SAFETY DATA SHEET

SECTION 1: IDENTIFICATION OF THE MIXTURE AND OF THE COMPANY/UNDERTAKING

1.1. Product identifier:
Ammonium hydroxide 25%

1.2. Relevant identified uses of the mixture and uses advised against:
Identified uses:
Industrial uses:
- Raw material: e.g.: manufacturing of fertilizers, paints, medicines, vitamins, cosmetics, synthetic textile fibres, plastics
- Auxiliary material: e.g.: photographic processes, cooling systems, insulating products, ink cartridges, toners, primers, thinners, detergents, textile painting and handling.
- Treatment agent: e.g.: paper, leather, rubber/later, electronical and semi conductive industry, wood and metal surface treatment.

Professional uses:
- Laboratory agent, pH adjusting and neutralising agent, food industry auxiliary agent.
- In the following products: water treatment agents, fertilizers, primers, paint thinners and solvents, photographic chemicals, detergents, leather and other surface treatment agents.

Consumer uses:
- In the following products: primers, paint thinners and solvents, insulating materials, detergents, cosmetics, hygienic products.

Uses advised against: No uses advised against.

1.3. Details of the supplier of the safety data sheet:
NITROGÉNMŰVEK Zrt.
Pétfürdő, Hősök tere 14.
8105 Pétfürdő, Pf. 450
Telefon: +36-88-620-100
Fax: +36-88-620-102
E-mail: sds@nitrogen.hu

1.3.1. Responsible person: -
E-mail: sds@nitrogen.hu

1.4. Emergency telephone number:

The UK National Poisons Emergency number +44 870 600 6266

SECTION 2: HAZARDS IDENTIFICATION

2.1. Classification of the mixture:

Classification according to Regulation 1272/2008/EC (CLP):
Skin Corr. 1.B - H314
Hazardous to the aquatic environment, Acute 1 – H400

Warning **H statements:**
H314 – Causes severe skin burns and eye damage.
H400 – Very toxic to aquatic life.

2.2. Label elements
Ammonium hydroxide

GHS05

GHS09

DANGER

Warning **H statements:**
H314 – Causes severe skin burns and eye damage.
H400 – Very toxic to aquatic life.

Precautionary **P statements:**
P280 – Wear protective gloves/eye protection/face protection.
P273 – Avoid release to the environment.
P261 – Do not breathe gas/mist/vapours/spray.
P304+P340 – INHALATION: Remove victim to fresh air and keep at rest in a position comfortable for breathing.
P303 + **P361** + **P353** – IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower.
P305 + **P351** + **P338** – IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

2.3. Other hazards:
The mixture has no other known specific hazards for human or environment.

SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS

3.1. Substance
Not applicable.

3.2. Mixture:
The product is an aqueous solution of ammonia.

Description	CAS number:	EU number	REACH reg. nr.	Conc. (%)	Classification: 1272/2008/EC (CLP)		
					Hazard pict.	Hazard cat.	H phrase
Ammonium hydroxide	1336-21-6	215-647-6	-	22-30	GHS05 GHS09 Dgr	Skin Corr. 1B Aquatic Acute 1	H314 H400

For the full text of H phrases: see Section 16.

SECTION 4: FIRST AID MEASURES

4.1. Description of first aid measures:
The solutions of ammonia may cause high ammonia concentration in closed areas due to the quick evaporation. The quickness is very important. Remove the affected person from the further exposure. Give immediate first aid and obtain medical help.
IN CASE OF INGESTION:
Measures:
- Do not induce vomiting.
- If the victim is conscious, flush the mouth of the victim with water and give him 2-3 glasses of water to drink.
- Obtain immediate medical help.

IN CASE OF INHALATION:
Measures:
- Immediately take the injured person into fresh air.
- Keep the injured person in half sitting position and keep him calm.
- If qualified person is available, administer oxygen.
- If the breathing stops or in case of breathing difficulties, administer artificial respiration.

IN CASE OF SKIN CONTACT:
Measures:
- Flush with plenty of water.
- Remove the contaminated clothes and wash the affected body parts.
- Obtain immediate medical help.

IN CASE OF EYE CONTACT:
Measures:
- Rinse eyes thoroughly with wash solution or clean water for at least 15 minutes.
- Remove the contact lenses, keep the eyelids open during flushing.

4.2. Most important symptoms and effects, both acute and delayed:
Acute symptoms:
The product is strongly corrosive. Its vapours and the liberated ammonia is also corrosive for the respiratory tract.
Inhalation: Burning feeling, strong coughing, sore throat. Laboured breath, hampered respiration.
Skin: Redness, pain, serious corrosive injuries, blisters.

Eye contact: Redness, pain, blurred vision, serious corrosive injuries.
Ingestion: Sore throat, abdominal cramps, pain, vomiting.
Delayed symptoms:
Due to the corrosive effects the symptoms may occur delayed. In case of high concentration of its vapours or the liberated ammonia gases, the inhalation may cause pulmonary oedema. The symptoms of pulmonary oedema occurs often only some hours later and physical loading increases the seriousness of the situation. That is why it is important to keep the injured person calm and keep under medical surveillance.

4.3. Indication of any immediate medical attention and special treatment needed:
Keep the injured person under medical surveillance because of the possibility of quick or delayed tracheal, bronchial and pulmonary oedema. Progressive eye injury may occur.
The quickness is important. Remove the affected person from the further exposure. Give immediate first aid and obtain medical help. After the exposure the injured person has to be kept under medical surveillance for at least 48 hours due to the possibility of delayed pulmonary oedema.

SECTION 5: FIRE-FIGHTING MEASURES

5.1. Extinguishing media:

5.1.1. Suitable extinguishing media:
All regular extinguishing media can be applied (e.g.: water, CO2)

5.1.2. Unsuitable extinguishing media:
None known.

5.2. Special hazards arising from the substance or mixture:
Its vapours and the liberated ammonia may form flammable/explosive mixture with air. In closed areas the 16 - 27 % mixture of ammonia and air may explode for the effect of ignition sources, so do not approach the heated, or fire/heat affected containers until it is cooled with water spray. Remove the liberated vapours, gases from the air with water spray.

5.3. Advise for fire fighters
For special measures see Section 5.2.
Special protective equipment:
In case of large quantities (the possibility of formation of high ammonia concentration) the use of self-contained respiratory device and hermetically closed full protective suit is reasonable.

SECTION 6: ACCIDENTAL RELEASE MEASURES

6.1. Personal precautions, protective equipment and emergency procedures:

6.1.1 For non-emergency personnel:
Keep unprotected people away, allow only well trained experts wearing suitable protective clothing to abide in the field of accident.

6.1.2. For emergency responders:
With the help of skilled personnel stop the leakage as soon as possible. Remove the liberated vapours, gases from the air with water spray. The personnel dealing with large spillage has to wear hermetically closed chemical protective suit and self-contained breathing apparatus. Remove unauthorised persons from the area of the spillage.

6.2. Environmental precautions:
Use water spray for the dispersion of gases, vapours or ventilate the area. The product is very toxic to aquatic life. Avoid contamination of watercourses. In case of accidental contamination of watercourses or sewers, inform the respective authority.

6.3. Methods and material for containment and cleaning up:
In case of accidental spillage the spilled substance has to be diluted or neutralised before disposal. The smaller spillages have to be diluted with water, the larger spillages have to be neutralized with appropriate chemical (e.g.: diluted solution of strong acids, monoammonium phosphate (MAP)).
Pump into an appropriate salvage container.

6.4. Reference to other sections:
For further and detailed information see section 8 and 13.

SECTION 7: HANDLING AND STORAGE

7.1. Precautions for safe handling:
Observe conventional hygiene precautions.
Avoid skin and eye contact, avoid inhalation of vapours.
In case of splashing risk use full protective suit, protective gloves and protective goggles (see Section 8.2.2).
Do not eat, drink or smoke during handling.
Technical measures:
Ensure adequate ventilation.
Keep the airborne concentration under the exposure limit value. (See Section 8.1.)
Precautions against fire and explosion:
No specific prescription.

7.2. Conditions for safe storage, including any incompatibilities:
Technical measures and storage condition:
Keep the containers tightly closed, in a cool, well-ventilated place. Protect from heat, ignition sources and incompatible materials (See Section 10.3). Do not allow smoking in the storage area.

Incompatible materials: Keep away from oxidizing agents, acids, halogens, non-ferrous and heavy metals, aluminium.
Packaging material: no special prescriptions.

7.3. Specific end use(s):
Further information about the uses listed in Section 1.2 in the exposure scenarios for ammonia which can be found in the Annex.

SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1. Control parameters:

Occupational exposure limit values:
Exposure limit value: none.

DNEL/DMEL values for anhydrous ammonia

		Workers:	Population:
oral (mg/kg bw/d)	long term systematic effects	6.8	6.8
dermal (mg/kg bw/d)	long term systematic effects	6.8	68
inhalation (mg/m^3)	acute local effects	36	7.2
	long term systematic effects	47.6	23.8
	long term local effects	14	2,8

PNEC values for free (non-ionized) ammonia:
Fresh and salt water: 0.0011 mg/l
Intermittent water streams: 0.089 mg/l

8.2. Exposure controls:
25/2000.. (IX. 30.) In case of a hazardous material with no controlled concentration limit it is the employer's duty to keep concentration levels down to a minimum achievable by existing scientific and technological means, where the hazardous substance poses no harm to workers.

8.2.1 Appropriate engineering controls
In pursuance of work is proper foresight needed to avoid spilling onto clothes and floors and to avoid contact with eyes and skin.
The control of workplace dust concentration is recommended in the workplace air with a frequency depending on the technological stability.
If applicable, apply local exhaust ventilation. The control of ammonia concentration in air. It is a good industrial practice to install safety shower and eye wash fountains in such places where ammonium hydroxide can contact skin or eyes.

8.2.2. Individual protection measures, such as personal protective equipment:

1. Eye/face protection: use appropriate protective goggles/face mask against liquids and vapours (type 3) conforming EN 166 standard.
2. Skin protection:
   a. Hand protection: use appropriate chemical resistant protective gloves (e.g.: long-sleeved neoprene or butyl rubber gloves) conforming EN 374 standard.
   b. Other: if necessary, use appropriate chemical resistant protective clothes conforming EN 368 or EN 14605 standard. Boots made of butyl rubber.
3. Respiratory protection: If the exposure limit values exceed the recommended limit values (for ammonia) use gas mask supplied with K sign green filter against ammonia conforming EN 141 standard or self-contained respiratory device (e.g.: EN402)
4. Thermal hazard: None known.

8.2.3. Environmental exposure controls:
No specific prescription.
The requirements detailed in Section 8 assume skilled work under normal conditions and usage of the product for appropriate aims. If conditions differ from normal or work is carried out under extreme conditions an expert's advice should be sought out before deciding upon further protective measures.

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

9.1. Information on basic physical and chemical properties:

Parameter		Test method:	Remarks:
1. **Appearance:**	colourless liquid		
2. **Odour:**	pungent		
3. Odour threshold:	no data available		
4. pH value:	11.7	in 1 % aqueous solution	
5. Melting point/ freezing point:	–58 °C (25 %)		
6. Initial boiling point/boiling range:	38 °C on 101.3 kPa (25 %)		
7. Flash point:	no data available		

8. Evaporation rate:	no data available
9. Flammability:	no data available
10. Upper/lower flammability or explosive limits:	no data available
11. Vapour pressure:	48 kPa, 20 °C (25%)
12 Vapour density:	no data available
13. Relative density:	no data available
14. Solubility(ies):	miscible with water in all ratio. soluble in alcohol, chloroform, ether.
15. Partition coefficient: n-octanol/water:	no data available
16. Self-ignition temperature:	651°C (NH3 vapour)
17. Degradation temperature:	no data available
18. Viscosity:	no data available
19. Explosive properties:	no data available
20. Oxidizing properties:	no data available

9.2. Other information:

Flammability (ammonia vapours): 16-27 V % NH_3 in air on 0 °C

Certain ammonia solutions, e.g.: 26% ammonia solution has such vapour pressure that the balance composition can be within the explosion limits.

Density (15 °C):° 0.950 g/cm³ (12.74 %) 0.880 g/cm³ (35.20 %)

The properties of the anhydrous ammonia

Physical state	gas
Colour	colourless
Odour	characteristic, pungent
Melting point/ freezing point:	- 78 °C (101.3 kPa)
Boiling point:	- 33 °C (101.3 kPa)
Flash point:	not flashing, inorganic substance
Evaporation rate:	no data available
Flammability:	flammable
Explosion range:	not explosive in itself, but it may form explosive mixture with air. Lower explosion limit: 16% Upper explosion limit: 25%
Vapour pressure:	8611 kPa, 20 C (25%)°
Relative gas density:	0.597 (air = 1)
Density (calculated)	0.717 kg/m³ (0°C) 0.769 kg/m³ (25°C)
Solubility in water:	very soluble 510-531g/l (20 °C) 482 g/l (25 °°C)
Partition coefficient: n-octanol/water)	(gas, estimated value: lg Kow (Pow): 0.23)
Auto-ignition temperature:	651°C
Degradation temperature:	no data available
Viscosity:	physical state: gas in 25°C
Explosive properties:	non explosive in itself
Oxidizing properties:	non oxidizing

SECTION 10: STABILITY AND REACTIVITY

10.1. Reactivity:

Reacts violently with acids, strong oxidants and halogens. Attacks several metals.

10.2. Chemical stability:

In case of planned storage circumstances thermically stable.

The ammonia liberated from liquid above 454 °C decomposes while forming hydrogen (in the presence of metals, eg.: nickel, even in lower temperature). In case of high temperature (690°C) and in case of high energy ignition source (electrical arc) it decomposes to nitrogen and hydrogen, which forms flammable mixtures with air.

10.3. Possibility of hazardous reactions:

The substance is a strong base, react violently with acids and it has a corrosive effect. Reacts violently with strong oxidants and halogens. Attacks copper, aluminium, zinc and their alloys. In case of reaction with metals hydrogen may be formed. With heavy metals and their salts explosive mixtures are formed.

10.4. Conditions to avoid:

Heat, direct sunshine, injury of the container.

10.5. Incompatible materials:

Keep away from oxidizing agents, acids, halogens, non-ferrous and heavy metals, aluminium.

10.6. Hazardous decomposition products:

In case of combustion nitrogen oxides, in case of contact with metals hydrogen.

SECTION 11: TOXICOLOGICAL INFORMATION

11.1. Information on toxicological effects:

Acute toxicity: none known.
Skin corrosion/irritation: none known.
Serious eye damage/eye irritation: Causes serious eye damage.
Respiratory or skin sensitisation: Causes severe burns.
Germ cell mutagenicity: none known.
Carcinogenicity: none known.
Reproductive toxicity: none known.
STOT-single exposure: none known.
STOT-repeated exposure: none known.
Aspiration hazard: none known.

11.1.1. For substances subject to registration, brief summaries of the information derived from the test conducted:
No data available.

11.1.2. Relevant toxicological properties of the hazardous substances:
We hereby give information about the results of the conducted toxicological studies (suitable for cross references) about ammonium hydroxide, ammonia and some ammonium salts.

Acute toxicity:

Test material	CAS number:	Routes of exposure	Species	Results
ammonium hydroxide	7664-41-7	oral	rat	LD50: 350 mg/kg bw
ammonia	1336-21-6	inhalation	rat	LC50: 28130 mg/m^3 (10 min.) LC50: 11590 mg/m^3 (60 min.)

Skin corrosion/irritation:
The ammonia solution is corrosive (in concentration > 5%).

Serious eye damage/eye irritation:

Test material	CAS number:	Routes of exposure	Species	Results
ammonium hydroxide	7664-41-7	*skin contact*	rat, rabbit	corrosive

Respiratory or skin sensitisation:
No data available. Non sensitizing.

Germ cell mutagenicity

Test material	CAS number:	Test	Species	Results
ammonium hydroxide	7664-41-7	bacterial reverse mutation assay	S. typhpimurium; E. coli	negative

Carcinogenicity:

Test material	CAS number:	Test	Routes of exposure	Species	Results
ammonium sulphate	7783-20-2	NOAEL:	oral	rat	256 mg/kg bw/day calculated for ammonium ion: 67 mg/kg bw/day

Reproductive toxicity:

Test material	CAS number:	Test	Routes of exposure	Species	Results
diammonium hydrogen orthophosphate	7783-28-0	fertility toxicity	oral	rat	NOAEL 1500 mg/kg bw/day calculated for ammonium ion: 408 mg/kg bw/day
ammonium perchlorate	7790-98-9	development toxicity	oral	rabbit	NOAEL: 100 mg/kg bw/day
ammonia	1336-21-6	development toxicity	inhalation	pig	NOAEC: 25 mg/m^3

11.1.3. Information on likely routes of exposure:
Ingestion, inhalation, skin contact, eye contact.

11.1.4. Symptoms related to the physical, chemical and toxicological characteristics:

No data available.

11.1.5. Delayed and immediate effects as well as chronic effects from short and long-term exposure:
Causes severe skin burns and eye damage.

11.1.6. Interactive effects:
No data available.

11.1.7. Absence of specific data:
No information.

11.1.8. Other information:
No data available.

SECTION 12: ECOLOGICAL INFORMATION

12.1. Toxicity:
Very toxic to aquatic life.

Test material	CAS number:	Test	Species/group of animal	Results
ammonia	1336-21-6	acute toxicity test in fish	different fish species	LC50: 0.89 mg/l (for non-ionized ammonia)
ammonium hydroxide	7664-41-7	acute toxicity test in fish	rainbow trout (Onchorynchus mykiss)	LC50: 11-48 mg/l
ammonia	1336-21-6	chronic toxicity test for fish	rainbow trout (Onchorynchus mykiss)	LOEC (73 day): 0.022 mg/l (for non-ionized ammonia)

Toxic effects of non-ionized ammonia for invertebrates and algae:

Test material	CAS number:	Test	Species/group of animal	Results
ammonia	1336-21-6	acute toxicity test for invertebrates	water flea ((Daphnia magna)	EC50 (48 h): 101 mg/l
ammonium chloride	12125-02-9	long term toxicity test on invertebrates	water flea ((Daphnia magna)	EC50 (96 h): 0.79 mg/l (for non-ionized ammonia)
ammonium sulphate	7783-20-2	acute toxicity test in freshwater algae	Chlorella vulgaris	EC50: 2700 mg/l

12.2. Persistence and degradability
In soil the microorganisms oxide the ammonium ion to nitrate ion, or it is adsorbed in the particles of sediment or colloids. Practically biodegradable.

12.3. Bioaccumulation potential:
Not bioaccumulative because inorganic.

12.4. Mobility in soil
The ammonium ion is binded in the surface of the soil particles, while the nitrate ion formed during nitrification is very mobile.

12.5. Results of PBT and vPvB assessment
Not applicable for inorganic compounds.

12.6. Other adverse effects:
No data available.

SECTION 13: DISPOSAL CONSIDERATIONS

13.1. Waste treatment methods:
Disposal according to the local regulations.

13.1.1. Information regarding the disposal of the product:
No solid waste is formed from the product. The ammonia solution is very toxic for the aquatic organisms, so do not enter into water. The contaminated water can not be emitted into watercourses or drains without proper sewage treatment. In case of accidental spillage the spilled substance has to be diluted or neutralised before disposal. The smaller spillages have to be diluted with water, the larger spillages have to be neutralised carefully with appropriate chemical (e.g.: diluted solution of strong acids, monoammonium phosphate (MAP)). Pump into an appropriate salvage container. The formed waste has to be disposed via a licensed contractor.
European Waste Code:
For this product no waste disposal key according the European Waste Catalogue (EWC) can be determined, as only the purpose of application defined by the user enables an allocation. The EWC codes indicated below are only recommendations, but they may have to be changed due to special circumstances, in such cases new classification may be needed.

13.1.2. Information regarding the disposal of the packaging:
Dispose according to the relevant regulations.

13.1.3. Physical/chemical properties that may affect waste treatment options shall be specified:
None known.

13.1.4. Sewage disposal:

None known.

13.1.5. Special precautions for any recommended waste treatment:
No data available.

SECTION 14: TRANSPORT INFORMATION

14.1. UN Number:
2672

14.2. UN proper shipping name:
AMMONIA SOLUTION

14.3. Transport hazard class(es)
8 (ADR/RID land transport, IMDG/CGV sea transport)

14.4. Packaging group
III.

14.5. Environmental hazard
Dangerous for the environment.

14.6. Special precautions for user:
No relevant information available.

14.7. Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code:
Not applicable.

SECTION 15: REGULATORY INFORMATION

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

REGULATION (EC) No 1907/2006 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 18 December 2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH), establishing a European Chemicals Agency, amending Directive 1999/45/EC and repealing Council Regulation (EEC) No 793/93 and Commission Regulation (EC) No 1488/94 as well as Council Directive 76/769/EEC and Commission Directives 91/155/EEC, 93/67/EEC, 93/105/EC and 2000/21/EC

REGULATION (EC) No 1272/2008 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 16 December 2008 on classification, labelling and packaging of substances and mixtures, amending and repealing Directives 67/548/EEC and 1999/45/EC, and amending Regulation (EC) No 1907/2006

Commission Regulation (EU) 2015/830 of 28 May 2015 amending Regulation (EC) No 1907/2006 of the European Parliament and of the Council on the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH)

REGULATION (EC) No 2003/2003 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 13 October 2003 relating to fertilisers

15.2. Chemical safety assessment: Chemical safety assessment for anhydrous ammonia is available.

SECTION 16: OTHER INFORMATION

Information regarding the revision of the safety data sheet:
The safety data sheet has been revised according to Regulation 453/2010/EU (Section 1-16).
The classification of the components and the mixture have been amended according to Regulation 1272/2008/EC (CLP) and its amendments.

Full text of the abbreviations in the safety data sheet:
DNEL: Derived no effect level. PNEC: Predicted no effect concentration. CMR effects: carcinogenicity, mutagenicity and toxicity for reproduction. PBT: Persistent, bioaccumulative and toxic. vPvB: very persistent and very bioaccumulative. n.d.: not defined. n.a.: not applicable.

Safety data sheet (dated ...) issued by the manufacturer. 01. 06. 2015, Version: 3.0/HU)

Methods used for the classification according to Regulation 1272/2008/EC:

Skin Corr. 1.B - H314	Based on test methods (test data)
Hazardous to the aquatic environment, Acute 1 – H400	Based on calculation method

Relevant H-Phrases (number and full text) of Section 2 and 3:
H314 – Causes severe skin burns and eye damage.
H400 – Very toxic to aquatic life.

Training instructions: n.d.