure to small concentrations may result in pulmonary oedema. May cause severe chemical burns to skin and cornea. Suitable first-aid treatment should be immediately available. Seek medical advice before using product. Material is destructive to tissue of the mucuous membranes and upper respiratory tract. Cough, shortness of breath, headache, nausea. See section 11. 4.3. Indication of any immediate medical attention and special treatment needed Obtain medical assistance. Treat with corticosteroid spray as soon as possible after inhalation. **SECTION 5: Firefighting measures** 5.1. Extinguishing media Suitable extinguishing media Foam. Water spray or fog. Shutting off the source of the gas is the preferred method of control. Unsuitable extinguishing media Do not use water jet to extinguish. 5.2. Special hazards arising from the substance or mixture Specific hazards : Exposure to fire may cause containers to rupture/explode. Hazardous combustion products : Nitric oxide/nitrogen dioxide. 5.3. Advice for firefighters Specific methods : Do not extinguish a leaking gas flame unless absolutely necessary. Spontaneous/explosive re-ignition may occur. Extinguish any other fire. Use fire control measures appropriate for the surrounding fire. Exposure to fire and heat radiation may cause gas receptacles to rupture. Cool endangered receptacles with water spray jet from a protected position. Prevent water used in emergency cases from entering sewers and drainage systems. If possible, stop flow of product. Use water spray or fog to knock down fire fumes if possible. Move containers away from the fire area if this can be done without risk.



according to the REACH Regulation (EC) 1907/2006 amended by Regulation (EU) 2020/878 Version: 10.0 Revision date: 23/12/2022 Supersedes version of: 29/08/2018

## **MSDS.002**

# ammonia, anhydrous

Special protective equipment for fire fighters

Wear gas tight chemically protective clothing in combination with self contained breathing apparatus. Standard EN 943-2: Protective clothing against liquid and gaseous chemicals, aerosols and solid particles. Gas-tight chemical protective suits for emergency teams. Standard EN 137 - Self-contained open-circuit compressed air breathing apparatus with full face mask.

## SECTION 6: Accidental release measures

### 6.1. Personal precautions, protective equipment and emergency procedures For non-emergency personnel : Act in accordance with local emergency plan. Try to stop release. Evacuate area. Ensure adequate air ventilation. Eliminate ignition sources. Stay upwind. See section 8 of the SDS for more information on personal protective equipment For emergency responders Wear self-contained breathing apparatus when entering area unless atmosphere is proved to be safe. Use chemically protective clothing. Monitor concentration of released product. Consider the risk of potentially explosive atmospheres. See section 5.3 of the SDS for more information. 6.2. Environmental precautions Reduce vapour with fog or fine water spray. Try to stop release.

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

Ventilate area.
Hose down area with water.
Wash contaminated equipment or sites of leaks with copious quantities of water.

## 6.4. Reference to other sections

See also sections 8 and 13.

## SECTION 7: Handling and storage

## 7.1. Precautions for safe handling

Safe use of the product	: Take precautionary measures against static discharge.
Sale use of the product	Keep away from ignition sources (including static discharges).
	Use only properly specified equipment which is suitable for this product, its supply pressure and
	temperature. Contact your gas supplier if in doubt.
	Purge air from system before introducing gas.
	Avoid exposure, obtain special instructions before use.
	Do not smoke while handling product.
	Avoid suck back of water, acid and alkalis.
	Only experienced and properly instructed persons should handle gases under pressure.
	Ensure the complete gas system was (or is regularily) checked for leaks before use.
	Installation of a cross purge assembly between the container and the regulator is recommended.
	Purge system with dry inert gas (e.g. helium or nitrogen) before gas is introduced and when system is
	placed out of service.
	Assess the risk of potentially explosive atmospheres and the need for explosion-proof equipment.
	Consider the use of only non-sparking tools.
	The product must be handled in accordance with good industrial hygiene and safety procedures.
	Consider pressure relief device(s) in gas installations.
	Do not breathe gas.
	Avoid release of product into work area.
	Ensure equipment is adequately earthed.
	Use only lubricants and sealings approved for the specific gas service.
	ose only rubicants and searings approved for the specific gas service.



according to the REACH Regulation (EC) 1907/2006 amended by Regulation (EU) 2020/878 Version: 10.0 Revision date: 23/12/2022 Supersedes version of: 29/08/2018

## MSDS.002

## ammonia, anhydrous

	ammoni	a, annyurous
Safe handling of the gas receptacle	Protect contain When moving of transport cylind Leave valve pro or placed in a co If user experier Never attempt Damaged valve Keep container Replace valve disconnected fr Close containen Never attempt Never attempt Never use dire Do not remove container. Suck back of w Open valve slo	ackfeed into the container. ters from physical damage; do not drag, roll, slide or drop. cylinders, even for short distances, use a cart (trolley, hand truck, etc.) designed to ders. otection caps in place until the container has been secured against either a wall or bench container stand and is ready for use. nces any difficulty operating valve discontinue use and contact supplier. to repair or modify container valves or safety relief devices. es should be reported immediately to the supplier. r valve outlets clean and free from contaminants particularly oil and water. outlet caps or plugs and container caps where supplied as soon as container is rom equipment. r valve after each use and when empty, even if still connected to equipment. to transfer gases from one cylinder/container to another. ct flame or electrical heating devices to raise the pressure of a container. or deface labels provided by the supplier for the identification of the content of the vater into the container must be prevented. wyly to avoid pressure shock.
	All electrical eq atmosphere. Observe all reg Containers sho Container valve Containers sho over. Stored container Keep container Store container	n oxidant gases and other oxidants in store. quipment in the storage areas should be compatible with the risk of a potentially explosive gulations and local requirements regarding storage of containers. puld not be stored in conditions likely to encourage corrosion. e guards or caps should be in place. build be stored in the vertical position and properly secured to prevent them from falling ers should be periodically checked for general condition and leakage. r below 50°C in a well ventilated place. rs in location free from fire risk and away from sources of heat and ignition. m combustible materials.
7.3. Specific end use(s)		
	None.	
SECTION 8: Exposure controls/perso	nal protection	
8.1. Control parameters		
ammonia, anhydrous (7664-41-7) USA - ACGIH - Occupational Exposure Limits		
Local name		Ammonia
ACGIH OEL TWA [ppm]		25 ppm
		35 ppm
ACGIH OEL STEL [ppm]		TLV® Basis: Eye dam; URT irr
Remark (ACGIH)		ACGIH 2019
Regulatory reference		A00112013
ammonia, anhydrous (7664-41-7)		
DNEL: Derived no effect level (Workers)		
Acute - local effects, inhalation		36 mg/m <sup>3</sup>
Acute - systemic effects, inhalation		47.6 mg/m <sup>3</sup>
Long-term - local effects, inhalation		14 mg/m <sup>3</sup>
Long-term - systemic effects, inhalation		47.6 mg/m <sup>3</sup>
Acute - systemic effects, dermal		6.8 mg/kg bw/day

ammonia, anhydrous (7664-41-7)
PNEC: Predicted no effect concentration

6.8 mg/kg bw/day

Long-term - systemic effects, dermal

Sapio Produzione Idrogeno Ossigeno Srl



according to the REACH Regulation (EC) 1907/2006 amended by Regulation (EU) 2020/878 Version: 10.0 Revision date: 23/12/2022 Supersedes version of: 29/08/2018

## MSDS.002

# ammonia, anhydrous

Aqua (freshwater)	0.0011 mg/l
Aqua (marine water)	0.0011 mg/l
8.2. Exposure controls	
8.2.1. Appropriate engineering controls	
	Provide adequate general and local exhaust ventilation.
	Product to be handled in a closed system.
	Consider the use of a work permit system e.g. for maintenance activities.
	Gas detectors should be used when toxic gases may be released.
	Systems under pressure should be regularily checked for leakages.
	Ensure exposure is below occupational exposure limits (where available).
8.2.2. Individual protection measures, e.	
	A risk assessment should be conducted and documented in each work area to assess the risks related to
	the use of the product and to select the PPE that matches the relevant risk. The following
	recommendations should be considered:
Eve/face protection	PPE compliant to the recommended EN/ISO standards should be selected.
Eye/face protection	<ul> <li>Wear goggles and a face shield when transfilling or breaking transfer connections.</li> <li>Provide readily accessible eye wash stations and safety showers.</li> </ul>
	Standard EN 166 - Personal eye-protection - specifications.
Skin protection	
Hand protection	: Wear working gloves when handling gas containers.
	Wear chemically resistant protective gloves.
	Standard EN 374 - Protective gloves against chemicals.
	Standard EN 388 - Protective gloves against mechanical risk, performance level 1 or higher.
	Standard EN 511 - Cold insulating gloves.
	Permeation time: minimum >30min short term exposure: material / thickness Chloroprene rubber
	(Neoprene®) (CR) / 0,5 [mm].
	Permeation time: minimum >480min long term exposure : material / thickness Butyl rubber (IIR) / 0,7
	[mm]. Consult glove menufecture/e preduct information on material quitability and material this/sees
	Consult glove manufacturer's product information on material suitability and material thickness. The breakthrough time of the selected gloves must be greater than the intended use period.
Other	: Keep suitable chemically resistant protective clothing readily available for emergency use.
	Standard EN943-1 - Full protective suits against liquid, solid and gaseous chemicals.
	Wear safety shoes while handling containers.
	Standard EN ISO 20345 - Personal protective equipment - Safety footwear.
Respiratory protection	: Recommended: Filter K (green).
	Keep self contained breathing apparatus readily available for emergency use.
	Self contained breathing apparatus is recommended, where unknown exposure may be expected, e.g.
	during maintenance activities on installation systems.
	Gas filters may be used if all surrounding conditions e.g. type and concentration of the contaminant(s)
	and duration of use are known.
	Use gas filters with full face mask, where exposure limits may be exceeded for a short-term period, e.g.
	connecting or disconnecting containers. Standard EN 137 - Self-contained open-circuit compressed air breathing apparatus with full face mask.
	Gas filters do not protect against oxygen deficiency.
	Standard EN 14387 - Gas filter(s), combined filter(s) and standard EN136, full face masks .

Thermal hazards

#### 8.2.3. Environmental exposure controls

Refer to local regulations for restriction of emissions to the atmosphere. See section 13 for specific methods for waste gas treatment.

## **SECTION 9: Physical and chemical properties**

## 9.1. Information on basic physical and chemical properties

- Colour :	Gas. Colourless. Ammoniacal.	
	Odour threshold is subjective and inadequate to warn of overexposure	<
Melting point / Freezing point :	-77.7 °C	
Boiling point :	-33 °C	
Flammability :	Flammable gas.	
Lower explosive limit (LEL) :	15.4 vol %	
Upper explosive limit (UEL) :	33.6 vol %	
Sapio Produzione Idrogeno Ossigeno Srl	EN (English) MSDS.002	6

: None in addition to the above sections.



according to the REACH Regulation (EC) 1907/2006 amended by Regulation (EU) 2020/878 Version: 10.0 Revision date: 23/12/2022 Supersedes version of: 29/08/2018

## MSDS.002

Flash point	: Not applicable for gases and gas mixtures.	
Auto-ignition temperature	: 630 °C	
Decomposition temperature	: Not applicable.	
рН	: If dissolved in water pH-value will be affected.	
Viscosity, kinematic	: No reliable data available.	
Water solubility [20°C]	: 517 g/l	
Partition coefficient n-octanol/water (Log Kow)	: Not available.	
Vapour pressure [20°C]	: 8.6 bar(a)	
Vapour pressure [50°C]	: 20 bar(a)	
Density and/or relative density	: Not applicable.	
Relative vapour density (air=1)	: 0.6	
Particle characteristics	: Not applicable for gases and gas mixtures.	
9.2. Other information		
9.2.1. Information with regard to physical hazard of	lasses	
Explosion limits	: 15.4 – 33.6 vol %	
Oxidising properties	: No oxidising properties.	
Critical temperature [°C]	: 132 °C	
9.2.2. Other safety characteristics		
Molar mass	: 17 g/mol	

## **SECTION 10: Stability and reactivity**

## 10.1. Reactivity

	No reactivity hazard other than the effects described in sub-sections below.
10.2. Chemical stability	
	Stable under normal conditions.
10.3. Possibility of hazardous reactions	
	Can form explosive mixture with air.
	May react violently with oxidants.
10.4. Conditions to avoid	
	Keep away from heat/sparks/open flames/hot surfaces. – No smoking.
	Avoid moisture in installation systems.
10.5. Incompatible materials	
	Reacts with water to form corrosive alkalis.
	May react violently with acids.
	Air, Oxidisers.
	For additional information on compatibility refer to ISO 11114.
10.6. Hazardous decomposition products	

### Under normal conditions of storage and use, hazardous decomposition products should not be produced.

## SECTION 11: Toxicological information

## 11.1. Information on hazard classes as defined in Regulation (EC) No 1272/2008

Acute toxicity	: Toxic if inhaled.
LC50 Inhalation - Rat [ppm]	2000 ppm/4h
Skin corrosion/irritation	Causes severe skin burns and eye damage.
Serious eye damage/irritation	Causes serious eye damage.
Respiratory or skin sensitisation	No known effects from this product.
Germ cell mutagenicity	No known effects from this product.
Carcinogenicity	No known effects from this product.



Safety Data Sheet according to the REACH Regulation (EC) 1907/2006 amended by Regulation (EU) 2020/878

Version: 10.0 Revision date: 23/12/2022 Supersedes version of: 29/08/2018

## MSDS.002

	ammonia, anhydrous		
Toxic for reproduction : Fertility	: No known effects from this product.		
Toxic for reproduction : unborn child	: No known effects from this product.		
STOT-single exposure	: May cause inflammation of the respiratory system.		
Target organ(s)	Severe corrosion to the respiratory tract at high concentrations. : Respiratory tract.		
STOT-repeated exposure	: No known effects from this product.		
Aspiration hazard	: Not applicable for gases and gas mixtures.		
11.2. Information on other hazards			
Other information	: Inhalation of large amounts leads to bronchospasm, laryngeal oedema and pseudomembrane formation The substance/mixture has no endocrine disrupting properties.		
SECTION 12: Ecological information			
<u>12.1. Toxicity</u>			
Assessment	: Very toxic to aquatic life. Toxic to aquatic life with long lasting effects.		
EC50 48h - Daphnia magna [mg/l] EC50 72h - Algae [mg/l] LC50 96 h - Fish [mg/l]	: 101 mg/l : No data available. : 0.89 mg/l		
12.2. Persistence and degradability			
Assessment	: The substance is readily biodegradable. Unlikely to persist.		
12.3. Bioaccumulative potential			
Assessment	: No data available.		
<u>12.4. Mobility in soil</u>			
Assessment	: Because of its high volatility, the product is unlikely to cause ground or water pollution. Partition into soil is unlikely.		
12.5. Results of PBT and vPvB assessment			
Assessment	: Not classified as PBT or vPvB.		
12.6. Endocrine disrupting properties			
	The substance/mixture has no endocrine disrupting properties.		
12.7. Other adverse effects			
Other adverse effects Effect on the ozone layer Effect on global warming	<ul> <li>May cause pH changes in aqueous ecological systems.</li> <li>No effect on the ozone layer.</li> <li>No known effects from this product.</li> </ul>		
SECTION 13: Disposal considerations			
13.1. Waste treatment methods			
	Toxic and corrosive gases formed during combustion should be scrubbed before discharge to		

	Toxic and corrosive gases formed during combustion should be scrubbed before discharge to
	atmosphere.
	Gas may be scrubbed in sulphuric acid solution.
	Gas may be scrubbed in water.
	Contact supplier if guidance is required.
	Must not be discharged to atmosphere.
	Ensure that the emission levels from local regulations or operating permits are not exceeded.
	Refer to the EIGA code of practice Doc.30 "Disposal of Gases", downloadable at http://www.eiga.eu for
	more guidance on suitable disposal methods.
	Return unused product in original container to supplier.
List of hazardous waste codes (from Commission Decision 2000/532/EC as amended)	: 16 05 04 *: Gases in pressure containers (including halons) containing hazardous substances.
13.2. Additional information	
	External treatment and disposal of waste should comply with applicable local and/or national regulations.



according to the REACH Regulation (EC) 1907/2006 amended by Regulation (EU) 2020/878

Version: 10.0 Revision date: 23/12/2022 Supersedes version of: 29/08/2018

## **MSDS.002**

## ammonia, anhydrous

## **SECTION 14: Transport information**

## 14.1. UN number or ID number

In accordance with ADR / RID / IMDG / IATA / ADN UN-No.

## 14.2. UN proper shipping name

Transport by road/rail (ADR/RID) Transport by air (ICAO-TI / IATA-DGR) Transport by sea (IMDG)

## 14.3. Transport hazard class(es)

Transport by road/rail (ADR/RID)

Emergency Schedule (EmS) - Fire

Emergency Schedule (EmS) - Spillage

Transport by air (ICAO-TI / IATA-DGR)

Transport by air (ICAO-TI / IATA-DGR)

14.6. Special precautions for user

Transport by air (ICAO-TI / IATA-DGR) Passenger and Cargo Aircraft

14.5. Environmental hazards Transport by road/rail (ADR/RID)

### Labelling

Class

Classification code Hazard identification number

Tunnel Restriction

Transport by sea (IMDG) Class / Div. (Sub. risk(s))

14.4. Packing group Transport by road/rail (ADR/RID)

Transport by sea (IMDG)

Transport by sea (IMDG)

Packing Instruction(s) Transport by road/rail (ADR/RID)

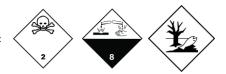
Cargo Aircraft only

Transport by sea (IMDG)

Special transport precautions

: 1005

- : AMMONIA, ANHYDROUS
- : Ammonia, anhydrous
- : AMMONIA, ANHYDROUS



2.3 : Toxic gases. 8 : Corrosive substances. Environmentally hazardous substances

## : 2

- · 2TC
- : 268

C/D - Tank carriage : Passage forbidden through tunnels of category C, D and E. Other carriage : Passage forbidden through tunnels of category D and E

- : 2.3 (8)
- : F-C
- : S-U
- : Not applicable
- : Not applicable
- : Not applicable
- : Environmentally hazardous substance / mixture.
- Environmentally hazardous substance / mixture.
- Marine pollutant

## : P200

- : Forbidden.
- P200

Avoid transport on vehicles where the load space is not separated from the driver's compartment. Ensure vehicle driver is aware of the potential hazards of the load and knows what to do in the event of an accident or an emergency.

- Before transporting product containers:
- Ensure there is adequate ventilation.
- Ensure that containers are firmly secured.
- Ensure valve is closed and not leaking.
- Ensure valve outlet cap nut or plug (where provided) is correctly fitted.
- Ensure valve protection device (where provided) is correctly fitted.

## 14.7. Maritime transport in bulk according to IMO instruments

#### Not applicable.

- : Forbidden.



according to the REACH Regulation (EC) 1907/2006 amended by Regulation (EU) 2020/878

Version: 10.0 Revision date: 23/12/2022 Supersedes version of: 29/08/2018

## MSDS.002

# ammonia, anhydrous

## **SECTION 15: Regulatory information**

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

Restrictions on use Other information, restriction and prohibition regulations Seveso Directive : 2012/18/EU (Seveso III)	<ul> <li>None.</li> <li>Not listed on the PIC list (Regulation EU 649/2012).</li> <li>Listed.</li> </ul>
National regulations	
Regulatory reference	: Ensure all national/local regulations are observed.

15.2. Chemical safety assessment

A CSA has been carried out.

Indication of changes	: Safety data sheet in accordance with commission regulation (EU) No 2020/878.
Abbreviations and acronyms	: ATE - Acute Toxicity Estimate
	CLP - Classification Labelling Packaging Regulation; Regulation (EC) No 1272/2008
	REACH - Registration, Evaluation, Authorisation and Restriction of Chemicals Regulation (EC) No 1907/2006
	EINECS - European Inventory of Existing Commercial Chemical Substances
	CAS# - Chemical Abstract Service number
	PPE - Personal Protection Equipment
	LC50 - Lethal Concentration to 50 % of a test population
	RMM - Risk Management Measures
	PBT - Persistent, Bioaccumulative and Toxic
	vPvB - Very Persistent and Very Bioaccumulative
	STOT- SE : Specific Target Organ Toxicity - Single Exposure
	CSA - Chemical Safety Assessment
	EN - European Standard
	UN - United Nations
	ADR - European Agreement concerning the International Carriage of Dangerous Goods by Road IATA - International Air Transport Association
	IMDG code - International Maritime Dangerous Goods
	RID - Regulations concerning the International Carriage of Dangerous Goods by Rail
	WGK - Water Hazard Class
	STOT - RE : Specific Target Organ Toxicity - Repeated Exposure
	UFI : Unique Formula Identifier
Training advice	: Users of breathing apparatus must be trained.
	Ensure operators understand the flammability hazard.
	Ensure operators understand the toxicity hazard.
Further information	: Classification in accordance with the procedures and calculation methods of Regulation (EC) 1272/2008 (CLP).
	Key literature references and sources of data are maintained in EIGA doc 169 : 'Classification and Labelling Guide', downloadable at http://www.Eiga.eu .

Full text of H- and EUH-statements		
Acute Tox. 3 (Inhalation:gas)	Acute toxicity (inhalation:gas) Category 3	
Aquatic Acute 1	Hazardous to the aquatic environment – Acute Hazard, Category 1	
Aquatic Chronic 2	Hazardous to the aquatic environment – Chronic Hazard, Category 2	
EUH071	Corrosive to the respiratory tract.	
Eye Dam. 1	Serious eye damage/eye irritation, Category 1	
Flam. Gas 2	Flammable gases, Category 2	
H221	Flammable gas.	
H280	Contains gas under pressure; may explode if heated.	
H314	Causes severe skin burns and eye damage.	
H318	Causes serious eye damage.	



according to the REACH Regulation (EC) 1907/2006 amended by Regulation (EU) 2020/878 Version: 10.0 Revision date: 23/12/2022 Supersedes version of: 29/08/2018

## MSDS.002

# ammonia, anhydrous

Full text of H- and EUH-statements		
H331	Toxic if inhaled.	
H400	Very toxic to aquatic life.	
H411	Toxic to aquatic life with long lasting effects.	
Press. Gas (Liq.)	Gases under pressure: Liquefied gas	
Skin Corr. 1B	Skin corrosion/irritation, Category 1, Sub-Category 1B	

DISCLAIMER OF LIABILITY

: Before using this product in any new process or experiment, a thorough material compatibility and safety study should be carried out.

Details given in this document are believed to be correct at the time of going to press.

Whilst proper care has been taken in the preparation of this document, no liability for injury or damage resulting from its use can be accepted.



according to the REACH Regulation (EC) 1907/2006 amended by Regulation (EU) 2020/878 Version: 10.0 Revision date: 23/12/2022 Supersedes version of: 29/08/2018

MSDS.002

# ammonia, anhydrous

## Annex to the safety data sheet

This Annex documents the Exposure Scenarios (ESs) related to the identified uses of the registered substance. The ESs detail protective measures for workers and the environment in addition to those described in sections 7, 8, 11, 12 and 13 of the SDS that are required to ensure that the potential exposure to workers and the environment remains within acceptable levels for each of the identified uses.

Table of contents of the Annex

Identified Uses	Es N°	Short title	Page
Water treatment	EIGA002-1	Industrial uses, closed contained conditions	13
Formulation of mixtures in pressure receptacles	EIGA002-1	Industrial uses, closed contained conditions	13
Transfilling in pressure receptacles	EIGA002-1	Industrial uses, closed contained conditions	13
Metal treatment	EIGA002-1	Industrial uses, closed contained conditions	13
Electronic component manufacture	EIGA002-1	Industrial uses, closed contained conditions	13
Manufacture of pharmaceutical products	EIGA002-1	Industrial uses, closed contained conditions	13
Calibration of analysis equipment	EIGA002-1	Industrial uses, closed contained conditions	13
Feedstock in chemical processes	EIGA002-1	Industrial uses, closed contained conditions	13
Precursor for fertiliser/explosive manufacture	EIGA002-1	Industrial uses, closed contained conditions	13
Exhaust gas DeNOx applications	EIGA002-1	Industrial uses, closed contained conditions	13
Treatment of plastics	EIGA002-1	Industrial uses, closed contained conditions	13
Aluminium casting	EIGA002-1	Industrial uses, closed contained conditions	13
Treatment of textiles	EIGA002-1	Industrial uses, closed contained conditions	13
Waste recycling	EIGA002-1	Industrial uses, closed contained conditions	13
Refilling of refrigeration equipment	EIGA002-2	Professional uses	23
In photocopying machines	EIGA002-2	Professional uses	23
Reaction gas in mass spectrometry	EIGA002-2	Professional uses	23
Microfiche developing and duplication	EIGA002-2	Professional uses	23



according to the REACH Regulation (EC) 1907/2006 amended by Regulation (EU) 2020/878 Version: 10.0 Revision date: 23/12/2022 Supersedes version of: 29/08/2018

MSDS.002

# ammonia, anhydrous

## 1. EIGA002-1: Industrial uses, closed contained conditions

1.1. Title section	
	Industrial uses, closed contained conditions
	ES Ref.: EIGA002-1 Revision date: 4/25/2017
Processes, tasks, activities covered	Industrial uses, including product transfers and associated laboratory activities within different closed of contained systems
Environment	Use descriptors
CS1	ERC1
CS2	ERC2
CS3	ERC4
CS4	ERC6a
CS5	ERC6b
CS6	ERC7
Worker	Use descriptors
CS7	PROC1
CS8	PROC2
CS9	PROC3
CS10	PROC4
CS11	PROC8b
CS12	PROC9
Assessment method	ECETOC TRA 2.0
	EUSES
	2
.2.1. Control of environmental exposure: ERC	2
.2.1. Control of environmental exposure: ERC ERC1	2
1.2. Conditions of use affecting exposure 1.2.1. Control of environmental exposure: ERC ERC1 Product (article) characteristics Physical form of product	2 C1 Manufacture of the substance
<b>.2.1. Control of environmental exposure: ERC</b> ERC1 <b>Product (article) characteristics</b> Physical form of product	2 C1 Manufacture of the substance See section 9 of the SDS, No additional information
.2.1. Control of environmental exposure: ERC ERC1 Product (article) characteristics Physical form of product	2 C1 Manufacture of the substance
.2.1. Control of environmental exposure: ERC ERC1 Product (article) characteristics Physical form of product Concentration of substance in product	2 C1 Manufacture of the substance See section 9 of the SDS, No additional information ≤ 100 %
.2.1. Control of environmental exposure: ERC ERC1 Product (article) characteristics Physical form of product Concentration of substance in product Amount used, frequency and duration of use (	2 C1 Manufacture of the substance See section 9 of the SDS, No additional information ≤ 100 %
.2.1. Control of environmental exposure: ERC ERC1 Product (article) characteristics Physical form of product Concentration of substance in product Amount used, frequency and duration of use ( Annual site tonnage:	2 C1 Manufacture of the substance See section 9 of the SDS, No additional information ≤ 100 % (or from service life)
ERC1     Froduct (article) characteristics     Physical form of product     Concentration of substance in product     Amount used, frequency and duration of use (     Annual site tonnage:     Regional use tonnage:	2 C1 Manufacture of the substance See section 9 of the SDS, No additional information ≤ 100 % (or from service life) 950000 t/yr
<b>2.1. Control of environmental exposure: ERC</b> ERC1 <b>Product (article) characteristics</b> Physical form of product         Concentration of substance in product <b>Amount used, frequency and duration of use (</b> Annual site tonnage:         Regional use tonnage:         Emission Days (days/year)	2 21 Manufacture of the substance See section 9 of the SDS, No additional information ≤ 100 % (or from service life) 950000 t/yr 6500000 t/yr 330
2.1. Control of environmental exposure: ERC ERC1 Product (article) characteristics Physical form of product Concentration of substance in product Amount used, frequency and duration of use ( Annual site tonnage: Regional use tonnage: Emission Days (days/year) Technical and organisational conditions and r	2 C1 Manufacture of the substance See section 9 of the SDS, No additional information ≤ 100 % (or from service life) 950000 t/yr 6500000 t/yr 330
2.1. Control of environmental exposure: ERC ERC1 Product (article) characteristics Physical form of product Concentration of substance in product Amount used, frequency and duration of use ( Annual site tonnage: Regional use tonnage: Emission Days (days/year) Technical and organisational conditions and r Use appropriate abatement systems to ensure th	2 21 Manufacture of the substance See section 9 of the SDS, No additional information ≤ 100 % (or from service life) 950000 t/yr 6500000 t/yr 330 measures nat the emission levels defined by local regulations are not exceeded.
ERC1      Product (article) characteristics      Physical form of product Concentration of substance in product      Amount used, frequency and duration of use (     Annual site tonnage:     Regional use tonnage:     Emission Days (days/year)      Technical and organisational conditions and r Use appropriate abatement systems to ensure th     Soil emission controls are not applicable as there	2 21 Manufacture of the substance See section 9 of the SDS, No additional information ≤ 100 % (or from service life) 950000 t/yr 6500000 t/yr 330 measures nat the emission levels defined by local regulations are not exceeded. is no direct release to soil
2.1. Control of environmental exposure: ERC ERC1  Product (article) characteristics Physical form of product Concentration of substance in product  Amount used, frequency and duration of use ( Annual site tonnage: Regional use tonnage: Emission Days (days/year)  Technical and organisational conditions and r Use appropriate abatement systems to ensure th Soil emission controls are not applicable as there	2 21 Manufacture of the substance See section 9 of the SDS, No additional information ≤ 100 % (or from service life) 950000 t/yr 6500000 t/yr 330 measures nat the emission levels defined by local regulations are not exceeded. is no direct release to soil
A.2.1. Control of environmental exposure: ERC ERC1      Product (article) characteristics Physical form of product Concentration of substance in product      Amount used, frequency and duration of use ( Annual site tonnage: Regional use tonnage: Emission Days (days/year)      Technical and organisational conditions and r Use appropriate abatement systems to ensure th Soil emission controls are not applicable as there Ensure operatives are trained to minimise release Conditions and measures related to sewage tr	2 2 2 Manufacture of the substance See section 9 of the SDS, No additional information \$ 100 % (or from service life) 950000 t/yr 6500000 t/yr 6500000 t/yr 330 measures nat the emission levels defined by local regulations are not exceeded. is no direct release to soil 38 reatment plant
A.2.1. Control of environmental exposure: ERC ERC1      Product (article) characteristics Physical form of product Concentration of substance in product      Amount used, frequency and duration of use ( Annual site tonnage: Regional use tonnage: Emission Days (days/year)      Technical and organisational conditions and r Use appropriate abatement systems to ensure th Soil emission controls are not applicable as there Ensure operatives are trained to minimise release	2 2 2 Manufacture of the substance See section 9 of the SDS, No additional information \$ 100 % (or from service life) 950000 t/yr 6500000 t/yr 6500000 t/yr 330 measures nat the emission levels defined by local regulations are not exceeded. is no direct release to soil 38 reatment plant
A.2.1. Control of environmental exposure: ERC ERC1      Product (article) characteristics Physical form of product Concentration of substance in product      Amount used, frequency and duration of use ( Annual site tonnage: Regional use tonnage: Emission Days (days/year)      Technical and organisational conditions and r Use appropriate abatement systems to ensure th Soil emission controls are not applicable as there Ensure operatives are trained to minimise release Conditions and measures related to sewage tr	2 21 Manufacture of the substance See section 9 of the SDS, No additional information ≤ 100 % (or from service life) 950000 t/yr 6500000 t/yr 330 measures hat the emission levels defined by local regulations are not exceeded. is no direct release to soil ss reatment plant be made.

Other conditions affecting environmental exposure			
Closed systems are used in order to prevent unintended en	hissions		
Flow rate of receiving water at least:	18000 m³/d		
Dilution of STP emissions at least:	10		
Conia Durduniana Idranana Onziana Od		NCDC 000	42/25



Version: 10.0 Revision date: 23/12/2022 Supersedes version of: 29/08/2018

MSDS.002

1.2.2. Control of employmental surveyors FDCC	annionia, annyo		
1.2.2. Control of environmental exposure: ERC2			
ERC2	Formulation into mixture		
Product (article) characteristics			
Physical form of product	See section 9 of the SDS, No a	ditional information	
Concentration of substance in product	≤ 100 %		
Amount used, frequency and duration of use (o	r from service life)		
Annual site tonnage:	1000000 t/yr		
Regional use tonnage:	3800000 t/yr		
Emission Days (days/year)	330		
Technical and organisational conditions and me Use appropriate abatement systems to ensure that		ns are not exceeded.	
Soil emission controls are not applicable as there is			
Ensure operatives are trained to minimise releases			
Conditions and measures related to sewage treat Direct emissions to the municipal STP should not b	-		
Conditions and measures related to treatment of	f waste (including article waste)		
See section 13 of the SDS	· · · · · · · · · · · · · · · · · · ·		
Other conditions offerting environmental even			
Other conditions affecting environmental expos			
Closed systems are used in order to prevent uninte			
Flow rate of receiving water at least:	18000 m³/d		
Dilution of STP emissions at least:	10		
ERC4	Use of non-reactive processing	aid at industrial site (no inclusion into or onto article)	
Product (article) characteristics			
Physical form of product	See section 9 of the SDS, No a	ditional information	
Concentration of substance in product	≤ 100 %		
Amount used, frequency and duration of use (o	r from service life)		
Annual site tonnage:	25000 t/yr		
Regional use tonnage:	354000 t/yr		
Emission Days (days/year)	330		
Technical and organisational conditions and me			
Use appropriate abatement systems to ensure that	, ,	ns are not exceeded.	
Soil emission controls are not applicable as there is Ensure operatives are trained to minimise releases	a no direct release to soil		
Conditions and measures related to sewage treated			
Direct emissions to the municipal STP should not b	e made.		
Conditions and measures related to treatment of	f waste (including article waste)		
See section 13 of the SDS			
Other conditions affecting onvironmental average			
Other conditions affecting environmental expose Closed systems are used in order to prevent uninte			
Flow rate of receiving water at least:	18000 m³/d		
Dilution of STP emissions at least:	10		
.2.4. Control of environmental exposure: ERC6			
ERC6a	Use of intermediate		
Sapio Produzione Idrogeno Ossigeno Srl	EN (English)	MSDS.002	
Capie - readzione reregene Coorgene en	Lity (Litynon)	W050.002	



Version: 10.0 Revision date: 23/12/2022 Supersedes version of: 29/08/2018

MSDS.002

Product (article) characteristics	
Physical form of product	See section 9 of the SDS, No additional information
Concentration of substance in product	≤ 100 %
Amount used, frequency and duration of use (or from s	ervice life)
Annual site tonnage:	800000 t/yr
Regional use tonnage:	380000 t/yr
Emission Days (days/year)	330
	330
Technical and organisational conditions and measures	
Use appropriate abatement systems to ensure that the em	
Soil emission controls are not applicable as there is no dire	
Ensure operatives are trained to minimise releases	
Conditions and measures related to sewage treatment	plant
Direct emissions to the municipal STP should not be made.	
·	
Conditions and measures related to treatment of waste	(including article waste)
See section 13 of the SDS	
Other conditions affecting environmental exposure	
Closed systems are used in order to prevent unintended en	nissions
Flow rate of receiving water at least:	18000 m³/d
Dilution of STP emissions at least:	10
1.2.5. Control of environmental exposure: ERC6b	
ERC6b	Use of reactive processing aid at industrial site (no inclusion into or onto article)
Product (article) characteristics	
Physical form of product	See section 9 of the SDS, No additional information
Concentration of substance in product	≤ 100 %
Amount used, frequency and duration of use (or from s	ervice life)
Annual site tonnage:	25000 t/yr
Regional use tonnage:	354000 t/yr
Emission Days (days/year)	330
Technical and organisational conditions and measures	
Use appropriate abatement systems to ensure that the em	
Soil emission controls are not applicable as there is no dire	ct release to soil
Ensure operatives are trained to minimise releases	
Conditions and measures related to sewage treatment	
Direct emissions to the municipal STP should not be made.	
Conditions and measures related to treatment of waste	(including article waste)
See section 13 of the SDS	
Other conditions affecting environmental exposure	
Closed systems are used in order to prevent unintended en	
Flow rate of receiving water at least:	18000 m³/d
Dilution of STP emissions at least:	10
1.2.6. Control of environmental exposure: ERC7	
-	
ERC7	Use of functional fluid at industrial site
Draduat (article) abaractorictica	
Product (article) characteristics	
Physical form of product	See section 9 of the SDS, No additional information
Concentration of substance in product	≤ 100 %



Version: 10.0 Revision date: 23/12/2022 Supersedes version of: 29/08/2018

MSDS.002

Amount used for any state of the state of the	
Amount used, frequency and duration of use (a	
Annual site tonnage:	25000 t/yr
Regional use tonnage:	354000 t/yr
Emission Days (days/year)	330
Technical and organisational conditions and m	leasures
Use appropriate abatement systems to ensure that	at the emission levels defined by local regulations are not exceeded.
Soil emission controls are not applicable as there i	is no direct release to soil
Ensure operatives are trained to minimise releases	S
Conditions and measures related to sewage tre	eatment plant
Direct emissions to the municipal STP should not	
Conditions and measures related to treatment	of waste (including article waste)
See section 13 of the SDS	
Other conditions affecting environmental expo	sure
Closed systems are used in order to prevent unint	
Flow rate of receiving water at least:	18000 m³/d
Dilution of STP emissions at least:	10
.2.7. Control of worker exposure: PROC1	
PROC1	Chemical production or refinery in closed process without likelihood of exposure or processes with
	equivalent containment conditions
Product (article) characteristics	
Physical form of product	See section 9 of the SDS, No additional information
Concentration of substance in product	≤ 100 %
	ered to influence the exposure as such for this scenario. Instead, the combination of the scale of operation and level hnical conditions) is the main determinant of the process-intrinsic emission potential.
Covers frequency up to:	5 days/week
Technical and organisational conditions and m	leasures
Handle product within a closed system	
,	ntilation when maintenance activities are carried out.
Ensure operatives are trained to minimise exposu	
Ensure supervision is in place to check that the RM	MMs are in place and are being used correctly and that the OCs are being followed
Conditions and measures related to personal p	protection, hygiene and health evaluation
See section 8 of the SDS.	
Other conditions affecting workers exposure	
Indoor or outdoor use	
I.2.8. Control of worker exposure: PROC2	
PROC2	Chemical production or refinery in closed continuous process with occasional controlled exposure or
	processes with equivalent containment conditions
Product (article) characteristics	
Physical form of product	See section 9 of the SDS, No additional information
Concentration of substance in product	≤ 100 %
Amount used (or contained in articles) fragment	
	ered to influence the exposure as such for this scenario. Instead, the combination of the scale of operation and level
,	hnical conditions) is the main determinant of the process-intrinsic emission potential.
Exposure duration	



Version: 10.0 Revision date: 23/12/2022 Supersedes version of: 29/08/2018

MSDS.002

Covers frequency up to:	5 days/week			
Technical and organisational conditions and measures				
Handle product within a closed system				
During indoor processes or in cases where natural ventilation is generally required.	s not sufficient, LEV should be in place at poin	ts were emissions could occur. Outdoor, LEV is not		
Ensure samples are obtained under containment or extract ven	tilation.			
Drain down and flush system prior to equipment break-in or ma				
Apply a good standard of general or controlled ventilation when	maintenance activities are carried out.			
Ensure operatives are trained to minimise exposure				
Ensure supervision is in place to check that the RMMs are in pl	ace and are being used correctly and that the	OCs are being followed		
Conditions and measures related to personal protection, h				
Use suitable eye protection. Wear suitable face shield. Wear su skin	itable coveralls to prevent exposure to the	Personal protection measures have to be applied in case of potential exposure only.		
Wear gloves providing a minimum efficiency of (%):		90		
Wear a respirator providing a minimum efficiency of (%):		95 Mandatory if activities take place outdoors or indoors with no local exhaust ventilation		
See section 8 of the SDS.				
Other conditions affecting workers exposure				
Indoor or outdoor use				
1.2.9. Control of worker exposure: PROC3				
PROC3	Manufacture or formulation in the chemical in	ndustry in closed batch processes with occasional		
	controlled exposure or processes with equiva			
Product (article) characteristics				
Physical form of product	See section 9 of the SDS, No additional info	rmation		
Concentration of substance in product	≤ 100 %			
Amount used (or contained in articles), frequency and dura	-			
The actual tonnage handled per shift is not considered to influe of containment/automation (as reflected in the technical condition				
Exposure duration	≤ 8 h/day			
Covers frequency up to:	5 days/week			
Technical and organisational conditions and measures				
Handle product within a closed system				
During indoor processes or in cases where natural ventilation is generally required.	s not sufficient, LEV should be in place at poin	ts were emissions could occur. Outdoor, LEV is not		
Ensure samples are obtained under containment or extract ven	tilation.			
Drain down and flush system prior to equipment break-in or ma	intenance.			
Apply a good standard of general or controlled ventilation when				
Ensure operatives are trained to minimise exposure				
Ensure supervision is in place to check that the RMMs are in pl	ace and are being used correctly and that the	OCs are being followed		
Conditions and measures related to personal protection, h	ygiene and health evaluation			
Use suitable eye protection. Wear suitable face shield. Wear suitable coveralls to prevent exposure to the skin Personal protection measures have to be applied in cas				
Wear gloves providing a minimum efficiency of (%): 90				
95				
Wear a respirator providing a minimum efficiency of (%):       Mandatory if activities take place outdoors or in no local exhaust ventilation				
See section 8 of the SDS.				
Other conditions affecting workers exposure				
Indoor or outdoor use				



Version: 10.0 Revision date: 23/12/2022 Supersedes version of: 29/08/2018

MSDS.002

# ammonia, anhydrous

1.2.10. Control of worker exposure: PROC4				
PROC4	Chemical production where opportunity for			
	chemical production where opportunity for			
Product (article) characteristics				
Physical form of product	See section 9 of the SDS, No additional info	ormation		
Concentration of substance in product	t ≤ 100 %			
Amount used (or contained in articles), frequency	and duration of use/exposure			
		nstead, the combination of the scale of operation and leve		
	cal conditions) is the main determinant of the process-i			
Exposure duration	≤ 8 h/day			
Covers frequency up to:	5 days/week			
Technical and organisational conditions and meas	sures			
Handle product within a closed system				
	entilation is not sufficient, LEV should be in place at poi	nts were emissions could occur. Outdoor, LEV is not		
Ensure samples are obtained under containment or e	xtract ventilation.			
Drain down and flush system prior to equipment breat	k-in or maintenance.			
Apply a good standard of general or controlled ventila	tion when maintenance activities are carried out.			
Ensure operatives are trained to minimise exposure				
Ensure supervision is in place to check that the RMM	s are in place and are being used correctly and that the	e OCs are being followed		
Conditions and measures related to personal prot	tection byging and health evaluation			
Use suitable eye protection. Wear suitable face shield		Personal protection measures have to be applied in case		
skin		of potential exposure only.		
Wear gloves providing a minimum efficiency of (%):		90		
Wear a respirator providing a minimum efficiency of (	%):	95 Mandatory if activities take place outdoors or indoors w no local exhaust ventilation		
See section 8 of the SDS.				
Other conditions affecting workers exposure				
Indoor or outdoor use				
I.2.11. Control of worker exposure: PROC8b				
PROC8b	Transfer of substance or mixture (charging	and discharging) at dedicated facilities		
Product (article) characteristics				
Physical form of product	See section 9 of the SDS, No additional info	prmation		
Concentration of substance in product	≤ 100 %			
Amount used (or contained in articles), frequency				
	d to influence the exposure as such for this scenario. I cal conditions) is the main determinant of the process-i	nstead, the combination of the scale of operation and leve ntrinsic emission potential.		
Exposure duration	≤ 8 h/day			
Covers frequency up to:	5 days/week			
Technical and organisational conditions and measure	sures			
Handle product within a closed system				
During indoor processes or in cases where natural ve generally required.	entilation is not sufficient, LEV should be in place at poi	nts were emissions could occur. Outdoor, LEV is not		
Fill containers at dedicated fill points supplied with loc				
Drain down and flush system prior to equipment breat				
Apply a good standard of general or controlled ventila	ation when maintenance activities are carried out.			
Ensure operatives are trained to minimise exposure				
Ensure supervision is in place to check that the RMM	s are in place and are being used correctly and that the	e OCs are being followed		
Conditions and measures related to personal prot	tection, hygiene and health evaluation			
Use suitable eye protection. Wear suitable face shield		Personal protection measures have to be applied in ca		
skin	· · · · · · · · · · · · · · · · · · ·	of potential exposure only.		
Sonio Braduzione Idrogone Ossigone Srl	EN (English)	MSDS 002		

Sapio Produzione Idrogeno Ossigeno Srl



Version: 10.0 Revision date: 23/12/2022 Supersedes version of: 29/08/2018

## MSDS.002

Wear are separated providing a minimum efficiency of (%):         90           Wear are registrate providing a minimum efficiency of (%):         96           Mine are registrate providing a minimum efficiency of (%):         96           Other conditions affecting voorters exposure         96           PROC0         Transfer of substance or proparation in to small containers (dedicated filing line, including weighing)           PROC01         Transfer of substance or proparation into anal containers (dedicated filing line, including weighing)           PROC02         Transfer of substance or proparation into anal containers (dedicated filing line, including weighing)           PROC03         Transfer of substance or proparation information           Concentration         See section 9 of the SDS, No additional information           Concentration or product         \$ 100 %.           Concentration or substance in product         \$ 100 %.           Concentration or substance in product         \$ 100 %.           Concentration or substance in product in the substance intermine or substance information or product in the substance information or substance informat						
Water a respirator providing a minimum efficiency of (%):         Metadota state with a doctation of unbrase with and inclusion of unbrase with a doctation of unbrase with and unbrase with and unbrase with and unbrase with a doctation of the scale of operation and layer.           Provent unbrase with and unbrase with a doctation of unbrase with and unbrase within and unbrase with and unbra	Wear gloves providing a minim	num efficiency of (%):			90	
See section 8 of the SDS.  Other conditions affecting workers exposure Index or or addoor use  1.3.2 Control of worker exposure: PROC9  PROC9  Transfer of aubitance or preparation into small containers (dedicated filling line, including weighing)  Product (and containers)  Prod	Wear a respirator providing a r	minimum efficiency of (%):			Mandatory if activities take place	ce outdoors or indoors with
Induor or outdoor use          1.1.12. Control of vorker sepseure:       PROC9         PROC01       Transfer of substance or preparation into small containers (dedicated filing line, including weighing)         PRoduct (and (a) characteristic       See section 6 of the SDS, No additional information         Contentiation of substance in product       ≤ 100 %         Amount used (or containers (dedicated filing line, including weighing)       Project (and (a) characteristic         Project (and (a) characteristic       ≤ 100 %         Amount used (or container of the line or considerer of line or the appoint as such for this scenario. Instead, the combination of the scale of operation and lovel         Parsitical forming handled per shift is not considerer of line on the appoint as such for this scenario. Instead, the combination of the scale of operation and lovel         Exposure duration       ≤ 8 Naisy         Convert frequency up to:       5 displayweek         Technical and organizational conditions and measures         Paind product within a closed system         During indoor processes or in cases where nature writikiton.         During indoor processes or incluse supplied with local extract writikiton.         Part and product or the state of prome supplied with the all extract writikiton.         During indoor processes or incluses where nature writikiton.         Protein durated of general or controlled vertifiation.         During indoor production.       Sepsection	See section 8 of the SDS.	See section 8 of the SDS.				
Induor or outdoor use          1.1.12. Control of vorker sepseure:       PROC9         PROC01       Transfer of substance or preparation into small containers (dedicated filing line, including weighing)         PRoduct (and (a) characteristic       See section 6 of the SDS, No additional information         Contentiation of substance in product       ≤ 100 %         Amount used (or containers (dedicated filing line, including weighing)       Project (and (a) characteristic         Project (and (a) characteristic       ≤ 100 %         Amount used (or container of the line or considerer of line or the appoint as such for this scenario. Instead, the combination of the scale of operation and lovel         Parsitical forming handled per shift is not considerer of line on the appoint as such for this scenario. Instead, the combination of the scale of operation and lovel         Exposure duration       ≤ 8 Naisy         Convert frequency up to:       5 displayweek         Technical and organizational conditions and measures         Paind product within a closed system         During indoor processes or in cases where nature writikiton.         During indoor processes or incluse supplied with local extract writikiton.         Part and product or the state of prome supplied with the all extract writikiton.         During indoor processes or incluses where nature writikiton.         Protein durated of general or controlled vertifiation.         During indoor production.       Sepsection						
1.12. Control of worker exposure: PROC9         PROC3       Transfer of substance or preparation into small containers (dedicated filling line, including weighing)         Product (criticle) characteristics       See section 9 of the SDS, No additional information         Concentration of substance in product       4 100 %.         Amount used (or contained in articles), frequency and duration of uselexposure       Encomparity of the scale of operation and level discontensity in the inconcentration of the scale of operation and level discontensity in the inconcentration of the scale of operation and level discontensity in the inconcentration of the scale of operation and level discontensity in the inconcentration of the scale of operation and level discontensity in the inconcentration of the scale of operation and level discontensity in the inconcentration of the scale of operation and level discontensity operation discontensity operation and level discontensity operation.         Exposure distribution       5 disputively       So         Darin down and flush system prior to supprenet break-in or maintenance.       Personal productin dintensity operation dintensity operation. </td <td></td> <td>orkers exposure</td> <td></td> <td></td> <td></td> <td></td>		orkers exposure				
PRCC9         Transfer of substance or preparation into small containers (dedicated filling line, induding weighing)           Product (article) characteristics         Preparation for up or dual         See section 9 of the SDS, No additional information           Concentration of substance in product         4 100 %.         A construction of the scale of operation and level of contained in articles). Frequency and duration of use/sexposure         A construction of the scale of operation and level of contained in articles). Frequency and duration of use/sexposure as sub-for inite somario. Instead, the combination potential.           Proves frequency up to:         5 days/weak         5 days/weak           Technical and organisational conditions and measures         High and conditions and measures           Plander product Mithin a closed system         During indicor processes or in cases where natural ventilation is not sufficient. LEV should be in place at points were emissions could occur. Outdoor, LEV is not generally required.           Pli containers at decicated Bi points supplied with local extract ventilation.         Endition and measures related to points user ensures nature and minimise exposure           Ensure supervision is in place to check that the RMMs are in place and are being used correctly and that the CCa are being followed           Conditions and measures related to personal protection, hygiene and health evaluation         Descenal protection measures have to be applied in case of no locate state of operation of (%):         B0           Be sublide systep protin con.         EUSES         Mandato						
Product (article) characteristics         Product (article) characteristics           Physical form of product         See section 9 of the SDS, No additional information           Concentration of substance in product         5 100 %.           Amount used (or contained in articles), frequency and duration of use/exposure         The SDB form of product in the behavior of the scole operation and level of containment automation (as reflected in the behavior conditions) is the main determinant of the process-intrinsic emission potential.           Exposure duration         1 8 hidds           Corest frequency up to:         5 days/           Technical and organisational conditions and measures           Handle product within a cload system           During indoor processes or in cases where natural verification is sufficient, LEV should be in place at points were emissions could occur. Outdoor, LEV is not generally required.           Prior bail down and flavel system off to a upgement break, the the RHMB are in place and are being used correctly and that the OCs are being followed           Conditions and measures related to priors and protection, hyglene and health evaluation           Use subble ope protection. Wear subable face shield. Wear subable coveralls to provent exposure to the anitial exposure of this.           Bain down and flave working a minimum efficiency of (%):         90           Wear gross providing a minimum efficiency of (%):         90           Mean of out durater supervised workers exposure         10 cont of duator if aclivit	1.2.12. Control of worker expo	osure: PROC9				
Physical form of product         See section 9 of the SDS, No additional information           Concentration of substance in product         ≤ 100 %           Amount used (or contained in articles), frequency and duration of use/oxposure         The actual tomos phandle op er shifts in an considered to influence the exposure as such for this scenario. Instead, the combination of the scale of operation and level of contained in articles), frequency and duration of use/oxposure           Prescuta transment/subornation (as reflected in the technical conditions) is the main determinant of the process-intrinsic emission potential.         Exposure duration           Sepsure duration         ≤ 8 h/day         Corvers frequency up to:         5 days/week           Technicat and organisational conditions and measures         Handle product within a closed system         During indeor processes or in cases where natural ventiliation.           Daring droop processes or in cases where natural ventiliation is not sufficient. LEV should be in place at points were emissions could occur. Outdoor, LEV is not generating required.         Ensure supervision is updated the final extent ventiliation.           Darin droop area at devicated fill points supplied with local extract ventiliation.         Ensure supervision is in place to check that the RMMs are in place and peing used correctly and that Ho COs are being followed           Conditions and measures related to personal protection. May are subtle coveralts to prevent exposure to the dy forbornial exposure only.         Personal protection measures have to be applied in case of a potenial exposure only.           W	PROC9		Transfer of substance or	preparation into sm	all containers (dedicated filling lin	ne, including weighing)
Concentration of substance in product         5 100 %           Amount used (or contained in articles), frequency and duration of uselexposure in a stual kornage handled per shift is not considered to influence the exposure as such for this scenario. Instead, the combination of the scele of operation and level discussion metabolication (ar effective)           Exposure duration         5 8 https:///intervence.	Product (article) characterist	tics				
Amount used (or contained in articles), frequency and duration of use/exposure           A mount used (or contained in articles), frequency and duration of use/exposure as such for this scenario. Instead, the combination of the scale of operation and level of containment/automation (as reflected in the technical conductors) is the main determinant of the process -intrinsic emission potential.           Exposure duration         S & floday           Covers frequency up to:         S & days/week           Technical and organisational conditions and measures           Handle product within a cload system           During Indoor processes on it cases where natural ventilation is not sufficient, LEV should be in place at points were emissions could occur. Outdoor, LEV is not generally required.           Fill containers at dedicated fill points supplied with local extract ventilation.           Drain down and flush system pror to equipment break-in or maintenance.           Apply a good standard of general controlied ventilation when maintenance activities are carried out.           Ensure supervision is in place to check that the RMMs are in place and are being used correctly and that the OCS are being followed           Conditions and measures related to personal protection, hygiene and health evaluation           User gloves providing a minimum efficiency of (%):         90           90         90           Wear or respirator providing a minimum efficiency of (%):         90           See section 8 of the SDS.         EUSES	Physical form of product		See section 9 of the SDS	, No additional info	rmation	
The statul tornage handled per shift is not considered to influence the exposure as such for this scenario. Instead, the existion potential.       Exposure duration       4 8 h/day         Exposure duration       4 8 h/day	Concentration of substance in	product	≤ 100 %			
d containment/automation (as reflected in the technical conditions) is the main determinant of the process-intrinsic emission potential. Exposure duration i & A May Covers frequency up to: i & days/week  Technical and organisational conditions and measures Handle product within a closed system During indoor processes or in cases where natural ventilation. During indoor processes or in cases where natural ventilation. Drain down and flush system prior to equipment break-in or maintenance. Apply a good standard of general or controlled ventilation is not maintenance. Apply a good standard of general or controlled ventilation where maintenance. Apply a good standard of general or controlled ventilation is proceed and are being used correctly and that the OCs are being followed  Conditions and measures related to personal protection, hygiene and health evaluation Use suitable eye protection. Wear suitable face shield. Wear suitable coveralis to prevent exposure to the indoor or outdoor use  Conditions affecting workers exposure  Assessment method  Freshwater  Munt  Euses  Protection target Unit  Exposure estimation  A main water  A main  A main	Amount used (or contained i	in articles), frequency and dur	ation of use/exposure			
Exposure duration       ≤ 8 hday         Covers frequency up to:       5 days/week         Technical and organisational conditions and measures         Handle product within a dosed system         During indoor processes or in cases where natural ventiliation is not sufficient, LEV should be in place at points were emissions could occur. Outdoor, LEV is not generally required.         Pil containers at dedicated fill points supplied with local extract ventiliation.         Drain drow and flush system prior to equipment break-in or maintenance.         Apply a good standard of general or controlled wertilistion where maintenance activities are carried out.         Ensure operatives are trained to minimise exposure         Ensure supervision is in place to check that the RMMs are in place and are being used correctly and that the OCs are being followed         Conditions and measures related to personal protection, hygiene and health evaluation         Use suitable eve protection. Wear suitable face shield. Wear suitable coveralts to prevent exposure to the origo point of (%):       90         Wear gloves providing a minimum efficiency of (%):       90         See section 8 of the SDS.       90         Other conditions affecting workers exposure       1         Indoor or outdoor use       1.3. Exposure estimation and reference to its source         1.3.1. Environmental release and exposure: ERC1       Assessment method         Marine water       mg1       0.000	The actual tonnage handled pe	er shift is not considered to influe	ence the exposure as such			ale of operation and level
Covers frequency up to:         § dags/week           Technical and organisational conditions and measures         Handle product within a closed system           During indoor processes or in cases where natural ventilation is outficient, LEV should be in place at points were emissions could occur. Outdoor, LEV is not generally required.           Fill containers at decicated fill points supplied with local extract ventilation.         Data down and fulls system prior to equipment break-in or maintenance.           Apply a good standard of general or controlled ventilation where maintenance activities are carried out.         Ensure supervision is in place to check that the RMMs are in place and are being used correctly and that the OCs are being followed           Conditions and measures related to personal protection, hygiene and health evaluation         Personal protection measures have to be applied in case of potential exposure only.           Use suitable exp protection. Wear suitable face shield. Wear suitable coveralls to prevent exposure to the protein any of %):         90           Wear gloves providing a minimum efficiency of (%):         90           See section 8 of the SDS.         See section 8 of the SDS.           Other conditions affecting workers exposure         Indicor or outdoor use           1.3. Exposure estimation and reference to its source         I.3. Environmental release and exposure: ERC1           Assessment method         EUSES           Protection target         Unit         EuSES           Protection targ			, , , , , , , , , , , , , , , , , , ,			
Handle product within a closed system During indoor processes or in cases where natural ventilation is not sufficient, LEV should be in place at points were emissions could occur. Outdoor, LEV is not generally required. Fill containers at dedicated fill points supplied with local extract ventilation. Drain down and flush system prior to equipment break-in or maintenance. Apply a good standard of general or controlled ventilation when maintenance activities are carried out. Ensure operatives are trained to minimise exposure Ensure supervision is in place to check that the RMMs are in place and are being used correctly and that the OCs are being followed Conditions and measures related to personal protection, hygiene and heatth evaluation Use suitable exported or (%): Use suitable exponent of (%): Use suitable exposure of (%): Use suitable protection, Wear suitable face shield. Wear suitable coveralls to prevent exposure to the sinn antimum efficiency of (%): Use a respirator providing a minimum efficiency of (%): Use section 8 of the SDS. Cother conditions affecting workers exposure Indoor or outdoor use 1.3.1. Environmental release and exposure: ERC1 Assessment method EUSES Protection target Unit Exposure estimation EUSES Protection target Unit EUSES Protection target Unit EUSES Protection target Unit EUSES Protection target Unit Exposure estimation PNEC RCR Assessment conditions Freshwater Mg/I 0.000037 0.0011 0.029	· ·					
Handle product within a closed system During indoor processes or in cases where natural ventilation is not sufficient, LEV should be in place at points were emissions could occur. Outdoor, LEV is not generally required. Fill containers at dedicated fill points supplied with local extract ventilation. Drain down and flush system prior to equipment break-in or maintenance. Apply a good standard of general or controlled ventilation when maintenance activities are carried out. Ensure operatives are trained to minimise exposure Ensure supervision is in place to check that the RMMs are in place and are being used correctly and that the OCs are being followed Conditions and measures related to personal protection, hygiene and heatth evaluation Use suitable exported or (%): Use suitable exponent of (%): Use suitable exposure of (%): Use suitable protection, Wear suitable face shield. Wear suitable coveralls to prevent exposure to the sinn antimum efficiency of (%): Use a respirator providing a minimum efficiency of (%): Use section 8 of the SDS. Cother conditions affecting workers exposure Indoor or outdoor use 1.3.1. Environmental release and exposure: ERC1 Assessment method EUSES Protection target Unit Exposure estimation EUSES Protection target Unit EUSES Protection target Unit EUSES Protection target Unit EUSES Protection target Unit Exposure estimation PNEC RCR Assessment conditions Freshwater Mg/I 0.000037 0.0011 0.029						
During indoor processes or in cases where natural ventilation is not sufficient, LEV should be in place at points were emissions could occur. Outdoor, LEV is not generally required.           Fill containers at dedicated fill points supplied with local extract ventilation.	-					
generality required.       Fill containers at dedicated fill points supplied with local extract ventilation.         Fill containers at dedicated fill points supplied with local extract ventilation.       Drain down and flush system prior to equipment break-in or maintenance.         Apply a good standard of general or controlled ventilation when maintenance activities are carried out.       Ensure supervision is in place to deck that the RMMs are in place and are being used correctly and that the OCs are being followed         Conditions and measures related to personal protection, hygiene and health evaluation       Personal protection measures have to be applied in case of potential exposure only.         Wear gives providing a minimum efficiency of (%):       90         Wear a respirator providing a minimum efficiency of (%):       93         See section 8 of the SDS.       Mandatory if activities take place outdoors or indoors with no local exhaust ventilation         See section 8 of the SDS.       EUSES         Protection target       Unit       Exposure estimation         Protection target       Unit       Exposure estimation         Freshwater       mg/l       0.000133       0.0011       0.121         Marine water       mg/l       0.0000315       0.0011       0.029       1.3.21         Protection target       Unit       Exposure estimation       PNEC       RCR       Assessment conditions         Freshwater	-	,				
Drain down and flush system prior to equipment break-in or maintenance.         Apply a good standard of general or controlled ventilation when maintenance activities are carried out.         Ensure operatives are trained to minimise exposure         Ensure supervision is in place to check that the RMMs are in place and are being used correctly and that the OCs are being followed         Conditions and measures related to personal protection, hygiene and health evaluation         Use suitable eve protection. Wear suitable face shield. Wear suitable coveralls to prevent exposure to the shin       Personal protection measures have to be applied in case of optential exposure only.         Wear a respirator providing a minimum efficiency of (%):       90         Wear a respirator providing a minimum efficiency of (%):       95         Mandatory if activities take place outdoors or indoors with no local exhaust ventilation         See section 8 of the SDS.         Other conditions affecting workers exposure         Indoor or outdoor use         1.3. Exposure estimation and reference to its source         1.3. Exposure estimation and reference to its source         1.3. Exposure estimation and reference to its source         1.3. Environmental release and exposure: ERC1         Assessment method       EUSES         Protection target       Unit       Exposure estimation       0.0011       0.121         Marine water       mg/l       0.000031	generally required.			be in place at poir	its were emissions could occur. C	Jutdoor, LEV is not
Apply a good standard of general or controlled ventilation when maintenance activities are carried out.         Ensure operatives are trained to minimise exposure         Ensure supervision is in place to check that the RMMs are in place and are being used correctly and that the OCs are being followed         Conditions and measures related to personal protection, hygiene and health evaluation         Use suitable eye protection. Wear suitable face shield. Wear suitable coveralls to prevent exposure to the skin         Wear allows providing a minimum efficiency of (%):       90         Wear a respirator providing a minimum efficiency of (%):       90         Wear a respirator providing a minimum efficiency of (%):       95         Mandatory if activities take place outdoors or indoors with no local exhaust ventilation       See section 8 of the SDS.         Other conditions affecting workers exposure       Exposure estimation and reference to its source         1.3.1. Environmental release and exposure: ERC1       Assessment method         Freshwater       mg/l       0.000133       0.0011       0.121         Marine water       mg/l       0.000015       0.0011       0.029       1.3.2. Environmental release and exposure: ERC2         Assessment method       EUSES       EUSES       Freshwater       mg/l       0.000015       0.0011       0.029       1.3.2. Environmental release and exposure: ERC2         Assessment method <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>						
Ensure operatives are trained to minimise exposure         Ensure supervision is in place to check that the RMMs are in place and are being used correctly and that the OCs are being followed         Conditions and measures related to personal protection, hygiene and health evaluation         Use suitable eye protection. Wear suitable face shield. Wear suitable coveralls to prevent exposure to the skin       Personal protection measures have to be applied in case of potential exposure only.         Wear gloves providing a minimum efficiency of (%):       90         Wear a respirator providing a minimum efficiency of (%):       95         Mandatory if activities take place outdoors or indoors with no local exhaust ventilation         See section 8 of the SDS.         Other conditions affecting workers exposure       Indoor or outdoor use         1.3. Exposure estimation and reference to its source         1.3.1. Environmental release and exposure: ERC1         Assessment method       EUSES         Protection target       Unit       Exposure estimation       PNEC       RCR       Assessment conditions         1.3.2. Environmental release and exposure: ERC2       Assessment method       0.0011       0.029       Inditions         See section target       Unit       Exposure estimation       PNEC       RCR       Assessment conditions         Freshwater       mg/l       0.00000315       0.0011       0.0						
Ensure supervision is in place to check that the RMMs are in place and are being used correctly and that the OCs are being followed         Conditions and measures related to personal protection, hygiene and health evaluation         Use suitable eye protection. Wear suitable face shield. Wear suitable coveralls to prevent exposure to the skin       Personal protection measures have to be applied in case of potential exposure only.         Wear gloves providing a minimum efficiency of (%):       90         Wear a respirator providing a minimum efficiency of (%):       95         Mandatory if activities take place outdoors or indoors with no local exhaust ventilation         See section 8 of the SDS.         Other conditions affecting workers exposure       Indoor or outdoor use         1.3. Exposure estimation and reference to its source         1.3.1. Environmental release and exposure: ERC1         Assessment method       EUSES         Protection target       Unit       Exposure estimation       0.0011       0.121         Marine water       mg/l       0.0000133       0.0011       0.029       0.029         1.3. Exposure estimation       EUSES       EVEN       EVEN       EVEN       EVEN         Protection target       Unit       Exposure estimation       0.029       0.029       IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII			n maintenance activities are	e carried out.		
Conditions and measures related to personal protection, hygiene and health evaluation         Use suitable eye protection. Wear suitable face shield. Wear suitable coveralls to prevent exposure to the or potential exposure only.         Wear gloves providing a minimum efficiency of (%):       90         Wear a respirator providing a minimum efficiency of (%):       90         Wear a respirator providing a minimum efficiency of (%):       90         Wear a respirator providing a minimum efficiency of (%):       95         Mandatory if activities take place outdoors or indoors with no local exhaust ventilation         See section 8 of the SDS.         Other conditions affecting workers exposure         Indoor or outdoor use         1.3.1. Environmental release and exposure: ERC1         Assessment method       EUSES         Protection target       Unit       Exposure estimation         Marine water       mg/l       0.000133       0.0011         Marine water       mg/l       0.000033       0.0011       0.029         1.3.2. Environmental release and exposure: ERC2       Assessment method       EUSES         Protection target       Unit       Exposure estimation       0.029       Assessment conditions         Freshwater       mg/l       0.0000437       0.0011       0.045       Didtions	· · · · · · · · · · · · · · · · · · ·	· · ·	loss and are being used as	reatly and that the	OCo oro boing followed	
Use suitable eye protection. Wear suitable face shield. Wear suitable coveralls to prevent exposure to the skin       Personal protection measures have to be applied in case of potential exposure only.         Wear gloves providing a minimum efficiency of (%):       90         Wear a respirator providing a minimum efficiency of (%):       95         Mandatory if activities take place outdoors or indoors with no local exhaust ventilation       95         See section 8 of the SDS.       96         Other conditions affecting workers exposure         Indoor or outdoor use       91         Assessment method         Eucle         Protection target       Unit       Exposure estimation       0.0011       0.121       0.121         Marine water       mg/l       0.0000315       0.0011       0.029       1.3.2. Environmental release and exposure: ERC2         Assessment method       EUSES       EUSES       Event and and active place and exposure: ERC2         Assessment method       EUSES       EUSES       Event and active place and exposure: ERC2         Assessment method       EUSES       Event active estimation       PNEC       RCR       Assessment conditions         Freshwater       mg/l       0.0000497       0.0011       0.045       Conditions	Ensure supervision is in place	to check that the Rivinis are in p	nace and are being used co	frectly and that the	OCS are being followed	
skin     of potential exposure only.       Wear a respirator providing a minimum efficiency of (%):     90       Wear a respirator providing a minimum efficiency of (%):     95       Mandatory if activities take place outdoors or indoors with no local exhaust ventilation     95       See section 8 of the SDS.     95       Other conditions affecting workers exposure       Indoor or outdoor use     95       1.3. Exposure estimation and reference to its source       1.3. Environmental release and exposure: ERC1       Assessment method     EUSES       Protection target     Unit       Exposure estimation     0.000133     0.0011     0.121       Marine water     mg/l     0.0000315     0.0011     0.029       1.3.2. Environmental release and exposure: ERC2       Assessment method     EUSES	Conditions and measures re	lated to personal protection, h	nygiene and health evalua	tion		
Wear a respirator providing a minimum efficiency of (%):     95       Wear a respirator providing a minimum efficiency of (%):     95       See section 8 of the SDS.     96       Other conditions affecting workers exposure     1       Indoor or outdoor use     1       1.3. Exposure estimation and reference to its source     1       1.3. Environmental release and exposure: ERC1     Assessment method       Assessment method     EUSES       Protection target     Unit     Exposure estimation       Marine water     mg/l     0.000133     0.0011       1.3. Environmental release and exposure: ERC2       Assessment method     EUSES		ear suitable face shield. Wear s	uitable coveralls to prevent	exposure to the		have to be applied in case
Wear a respirator providing a minimum efficiency of (%):       Mandatory if activities take place outdoors or indoors with no local exhaust ventilation         See section 8 of the SDS.       Indoor or outdoor use         Other conditions affecting workers exposure         Indoor or outdoor use       Indoor or outdoor use         A.S. Exposure estimation and reference to its source         1.3. Exposure estimation and reference to its source         Indication target         Unit         Exposure estimation         PREC       RCR       Assessment conditions         Freshwater       mg/l       0.000133       0.0011       0.121       Indication of the SDS         J.S. Environmental release and exposure: ERC1         Assessment method       EUSES         Protection target       Unit       Exposure estimation       PNEC       RCR       Assessment conditions         Indication target       Unit       Exposure estimation       PNEC       RCR       Assessment conditions         Freshwater       mg/l       0.000133       0.0011       0.029       Indications         Assessment method       EUSES         Protection target       Unit<	Wear gloves providing a minim	num efficiency of (%):			90	
Other conditions affecting workers exposure Indoor or outdoor use         Assessment conditions         Assessment           1.3. Exposure estimation and reference to its source         EUSES         Assessment method         EUSES           Protection target         Unit         Exposure estimation         PNEC         RCR         Assessment conditions           Freshwater         mg/l         0.000133         0.0011         0.121         Image: Conditions           1.3.2. Environmental release and exposure: ERC2         Assessment method         EUSES         Conditions         Conditions           Freshwater         mg/l         0.0000315         0.0011         0.029         Image: Conditions           1.3.2. Environmental release and exposure: ERC2         EUSES         Assessment method         EUSES           Protection target         Unit         Exposure estimation         PNEC         RCR         Assessment conditions           Freshwater         mg/l         0.0000497         0.0011         0.045         Image: Conditions	Wear a respirator providing a r	ninimum efficiency of (%):			Mandatory if activities take place	ce outdoors or indoors with
Indoor or outdoor use         1.3. Exposure estimation and reference to its source         1.3.1. Environmental release and exposure: ERC1         Assessment method       EUSES         Protection target       Unit       Exposure estimation       PNEC       RCR       Assessment conditions         Freshwater       mg/l       0.000133       0.0011       0.121       Image: Condition set in the set	See section 8 of the SDS.					
Indoor or outdoor use         1.3. Exposure estimation and reference to its source         1.3.1. Environmental release and exposure: ERC1         Assessment method       EUSES         Protection target       Unit       Exposure estimation       PNEC       RCR       Assessment conditions         Freshwater       mg/l       0.000133       0.0011       0.121       Image: Condition set in the set						
I.3. Exposure estimation and reference to its source         1.3.1. Environmental release and exposure: ERC1         Assessment method       EUSES         Protection target       Unit       Exposure estimation       PNEC       RCR       Assessment conditions         Freshwater       mg/l       0.000133       0.0011       0.121       Image: Condition set in the set in		orkers exposure				
I.3.1. Environmental release and exposure: ERC1         Assessment method       EUSES         Protection target       Unit       Exposure estimation       PNEC       RCR       Assessment conditions         Freshwater       mg/l       0.000133       0.0011       0.121       Image: Condition conditions         Marine water       mg/l       0.000315       0.0011       0.029       Image: Condition condition conditions         Assessment method         EUSES         Protection target       Unit       Exposure estimation       PNEC       RCR       Assessment conditions         Assessment method       EUSES       EUSES       Image: Condition conditicon conditicon condition condition condition conditio	Indoor or outdoor use					
Assessment method       EUSES         Protection target       Unit       Exposure estimation       PNEC       RCR       Assessment conditions         Freshwater       mg/l       0.000133       0.0011       0.121       Image: Conditions         Marine water       mg/l       0.0000315       0.0011       0.029       Image: Conditions         I.3.2. Environmental release and exposure: ERC2         Assessment method       EUSES         Protection target       Unit       Exposure estimation       PNEC       RCR       Assessment conditions         Freshwater       mg/l       0.000497       0.0011       0.045       Image: Conditions	1.3. Exposure estimation	and reference to its source	<u>e</u>			
Protection target       Unit       Exposure estimation       PNEC       RCR       Assessment conditions         Freshwater       mg/l       0.000133       0.0011       0.121       Image: Conditions         Marine water       mg/l       0.0000315       0.0011       0.029       Image: Conditions         1.3.2. Environmental release and exposure: ERC2       EUSES       EUSES       Image: Conditions       Image: Conditions         Protection target       Unit       Exposure estimation       PNEC       RCR       Assessment conditions         Freshwater       mg/l       0.0000497       0.0011       0.045       Image: Conditions	1.3.1. Environmental release a	and exposure: ERC1				
Protection target     Unit     Exposure estimation     PNEC     RCR     conditions       Freshwater     mg/l     0.000133     0.0011     0.121     Image: Conditions       Marine water     mg/l     0.0000315     0.0011     0.029     Image: Conditions       1.3.2. Environmental release and exposure: ERC2     EUSES     Image: Conditions     Image: Conditions       Protection target     Unit     Exposure estimation     PNEC     RCR     Assessment conditions       Freshwater     mg/l     0.0000497     0.0011     0.045     Image: Conditions	Assessment method		EUSES			
Freshwater     mg/l     0.000133     0.0011     0.121       Marine water     mg/l     0.0000315     0.0011     0.029 <b>1.3.2. Environmental release and exposure: ERC2</b> Assessment method     EUSES <b>Protection target</b> Unit     Exposure estimation     PNEC     RCR     Assessment conditions       Freshwater     mg/l     0.000497     0.0011     0.045     Image: Conditions	Protection target	Unit	Exposure estimation	PNEC	RCR	
Marine water     mg/l     0.0000315     0.0011     0.029       1.3.2. Environmental release and exposure: ERC2       Assessment method     EUSES       Protection target     Unit     Exposure estimation     PNEC     RCR     Assessment conditions       Freshwater     mg/l     0.0000497     0.0011     0.045     Image: Condition set in the set	Freshwater	ma/l	0.000133	0.0011	0.121	conditions
I.3.2. Environmental release and exposure: ERC2         Assessment method       EUSES         Protection target       Unit       Exposure estimation       PNEC       RCR       Assessment conditions         Freshwater       mg/l       0.0000497       0.0011       0.045       Image: Condition conditions						
Assessment method     EUSES       Protection target     Unit     Exposure estimation     PNEC     RCR     Assessment conditions       Freshwater     mg/l     0.0000497     0.0011     0.045     Image: Condition of the con			1		1	1
Protection target         Unit         Exposure estimation         PNEC         RCR         Assessment conditions           Freshwater         mg/l         0.0000497         0.0011         0.045         Image: Condition of the condition of t	[		FUSES			
Protection target         Unit         Exposure estimation         PNEC         RCR         conditions           Freshwater         mg/l         0.0000497         0.0011         0.045         Image: Condition series			L00L0			
Freshwater         mg/l         0.0000497         0.0011         0.045	Protection target	Unit	Exposure estimation	PNEC	RCR	
	Freshwater	mg/l	0.0000497	0.0011	0.045	
	Marine water	mg/l	0.000012	0.0011	0.011	



according to the REACH Regulation (EC) 1907/2006 amended by Regulation (EU) 2020/878

Version: 10.0 Revision date: 23/12/2022 Supersedes version of: 29/08/2018

## MSDS.002

# ammonia, anhydrous

### 1.3.3. Environmental release and exposure: ERC4

Protection target	Unit	Exposure estimation	PNEC	RCR	Assessment conditions
Freshwater	mg/l	0.0000108	0.0011	0.01	
Marine water	mg/l	0.0000231	0.0011	0.021	

#### 1.3.4. Environmental release and exposure: ERC6a

Assessment method

EUSES

Protection target	Unit	Exposure estimation	PNEC	RCR	Assessment conditions
Freshwater	mg/l	0.0000837	0.0011	0.076	
Marine water	mg/l	0.0000205	0.0011	0.019	

### 1.3.5. Environmental release and exposure: ERC6b

Protection target	Unit	Exposure estimation	PNEC	BC B	Assessment conditions
Freshwater	mg/l	0.00000173	0.0011	0.002	
Marine water	mg/l	0.00000019	0.0011	≈ 0.00018	

## 1.3.6. Environmental release and exposure: ERC7

Protection target	Unit	Exposure estimation	PNEC	RCR	Assessment conditions
Freshwater	mg/l	0.00000558	0.0011	0.005	
Marine water	mg/l	0.00000121	0.0011	0.001	

## 1.3.7. Worker exposure: PROC1

Route of exposure and type of effects	Exposure estimate	Assessment conditions	RCR
Dermal - Long-term - systemic effects	0.34 mg/kg bodyweight/day	Outdoor use, Indoor use , Without LEV, No gloves worn	0.05
Inhalation - Long-term - systemic effects	0 mg/m³	Outdoor use, Indoor use , Without LEV	< 0.01
Dermal - Acute - systemic effects	0.34 mg/kg bodyweight/day	Outdoor use, Indoor use , Without LEV, No gloves worn	0.05
Inhalation - Acute - systemic effects	0 mg/m³	Outdoor use, Indoor use , Without LEV	< 0.01
Acute - Local - Inhalation	0 mg/m³	Outdoor use, Indoor use , Without LEV	< 0.01
Long term - Local - Inhalation	0 mg/m³	Outdoor use, Indoor use , Without LEV	< 0.01

### 1.3.8. Worker exposure: PROC2

Route of exposure and type of effects	Exposure estimate	Assessment conditions	RCR
Dermel Long term overtemic offects	1.37 mg/kg bodyweight/day	Outdoor use, Indoor use , Without LEV, No gloves worn	0.201
Dermal - Long-term - systemic effects	0.14 mg/kg bodyweight/day	Indoor use , With LEV, No gloves worn	0.021
Inhalation - Long-term - systemic effects	1.24 mg/m <sup>3</sup>	Outdoor use, With RPE95%	0.026
	3.54 mg/m <sup>3</sup>	Indoor use , With LEV, No RPE	0.074
	1.37 mg/kg bodyweight/day	Outdoor use, Indoor use , Without LEV, No gloves worn	0.201
Dermal - Acute - systemic effects	0.14 mg/kg bodyweight/day	Indoor use , With LEV, No gloves worn	0.021
Inhelation Aguta gyratamic officiate	1.24 mg/m <sup>3</sup>	Outdoor use, With RPE95%	0.026
Inhalation - Acute - systemic effects	3.54 mg/m <sup>3</sup>	Indoor use , With LEV, No RPE	0.074
Acute - Local - Inhalation	1.24 mg/m <sup>3</sup>	Outdoor use, With RPE95%	0.034
Acute - Local - Innalation	3.54 mg/m <sup>3</sup>	Indoor use , With LEV, No RPE	0.098
Long term Local Inhelation	1.24 mg/m <sup>3</sup>	Outdoor use, With RPE95%	0.089
Long term - Local - Inhalation	3.54 mg/m <sup>3</sup>	Indoor use , With LEV, No RPE	0.253



according to the REACH Regulation (EC) 1907/2006 amended by Regulation (EU) 2020/878 Version: 10.0 Revision date: 23/12/2022 Supersedes version of: 29/08/2018

MSDS.002

# ammonia, anhydrous

## 1.3.9. Worker exposure: PROC3

Route of exposure and type of effects	Exposure estimate	Assessment conditions	RCR
Dermel Long term systemic offects	0.34 mg/kg bodyweight/day	Outdoor use, Indoor use , Without LEV, No gloves worn	0.05
Dermal - Long-term - systemic effects	0.03 mg/kg bodyweight/day	Indoor use , With LEV, No gloves worn	0.004
Inhalation - Long-term - systemic effects	2.48 mg/m <sup>3</sup>	Outdoor use, With RPE95%	0.052
	7.08 mg/m <sup>3</sup>	Indoor use , With LEV, No RPE	0.149
	0.34 mg/kg bodyweight/day	Outdoor use, Indoor use , Without LEV, No gloves worn	0.05
Dermal - Acute - systemic effects	0.03 mg/kg bodyweight/day	Indoor use , With LEV, No gloves worn	0.004
Inholation Aguta quatamia affacta	2.48 mg/m <sup>3</sup>	Outdoor use, With RPE95%	0.052
Inhalation - Acute - systemic effects	7.08 mg/m <sup>3</sup>	Indoor use , With LEV, No RPE	0.149
	2.48 mg/m <sup>3</sup>	Outdoor use, With RPE95%	0.069
Acute - Local - Inhalation	7.08 mg/m <sup>3</sup>	Indoor use , With LEV, No RPE	0.197
Long torm Local Inhelation	2.48 mg/m <sup>3</sup>	Outdoor use, With RPE95%	0.177
Long term - Local - Inhalation	7.08 mg/m <sup>3</sup>	Indoor use , With LEV, No RPE	0.506

## 1.3.10. Worker exposure: PROC4

Route of exposure and type of effects	Exposure estimate	Assessment conditions	RCR
Dennel Lean terre and min fierte	0.69 mg/kg bodyweight/day	Outdoor use, Indoor use, Without LEV, Gloves worn (90% Reduction)	0.101
Dermal - Long-term - systemic effects	0.69 mg/kg bodyweight/day	Indoor use , With LEV, No gloves worn	0.101
	2.48 mg/m <sup>3</sup>	Outdoor use, With RPE95%	0.052
Inhalation - Long-term - systemic effects	7.08 mg/m <sup>3</sup>	Indoor use , With LEV, No RPE	0.149
	0.69 mg/kg bodyweight/day	Outdoor use, Indoor use, Without LEV, Gloves worn (90% Reduction)	0.101
Dermal - Acute - systemic effects	0.69 mg/kg bodyweight/day	Indoor use , With LEV, No gloves worn	0.101
Inhalation - Acute - systemic effects	2.48 mg/m <sup>3</sup>	Outdoor use, With RPE95%	0.052
	7.08 mg/m <sup>3</sup>	Indoor use , With LEV, No RPE	0.149
Acute - Local - Inhalation	2.48 mg/m <sup>3</sup>	Outdoor use, With RPE95%	0.069
	7.08 mg/m <sup>3</sup>	Indoor use , With LEV, No RPE	0.197
Long term Local Inhelation	2.48 mg/m <sup>3</sup>	Outdoor use, With RPE95%	0.177
Long term - Local - Inhalation	7.08 mg/m <sup>3</sup>	Indoor use , With LEV, No RPE	0.506

## 1.3.11. Worker exposure: PROC8b

Route of exposure and type of effects	Exposure estimate	Assessment conditions	RCR
Dennel Long town and the first	0.69 mg/kg bodyweight/day	Outdoor use, Indoor use , Without LEV, Gloves worn (90% Reduction)	0.101
Dermal - Long-term - systemic effects	0.69 mg/kg bodyweight/day	Indoor use , With LEV, No gloves worn	0.101
	3.72 mg/m <sup>3</sup>	Outdoor use, With RPE95%	0.078
Inhalation - Long-term - systemic effects	3.19 mg/m <sup>3</sup>	Indoor use , With LEV, No RPE	0.067
2	0.69 mg/kg bodyweight/day	Outdoor use, Indoor use , Without LEV, Gloves worn (90% Reduction)	0.101
Dermal - Acute - systemic effects	0.69 mg/kg bodyweight/day	Indoor use , With LEV, No gloves worn	0.101
	3.72 mg/m <sup>3</sup>	Outdoor use, With RPE95%	0.078
Inhalation - Acute - systemic effects	3.19 mg/m <sup>3</sup>	Indoor use , With LEV, No RPE	0.067
Acute - Local - Inhalation	3.72 mg/m <sup>3</sup>	Outdoor use, With RPE95%	0.103
	3.19 mg/m <sup>3</sup>	Indoor use , With LEV, No RPE	0.089
Long term Local Inholation	3.72 mg/m <sup>3</sup>	Outdoor use, With RPE95%	0.266
Long term - Local - Inhalation	3.19 mg/m <sup>3</sup>	Indoor use , With LEV, No RPE	0.228

### 1.3.12. Worker exposure: PROC9



according to the REACH Regulation (EC) 1907/2006 amended by Regulation (EU) 2020/878 Version: 10.0 Revision date: 23/12/2022 Supersedes version of: 29/08/2018

## MSDS.002

# ammonia, anhydrous

Route of exposure and type of effects	Exposure estimate	Assessment conditions	RCR
Dermal - Long-term - systemic effects 0.69 mg/kg bodyweight/day 0.69 mg/kg bodyweight/day	0.69 mg/kg bodyweight/day	Outdoor use, Indoor use, Without LEV, Gloves worn (90% Reduction)	0.101
	0.69 mg/kg bodyweight/day	Indoor use , With LEV, No gloves worn	0.101
Inholation I and tarm avatamic offects	4.96 mg/m <sup>3</sup>	Outdoor use, With RPE95%	0.104
Inhalation - Long-term - systemic effects	0.71 mg/m <sup>3</sup>	Indoor use , With LEV, With RPE	0.015
Dermal - Acute - systemic effects	0.69 mg/kg bodyweight/day	Outdoor use, Indoor use, Without LEV, Gloves worn (90% Reduction)	0.101
	0.69 mg/kg bodyweight/day	Indoor use , With LEV, No RPE	0.101
Inhalation - Acute - systemic effects	4.96 mg/m <sup>3</sup>	Outdoor use, With RPE95%	0.104
	0.71 mg/m <sup>3</sup>	Indoor use , With LEV, With RPE	0.015
Acute - Local - Inhalation	4.96 mg/m <sup>3</sup>	Outdoor use, With RPE95%	0.138
	0.71 mg/m <sup>3</sup>	Indoor use , With LEV, With RPE	0.02
Long term   and   Inhelation	4.96 mg/m <sup>3</sup>	Outdoor use, With RPE95%	0.354
Long term - Local - Inhalation	0.71 mg/m <sup>3</sup>	Indoor use , With LEV, With RPE	0.051

## 1.4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the ES

### 1.4.1. Environment

Guidance - Environment	Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures. For scaling see : https://ec.europa.eu/jrc/en/scientific-tool/european-union-system-evaluation-substances	
1.4.2. Health		
Guidance - Health	Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures. For scaling see : http://www.ecetoc.org/tra	



Version: 10.0 Revision date: 23/12/2022 Supersedes version of: 29/08/2018

MSDS.002

2. EIGA002-2: Professional uses	
2.1. Title section	
	Professional uses
	ES Ref.: EIGA002-2 Revision date: 4/25/2017
Processes, tasks, activities covered	Professional uses, including transfer of product in non-industrial settings
Environment	Use descriptors
CS1	ERC9a, ERC9b
Worker	Use descriptors
CS2	PROC4
CS3	PROC8a
Assessment method	ECETOC TRA 2.0
2.2. Conditions of use affecting exposure	
2.2.1. Control of environmental exposure: ERC9a,	ERC9b
ERC9a	Widespread use of functional fluid (indoor)
ERC9b	Widespread use of functional fluid (indoor) Widespread use of functional fluid (outdoor)
Product (article) characteristics	
Physical form of product	See section 9 of the SDS, No additional information
Concentration of substance in product	≤ 100 %
No additional information	
Amount used, frequency and duration of use (or free No additional information Technical and organisational conditions and means	
No additional information	
No additional information Technical and organisational conditions and measure	sures
No additional information Technical and organisational conditions and meas Ensure operatives are trained to minimise exposure	sures
No additional information Technical and organisational conditions and meas Ensure operatives are trained to minimise exposure Conditions and measures related to sewage treatr No additional information	sures
No additional information Technical and organisational conditions and meas Ensure operatives are trained to minimise exposure Conditions and measures related to sewage treatr No additional information Conditions and measures related to treatment of v	sures
No additional information Technical and organisational conditions and meas Ensure operatives are trained to minimise exposure Conditions and measures related to sewage treatr No additional information	sures
No additional information Technical and organisational conditions and mease Ensure operatives are trained to minimise exposure Conditions and measures related to sewage treater No additional information Conditions and measures related to treatment of v See section 13 of the SDS	sures ment plant waste (including article waste)
No additional information Technical and organisational conditions and meas Ensure operatives are trained to minimise exposure Conditions and measures related to sewage treatr No additional information Conditions and measures related to treatment of v See section 13 of the SDS Other conditions affecting environmental exposure	sures nent plant waste (including article waste) re
No additional information Technical and organisational conditions and meas Ensure operatives are trained to minimise exposure Conditions and measures related to sewage treatr No additional information Conditions and measures related to treatment of v See section 13 of the SDS Other conditions affecting environmental exposur Closed systems are used in order to prevent unintend	sures nent plant waste (including article waste) re
No additional information Technical and organisational conditions and mease Ensure operatives are trained to minimise exposure Conditions and measures related to sewage treatm No additional information Conditions and measures related to treatment of v See section 13 of the SDS Other conditions affecting environmental exposure Closed systems are used in order to prevent unintend	sures nent plant waste (including article waste) re
No additional information Technical and organisational conditions and mease Ensure operatives are trained to minimise exposure Conditions and measures related to sewage treater No additional information Conditions and measures related to treatment of v See section 13 of the SDS Other conditions affecting environmental exposure Closed systems are used in order to prevent unintend 2.2.2. Control of worker exposure: PROC4	sures nent plant waste (including article waste) re
No additional information Technical and organisational conditions and mease Ensure operatives are trained to minimise exposure Conditions and measures related to sewage treater No additional information Conditions and measures related to treatment of v See section 13 of the SDS Other conditions affecting environmental exposure Closed systems are used in order to prevent unintend 2.2.2. Control of worker exposure: PROC4 PROC4	sures nent plant waste (including article waste) re led emissions
No additional information Technical and organisational conditions and mease Ensure operatives are trained to minimise exposure Conditions and measures related to sewage treater No additional information Conditions and measures related to treatment of v See section 13 of the SDS Other conditions affecting environmental exposur Closed systems are used in order to prevent unintend 2.2.2. Control of worker exposure: PROC4 PROC4 Product (article) characteristics	sures  nent plant  waste (including article waste)  re led emissions  Chemical production where opportunity for exposure arises
No additional information Technical and organisational conditions and mease Ensure operatives are trained to minimise exposure Conditions and measures related to sewage treater No additional information Conditions and measures related to treatment of v See section 13 of the SDS Other conditions affecting environmental exposure Closed systems are used in order to prevent unintend 2.2.2. Control of worker exposure: PROC4 PROC4 Product (article) characteristics Physical form of product	sures  ment plant  waste (including article waste)  re led emissions  Chemical production where opportunity for exposure arises  See section 9 of the SDS, No additional information
No additional information Technical and organisational conditions and mease Ensure operatives are trained to minimise exposure Conditions and measures related to sewage treater No additional information Conditions and measures related to treatment of v See section 13 of the SDS Other conditions affecting environmental exposur Closed systems are used in order to prevent unintend 2.2.2. Control of worker exposure: PROC4 PROC4 Product (article) characteristics	sures  nent plant  waste (including article waste)  re led emissions  Chemical production where opportunity for exposure arises
No additional information Technical and organisational conditions and mease Ensure operatives are trained to minimise exposure Conditions and measures related to sewage treatr No additional information Conditions and measures related to treatment of v See section 13 of the SDS Other conditions affecting environmental exposure Closed systems are used in order to prevent unintend 2.2.2. Control of worker exposure: PROC4 PROC4 PROC4 Physical form of product Concentration of substance in product	sures nent plant waste (including article waste)  re led emissions  Chemical production where opportunity for exposure arises  See section 9 of the SDS, No additional information ≤ 100 %
No additional information Technical and organisational conditions and mease Ensure operatives are trained to minimise exposure Conditions and measures related to sewage treatr No additional information Conditions and measures related to treatment of v See section 13 of the SDS Other conditions affecting environmental exposure Closed systems are used in order to prevent unintend 2.2.2. Control of worker exposure: PROC4 PROC4 PROC4 Product (article) characteristics Physical form of product Concentration of substance in product Amount used (or contained in articles), frequency The actual tonnage handled per shift is not considered	sures  ment plant  waste (including article waste)  re  led emissions  Chemical production where opportunity for exposure arises  See section 9 of the SDS, No additional information ≤ 100 %  and duration of use/exposure d to influence the exposure as such for this scenario. Instead, the combination of the scale of operation and leve
No additional information Technical and organisational conditions and mease Ensure operatives are trained to minimise exposure Conditions and measures related to sewage treatr No additional information Conditions and measures related to treatment of v See section 13 of the SDS Other conditions affecting environmental exposure Closed systems are used in order to prevent unintend 2.2.2. Control of worker exposure: PROC4 PROC4 PROC4 Product (article) characteristics Physical form of product Concentration of substance in product Amount used (or contained in articles), frequency The actual tonnage handled per shift is not considered of containment/automation (as reflected in the technic	sures  nent plant  waste (including article waste)  re led emissions  Chemical production where opportunity for exposure arises  Chemical production where opportunity for exposure arises  See section 9 of the SDS, No additional information ≤ 100 %  and duration of use/exposure d to influence the exposure as such for this scenario. Instead, the combination of the scale of operation and leve al conditions) is the main determinant of the process-intrinsic emission potential.
No additional information Technical and organisational conditions and mease Ensure operatives are trained to minimise exposure Conditions and measures related to sewage treatr No additional information Conditions and measures related to treatment of v See section 13 of the SDS Other conditions affecting environmental exposure Closed systems are used in order to prevent unintend 2.2.2. Control of worker exposure: PROC4 PROC4 PROC4 Product (article) characteristics Physical form of product Concentration of substance in product Amount used (or contained in articles), frequency The actual tonnage handled per shift is not considered for containment/automation (as reflected in the technic Exposure duration	sures  nent plant  waste (including article waste)  re  led emissions  Chemical production where opportunity for exposure arises  Chemical production where opportunity for exposure arises  See section 9 of the SDS, No additional information  \$ See section 9 of the SDS, No additional information  \$ 100 %  and duration of use/exposure d to influence the exposure as such for this scenario. Instead, the combination of the scale of operation and lever al conditions) is the main determinant of the process-intrinsic emission potential.  \$ 8 h/day
No additional information Technical and organisational conditions and mease Ensure operatives are trained to minimise exposure Conditions and measures related to sewage treatr No additional information Conditions and measures related to treatment of v See section 13 of the SDS Other conditions affecting environmental exposure Closed systems are used in order to prevent unintend 2.2.2. Control of worker exposure: PROC4 PROC4 PROC4 Product (article) characteristics Physical form of product Concentration of substance in product Amount used (or contained in articles), frequency The actual tonnage handled per shift is not considered of containment/automation (as reflected in the technic	sures  nent plant  waste (including article waste)  re led emissions  Chemical production where opportunity for exposure arises  Chemical production where opportunity for exposure arises  See section 9 of the SDS, No additional information ≤ 100 %  and duration of use/exposure d to influence the exposure as such for this scenario. Instead, the combination of the scale of operation and leve al conditions) is the main determinant of the process-intrinsic emission potential.
No additional information Technical and organisational conditions and mease Ensure operatives are trained to minimise exposure Conditions and measures related to sewage treatr No additional information Conditions and measures related to treatment of v See section 13 of the SDS Other conditions affecting environmental exposure Closed systems are used in order to prevent unintend C.2.2. Control of worker exposure: PROC4 PROC4 PROC4 Product (article) characteristics Physical form of product Concentration of substance in product Amount used (or contained in articles), frequency The actual tonnage handled per shift is not considerer of containment/automation (as reflected in the technic Exposure duration Covers frequency up to:	sures  ment plant  waste (including article waste)  re  led emissions  Chemical production where opportunity for exposure arises  See section 9 of the SDS, No additional information ≤ 100 %  and duration of use/exposure d to influence the exposure as such for this scenario. Instead, the combination of the scale of operation and leve al conditions) is the main determinant of the process-intrinsic emission potential.  ≤ 8 h/day 5 days/week
No additional information Technical and organisational conditions and mease Ensure operatives are trained to minimise exposure Conditions and measures related to sewage treatr No additional information Conditions and measures related to treatment of v See section 13 of the SDS Other conditions affecting environmental exposure Closed systems are used in order to prevent unintend 2.2.2. Control of worker exposure: PROC4 PROC4 PROC4 Product (article) characteristics Physical form of product Concentration of substance in product Amount used (or contained in articles), frequency The actual tonnage handled per shift is not considered for containment/automation (as reflected in the technic Exposure duration	sures  ment plant  waste (including article waste)  re  led emissions  Chemical production where opportunity for exposure arises  See section 9 of the SDS, No additional information ≤ 100 %  and duration of use/exposure d to influence the exposure as such for this scenario. Instead, the combination of the scale of operation and leve al conditions) is the main determinant of the process-intrinsic emission potential.  ≤ 8 h/day  5 days/week



according to the REACH Regulation (EC) 1907/2006 amended by Regulation (EU) 2020/878 Version: 10.0 Revision date: 23/12/2022 Supersedes version of: 29/08/2018

MSDS.002

# ammonia, anhydrous

During indoor processes or in cases where natural ventilation i generally required.	s not sufficient, LEV should be in place at poir	nts were emissions could occur. Outdoor, LEV is not
Drain down and flush system prior to equipment break-in or ma	aintenance.	
Apply a good standard of general or controlled ventilation when	n maintenance activities are carried out.	
Ensure operatives are trained to minimise exposure		
Ensure supervision is in place to check that the RMMs are in p	lace and are being used correctly and that the	e OCs are being followed
Conditions and measures related to personal protection, h		
Use suitable eye protection. Wear suitable face shield. Wear s skin	uitable coveralls to prevent exposure to the	Personal protection measures have to be applied in case of potential exposure only.
Wear gloves providing a minimum efficiency of (%):		90
Wear a respirator providing a minimum efficiency of	Wear a respirator providing a minimum efficiency of	
See section 8 of the SDS.		
Other conditions affecting workers exposure		
Indoor or outdoor use		
2.2.3. Control of worker exposure: PROC8a		
PROC8a	Transfer of substance or mixture (charging a	and discharging) at non-dedicated facilities
Product (article) characteristics	1	
Physical form of product	See section 9 of the SDS, No additional info	ormation
Concentration of substance in product	≤ 100 %	
Amount used (or contained in articles), frequency and dur	•	
The actual tonnage handled per shift is not considered to influe of containment/automation (as reflected in the technical conditi	ons) is the main determinant of the process-ir	
	Exposure duration ≤ 8 h/day	
Covers frequency up to:	5 days/week	
Technical and organisational conditions and measures		
Handle product within a closed system During indoor processes or in cases where natural ventilation i generally required.	s not sufficient, LEV should be in place at poir	nts were emissions could occur. Outdoor, LEV is not
Drain down and flush system prior to equipment break-in or ma	nintonanco	
Apply a good standard of general or controlled ventilation when Ensure operatives are trained to minimise exposure	Thankehance activities are carried out.	
Ensure supervision is in place to check that the RMMs are in p	lace and are being used correctly and that the	OCs are being followed
	lace and are being used correctly and that the	OCS are being followed
Conditions and measures related to personal protection, h	volution	
Use suitable eye protection. Wear suitable face shield. Wear s skin		Personal protection measures have to be applied in case of potential exposure only.
Wear gloves providing a minimum efficiency of (%):		90
Wear a respirator providing a minimum efficiency of		95 Mandatory if activities take place outdoors or indoors with no local exhaust ventilation
See section 8 of the SDS.		
Other conditions affecting workers exposure		
Indoor or outdoor use		
2.3. Exposure estimation and reference to its source	2	
2.3.1. Environmental release and exposure: ERC9a, ERC9b		
Qualitative approach used to conclude safe use, The exposure because the substance partitions primarily to air when released already present background levels of the gas in the environme presented in section 3.	d to the environment. ,The resulting environme	ental exposure is not expected to add significantly to

### 2.3.2. Worker exposure: PROC4



according to the REACH Regulation (EC) 1907/2006 amended by Regulation (EU) 2020/878 Version: 10.0 Revision date: 23/12/2022 Supersedes version of: 29/08/2018

## MSDS.002

# ammonia, anhydrous

Route of exposure and type of effects	Exposure estimate	Assessment conditions	RCR
	0.69 mg/kg bodyweight/day	Indoor use , With LEV, No gloves worn	0.101
Dermal - Long-term - systemic effects	0.69 mg/kg bodyweight/day	Outdoor use, Indoor use, Without LEV, Gloves worn (90% Reduction)	0.101
Inhalation - Long-term - systemic effects	2.48 mg/m <sup>3</sup>	Outdoor use, With RPE95%	0.052
	7.08 mg/m <sup>3</sup>	Indoor use , With LEV, No RPE	0.149
	0.69 mg/kg bodyweight/day	Indoor use , With LEV, No gloves worn	0.101
Dermal - Acute - systemic effects	0.69 mg/kg bodyweight/day	Outdoor use, Indoor use, Without LEV, Gloves worn (90% Reduction)	0.101
Inhalation - Acute - systemic effects	2.48 mg/m <sup>3</sup>	Outdoor use, With RPE95%	0.052
	7.08 mg/m <sup>3</sup>	Indoor use , With LEV, No RPE	0.149
Acute - Local - Inhalation	2.48 mg/m <sup>3</sup>	Outdoor use, With RPE95%	0.069
	7.08 mg/m <sup>3</sup>	Indoor use , With LEV, No RPE	0.197
	2.48 mg/m <sup>3</sup>	Outdoor use, With RPE95%	0.177
Long term - Local - Inhalation	7.08 mg/m <sup>3</sup>	Indoor use , With LEV, No RPE	0.506

### 2.3.3. Worker exposure: PROC8a

Route of exposure and type of effects	Exposure estimate	Assessment conditions	RCR
Demol Lang term and min that	0.14 mg/kg bodyweight/day	Indoor use , With LEV, No gloves worn	0.021
Dermal - Long-term - systemic effects	1.37 mg/kg bodyweight/day	Outdoor use, Indoor use , Without LEV, Gloves worn (90% Reduction)	0.201
Inhalation - Long-term - systemic effects	6.2 mg/m <sup>3</sup>	Outdoor use, With RPE95%	0.13
	0.89 mg/m <sup>3</sup>	Indoor use , With LEV, No RPE	0.019
Dermal - Acute - systemic effects	0.14 mg/kg bodyweight/day	Indoor use , With LEV, No gloves worn	0.021
	1.37 mg/kg bodyweight/day	Outdoor use, Indoor use , Without LEV, Gloves worn (90% Reduction)	0.201
Inhalation - Acute - systemic effects	6.2 mg/m <sup>3</sup>	Outdoor use, With RPE95%	0.13
	0.89 mg/m <sup>3</sup>	Indoor use , With LEV, No RPE	0.019
Acute - Local - Inhalation	6.2 mg/m <sup>3</sup>	Outdoor use, With RPE95%	0.172
	0.89 mg/m <sup>3</sup>	Indoor use , With LEV, No RPE	0.025
	6.2 mg/m <sup>3</sup>	Outdoor use, With RPE95%	0.443
Long term - Local - Inhalation	0.89 mg/m <sup>3</sup>	Indoor use , With LEV, No RPE	0.064

## 2.4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the ES

## 2.4.1. Environment

Guidance - Environment	Check that RMMs and OCs are as described above or of equivalent efficiency	
2.4.2. Health		
Guidance - Health	Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures. For scaling see : http://www.ecetoc.org/tra	

End of document