Safety data sheet
Ammonia, anhydrous.

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

1.1. Product identifier
Product name
Ammonia, anhydrous.

EC No (from EINECS): 231-635-3
CAS No: 7664-41-7
Index-Nr. 007-001-00-5
Chemical formula NH3
REACH Registration number:
01-2119488876-14

1.2. Relevant identified uses of the substance or mixture and uses advised against
Relevant identified uses
Industrial and professional. Perform risk assessment prior to use.
Uses advised against
Consumer use.

1.3. Details of the supplier of the safety data sheet
Company identification
BOC, Priestley Road, Worsley, Manchester M28 2UT
E-Mail Address ReachSDS@boc.com

1.4. Emergency telephone number
Emergency phone numbers (24h): 0800 111 333

SECTION 2: Hazards identification

2.1. Classification of the substance or mixture

Classification acc. to Regulation (EC) No 1272/2008/EC (CLP/GHS)
Press. Gas (Liquefied gas) - Contains gas under pressure; may explode if heated.
Flam. Gas 2 - Flammable gas.
Acute Tox. 3 - Toxic if inhaled.
Skin Corr. 1B - Causes severe skin burns and eye damage.
Acute Tox. 1 - Very toxic to aquatic life.
- Corrosive to the respiratory tract.

Classification acc. to Directive 67/548/EEC & 1999/45/EC
R10 | T; R23 | C; R34 | N; R50
Flammable
Toxic by inhalation.
Causes burns (to eyes, respiratory system and skin).
Very toxic to aquatic organisms.
Risk advice to man and the environment
Liquefied gas.

2.2. Label elements
- Labelling Pictograms

- Signal word

Danger

- Hazard Statements

H280	Contains gas under pressure; may explode if heated.
H221	Flammable gas.
H331	Toxic if inhaled.
H314	Causes severe skin burns and eye damage.
H400	Very toxic to aquatic life.
EUH071	Corrosive to the respiratory tract.

- Precautionary Statements

Precautionary Statement Prevention

P210	Keep away from heat/sparks/open flames/hot surfaces. - No smoking.
P280	Wear protective gloves/protective clothing/eye protection/face protection.
P260	Do not breathe gas, vapours.
P273	Avoid release to the environment.

Precautionary Statement Response

P377	Leaking gas fire: Do not extinguish, unless leak can be stopped safely.
P381	Eliminate all ignition sources if safe to do so.
P303+P361+P353+P315	IF ON SKIN (or hair): Remove / Take off immediately all contaminated clothes. Rinse skin with water/shower. Get immediate medical advice/attention.
P304+P340+P315	IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. Get immediate medical advice/attention.
P305+P351+P338+P315	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Get immediate medical advice/attention.

Precautionary Statement Storage

P403	Store in a well-ventilated place.
P405	Store locked up.

Precautionary Statement Disposal

None.

2.3. Other hazards
Contact with liquid may cause cold burns/frost bite.

SECTION 3: Composition/information on ingredients

Substance / Mixture: Substance.

3.1. Substances
Ammonia, anhydrous.
CAS No: 7664-41-7
Index-Nr.: 007-001-00-5
EC No (from EINECS): 231-635-3
REACH Registration number:
01-2119488876-14
Contains no other components or impurities which will influence the classification of the product.

3.2. Mixtures
Not applicable.

SECTION 4: First aid measures

4.1. Description of first aid measures
First Aid General Information:
Remove victim to uncontaminated area wearing self contained breathing apparatus. Keep victim warm and rested. Call a doctor. Apply artificial respiration if breathing stopped.
First Aid Inhalation:
Remove victim to uncontaminated area wearing self contained breathing apparatus. Keep victim warm and rested. Call a doctor. Apply artificial respiration if breathing stopped.
First Aid Skin / Eye:
May cause severe chemical burns to skin and cornea. Suitable first-aid treatment should be immediately available. Seek medical advice before using product. Remove contaminated clothing. Drench affected area with water for at least 15 minutes. Immediately flush eyes thoroughly with water for at least 15 minutes. Obtain medical assistance
First Aid Ingestion:
Ingestion is not considered a potential route of exposure.

4.2. Most important symptoms and effects, both acute and delayed
May cause severe chemical burns to skin and cornea. Suitable first-aid treatment should be immediately available. Seek medical advice before using product. May result in pulmonary oedema

4.3. Indication of any immediate medical attention and special treatment needed
Obtain medical assistance. Treat with a corticosteroid spray as soon as possible after inhalation.

SECTION 5: Fire fighting measures

5.1. Extinguishing media
Suitable extinguishing media
All known extinguishants can be used.

5.2. Special hazards arising from the substance or mixture
Specific hazards
Exposure to fire may cause containers to rupture/explode.
Hazardous combustion products
If involved in a fire the following toxic and/or corrosive fumes may be produced by thermal decomposition:
Nitrogen dioxide, Nitric oxide.

5.3. Advice for firefighters
Specific methods
If possible, stop flow of product. Move container away or cool with water from a protected position. Prevent water used in emergency cases from entering sewers and drainage systems.
Special protective equipment for fire fighters
Use self-contained breathing apparatus and chemically protective clothing. Clothing for fire-fighters (including helmets, protective boots and gloves) conforming to EN 469 will provide a basic level of protection from chemical incidents. EN 469:2005: Protective clothing for fire-fighters. Performance requirements for protective clothing for fire-fighting.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures
Evacuate area. Use self-contained breathing apparatus and chemically protective clothing. Ensure adequate air ventilation. Monitor concentration of released product. Eliminate ignition sources.

6.2. Environmental precautions
Try to stop release. Reduce vapour with fog or fine water spray.

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. Keep area evacuated and free from ignition sources until any spilled liquid has evaporated. (Ground free from frost).

6.4. Reference to other sections
See also sections 8 and 13.

SECTION 7: Handling and storage

7.1. Precautions for safe handling
Use only properly specified equipment which is suitable for this product, its supply pressure and temperature. Contact your gas supplier if in doubt. Do not allow backfeed into the container. Suck back of water into the container must be prevented. Keep away from ignition sources (including

static discharges). Purge air from system before introducing gas. Refer to supplier's handling instructions. Avoid exposure, obtain special instructions before use. Avoid suckback of water, acid and alkalis. 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 atmosphere and the need for explosion-proof equipment. Consider the use of only non-sparking tools. Do not smoke while handling product. Only experienced and properly instructed persons should handle gases under pressure. Protect cylinders from physical damage; do not drag, roll, slide or drop. Never use direct flame or electrical heating devices to raise the pressure of a container. Do not remove or deface labels provided by the supplier for the identification of the cylinder contents. When moving cylinders, even for short distances, use a cart (trolley, hand truck, etc.) designed to transport cylinders. Leave valve protection caps in place until the container has been secured against either a wall or bench or placed in a container stand and is ready for use. Ensure the complete gas system has been (or is regularly) checked for leaks before use. If user experiences any difficulty operating cylinder valve discontinue use and contact supplier. Close container valve after each use and when empty, even if still connected to equipment. Never attempt to repair or modify container valves or safety relief devices. Keep container valve outlets clean and free from contaminates particularly oil and water. Never attempt to transfer gases from one cylinder/container to another. Installation of a cross purge assembly between the cylinder and the regulator is recommended. The substance must be handled in accordance with good industrial hygiene and safety procedures. Ensure equipment is adequately earthed.

7.2. Conditions for safe storage, including any incompatibilities

Secure cylinders to prevent them falling. Keep container below 50°C in a well ventilated place. Segregate from oxidant gases and other oxidants in store. Observe all regulations and local requirements regarding storage of containers. Containers should not be stored in conditions likely to encourage corrosion. Containers should be stored in the vertical position and properly secured to prevent falling over. Stored containers should be periodically checked for general conditions and leakage. Container valve guards or caps should be in place. Store containers in location free from fire risk and away from sources of heat and ignition. Keep away from combustible materials. All electrical equipment in the storage areas should be compatible with the risk of potentially explosive atmosphere.

7.3. Specific end use(s)

None.

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

Exposure limit value

Value type	value	Note
Great Britain - LTEL	25 ppm	EH 40/07
Great Britain - STEL	35 ppm	EH 40/07

Derived No Effect Levels

Type	Exposure	Value	Population	Effects
DNEL	Short term Dermal	6,8 mg/kg bw/day	Workers	Systemic
DNEL	Long term Inhalation	36 mg/m³	Workers	Local
DNEL	Long term Inhalation	14 mg/cm²	Workers	Local

Predicted No Effect Concentrations

Type	Compartment Detail	Value
PNEC	Fresh water	0,0011 mg/l
PNEC	Marine	0,0011 mg/l

8.2. Exposure controls

Appropriate engineering controls

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. Product to be handled in a closed system. Use only permanent leak-tight installations (e.g. welded pipes). Gas detectors should be used when toxic quantities may be released. Keep concentrations well below occupational exposure limits. Provide adequate general or local ventilation. Systems under pressure should be regularly checked for leakages. The substance must be handled in accordance with good industrial hygiene and safety procedures. Consider work permit system e.g. for maintenance activities.

Personal protective equipment

Eye and face protection

Protect eyes, face and skin from liquid splashes. Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period.Wear a face-shield when transfilling and breaking transfer connections. Safety eyewear, goggles or face-shield to EN166 should be used to avoid exposure to liquid splashes. Wear eye protection to EN 166 when using gases. Full-face mask recommended.
Guideline:
EN 136: Respiratory protective devices. Full face masks. Requirements, testing, marking.

Skin protection

Hand protection

Advice: Wear working gloves and safety shoes while handling gas cylinders., Chemically resistant gloves complying with EN 374 should be worn at all times when handling chemical products if a risk assessment indicates this is necessary., Materials suitable for prolonged, direct contact.
Material:
Butyl rubber (Butyl)
Min. Breakthrough time:
480 min
Glove thickness:

0,7 mm
Guideline:
EN 374-1/2/3 Protective gloves against chemicals and microorganisms
Protection index:
6

Advice: Materials suitable for short-term contact and/or liquid splashes
Material:
CR(Chloroprene, Polychloroprene rubber)
Min. Breakthrough time:
30 min
Glove thickness:
0,5 mm
Guideline:
EN 374-1/2/3 Protective gloves against chemicals and microorganisms
Protection index:
2

Body protection
Keep suitable chemically resistant protective clothing readily available for emergency use. Personal protective equipment for the body should be selected based on the task being performed and the risks involved.
Guideline:
EN 943: Protective clothing against liquid and gaseous chemicals, aerosols and solid particles.
Other protection
Wear working gloves and safety shoes while handling gas cylinders. Guideline:
ISO 20345 Safety footwear
Respiratory protection
Keep self contained breathing apparatus readily available for emergency use. Use SCBA in the event of high concentrations. The selection of the Respiratory Protective Device (RPD) must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected RPD. When allowed by a risk assessment Respiratory Protective Equipment (RPE) may be used.
Guideline:
EN 136: Respiratory protective devices. Full face masks. Requirements, testing, marking.

Material:
Filter K
Guideline:
EN 14387: Respiratory protective devices. Gas filter(s) and combined filter(s). Requirements, testing, marking
Thermal hazards
If there is a risk of contact with the liquid, all protective equipment should be suitable for extremely low temperatures.
Environmental Exposure Controls
Refer to local regulations for restriction of emissions to the atmosphere. See section 13 for specific methods for waste gas treatment. Provide adequate general or local ventilation.

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

General information
Appearance/Colour: Colourless gas.
Odour: Ammoniacal
Odour threshold:
Odour threshold is subjective and inadequate to warn for over exposure.
pH value: If dissolved in water pH-value will be affected.
Melting point: -77,7 °C
Boiling point: -33 °C
Flash point: Not applicable for gases and gas mixtures.
Flammability range: 15 %(V) - 30 %(V)
Vapour Pressure 20 °C: 8,6 bar
Relative density, gas: 0,6
Solubility in water: Hydrolyses.
Partition coefficient: n-octanol/water: < 1 logPow
Autoignition temperature: 630 °C
Explosive properties:
Explosive acc. EU legislation: Not explosive.
Explosive acc. transp. reg.: Not explosive.
Oxidising properties: Not applicable.
Molecular weight: 17 g/mol
Critical temperature: 132,4 °C
Relative density, liquid: 0,7

9.2. Other information

Although this substance has flammability data, it is difficult to ignite in air and is classified as non-flammable.

SECTION 10: Stability and reactivity

10.1. Reactivity

Unreactive under normal conditions.

10.2. Chemical stability

Stable under normal conditions.

10.3. Possibility of hazardous reactions

Can form potential explosive atmosphere in air., May react violently with oxidants.

10.4. Conditions to avoid

Keep away from heat/sparks/open flames/hot surfaces. - No smoking.

10.5. Incompatible materials

Oxidising agents. Air, Oxidiser. May react violently with acids. Reacts with water to form corrosive alkalis. Corrosive to galvanised metal. Corrosive to brass, Cu, Zn, Au, Ag and Hg. For material compatibility see latest version of ISO-11114.

10.6. Hazardous decomposition products

Under normal conditions of storage and use, hazardous decomposition products should not be produced. If involved in a fire the following toxic and/or corrosive fumes may be produced by thermal decomposition:

Nitrogen dioxide, Nitric oxide.

SECTION 11: Toxicological information

11.1. Information on toxicological effects
Acute oral toxicity
Value: LD50
Species: Rat
Value in standard unit mg/kg: 350 mg/kg
Acute inhalation toxicity
Value: LC50
Species: Rat
Exposure time: 1 h
Value in non-standard unit: 9500 ppm

Value: LC50
Species: Rat
Exposure time: 4 h
Value in non-standard unit: 2000 ppm
Acute dermal toxicity
Not applicable.
Acute toxicity other routes
Not applicable.
Skin irritation
Irritant
Eye irritation
Irritant
Sensitization
This substance is not classified as a sensitiser.
Assessment mutagenicity
Memo: There is no evidence of mutagenic potential.
CarcinogenicityAssessment carcinogenicity
No evidence of carcinogenic effects.
Assessment toxicity to reproduction
No known effects from this product.
Assessment teratogenicity
No indication of teratogenic effects.
Other relevant toxicity information
May cause inflammation of the respiratory system and skin., Inhalation of large amounts leads to bronchospasm, laryngeal oedema and pseudomembrane formation., Irritating to the eyes.

SECTION 12: Ecological information

12.1. Toxicity
Toxic to water organisms., Avoid release to the environment., Product is not allowed to be discharged into ground water or aquatic environment.
Acute and prolonged toxicity fish
Species: Rainbow trout (Oncorhynchus mykiss)
Exposure time: 96 h
Value type: LC50
Value in standard unit mg/l: 0,16 - 1,1 mg/l
Acute and prolonged toxicity fish
Species: Rainbow trout (Oncorhynchus mykiss)
Value type: NOEC
Value in standard unit mg/l: 1,2 mg/l
Acute toxicity aquatic invertebrates
Species: Daphnia magna
Value type: NOEC
Value in standard unit mg/l: 0,79 mg/l
Acute toxicity aquatic invertebrates
Species: Daphnia magna
Exposure time: 48 h
Value type: EC50
Value in standard unit mg/l: 25,4 mg/l
Toxicity aquatic plants
Species: Chlorella vulgaris
Exposure time: 432 h
Value type: EC50
Value in standard unit mg/l: 2.700 mg/l
Chronic toxicity fish
Species: Ictalurus punctatus
Exposure time: 31 d
Value in standard unit mg/l: 0,048 mg/l
The statement of the toxic effect relates to the analytically determined concentration.
Chronic toxicity aquatic invertebrates
Species: Daphnia magna
Exposure time: 4 d
Value in standard unit mg/l: 0,79 mg/l
The product has not been tested. The statement has been derived from products of a similar structure or composition.

12.2. Persistence and degradability
The substance is biodegradable. Unlikely to persist.

12.3. Bioaccumulative potential
The substance has no potential for bioaccumulation.

12.4. Mobility in soil
The substance has low mobility in soil., The substance is soluble in water.

12.5. Results of PBT and vPvB assessment
Not classified as PBT or vPvB.

12.6. Other adverse effects
May cause pH changes in aqueous ecological systems. Depending on local conditions and existing concentrations, disturbances in the biodegradation process of activated sludge are possible.

SECTION 13: Disposal considerations

13.1. Waste treatment methods
Must not be discharged to atmosphere. Gas may be scrubbed in sulphuric acid solution. Gas may be scrubbed in water. Toxic and corrosive gases formed during combustion should be scrubbed before discharge to atmosphere. Do not discharge into any place where its accumulation could be dangerous. Refer to the EIGA code of practice (Doc.30 “Disposal of Gases", downloadable at http://www.eiga.org) for more guidance on suitable disposal methods.
Contact supplier if guidance is required. Dispose of cylinder via gas supplier only. Gases in pressure containers

(including halons) containing dangerous substances
EWC Nr. 16 05 04*

SECTION 14: Transport information

ADR/RID

14.1. UN number
1005

14.2. UN proper shipping name
Ammonia, anhydrous

14.3. Transport hazard class(es)
Class: 2
Classification Code: 2TC
Labels: 2.3, 8
Hazard number: 268
Tunnel restriction code: (C/D)
Emergency Action Code: 2RE

14.4. Packing group (Packing Instruction)
P200

14.5. Environmental hazards
Environmentally hazardous.

14.6. Special precautions for user
None.

IMDG

14.1. UN number
1005

14.2. UN proper shipping name
Ammonia, anhydrous

14.3. Transport hazard class(es)
Class: 2.3
Labels: 2.3, 8
EmS: F-C, S-U

14.4. Packing group (Packing Instruction)
P200

14.5. Environmental hazards
None.

14.6. Special precautions for user
None.

14.7. Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code
Not applicable.

IATA

14.1. UN number
1005

14.2. UN proper shipping name
Ammonia, anhydrous

14.3. Transport hazard class(es)
Class: 2.3
Labels: 2.3, 8

14.4. Packing group (Packing Instruction)
P200

14.5. Environmental hazards
Environmentally hazardous.

14.6. Special precautions for user
None.

Other transport information
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 that they are firmly secured. Ensure that the cylinder valve is closed and not leaking. Ensure that the valve outlet cap nut or plug (where provided) is correctly fitted. Ensure that the valve protection device (where provided) is correctly fitted. Ensure adequate ventilation. Ensure compliance with applicable regulations.

SECTION 15: Regulatory information

15.1. Safety, health and environmental regulations/legislation specific for the substance or mixture
Seveso Directive 96/82/EC: Listed

15.2. Chemical safety assessment
CSA has been carried out.

SECTION 16: Other information

Ensure all national/local regulations are observed. Ensure operators understand the toxicity hazard. Users of breathing apparatus must be trained. Before using this product in any new process or experiment, a thorough material compatibility and safety study should be carried out.
Advice
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. Details given in this document are believed to be correct at the time of going to press.
Further information
Note:
When using this document care should be taken, as the decimal sign and its position complies with rules for the structure and drafting of international standards, and is a comma on the line.

As an example 2,000 is two (to three decimal places) and not two thousand, whilst 1.000 is one thousand and not one (to three decimal places).

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