



USIQUÍMICA

MATERIAL SAFETY DATA SHEETMSDS

Ammonia Solution in various concentrations

REVISION DATE: 03/20/2018

1. - IDENTIFICATION OF PRODUCT AND COMPANY

Product name: Ammonium hydroxide solution 20 to 28%.

Internal identification code of the product: 113.01.0.

Company name: USIQUÍMICA DO BRASIL LTDA.

Address: Rua da Lagoa, 431 - Cumbica - Guarulhos - SP.

Business Phone: (11) 3821-7000 - Trunk Key.

Telephones for emergencies: SUATRANS - COTEC - Environmental Emergency.
DDG (0800) 0111-767 - (0800) 7071-767 - 24 HORAS.
193 – Fireman.

Recommended main uses for the substance: Textile, agricultural, rubber, leather, lubricants, food, cosmetics, effluent treatment, film production, photo development, paints, among others.

2. - HAZARDS IDENTIFICATION

Classification of the substance or mixture (according to ABNT NBR 14.725-2):

Corrosive for metals - Category 1.


Corrosion and irritation of the skin - Category 1C.

Eye damage - Category 1 (1A).

Systemic toxicity to certain target organs: Single exposure - category 3.

Harmful to aquatic environment - Acute - category 1.

Label element (according to the ABNT NBR 14.725-2):

| LABEL ELEMENT | DATE |
|--|--|
| Identification of the supplier's product and emergency telephone number. | Trade name: AMMONIA SOLUTION, AMMONIUM HYDROXIDE, SOLUTION (NH ₄ OH). Synonym (s): AMMONIA (SOLUTION AQUOSA DE). Emergency telephone number: SUATRANS - COTEC – Environmental Emergency. DDG (0800) 0111-767 - (0800) 7071-767 - 24 HOURS. |
| Chemical composition | NH ₃ , 20 a 28% (mass/mass). H ₂ O, 80 a 72 % (mass/mass). |
| Hazard pictograms |  |
| Word of warning | DANGER |
| Hazard statements | May be corrosive to metals. Causes severe skin burns and eye damage. Causes serious eye damage. May cause irritation of the respiratory tract. Very toxic to aquatic organisms. |
| Precautionary statements | Wash thoroughly after use. Use the necessary PPE. Avoid inhaling gases / vapors. Use only outdoors or in a well-ventilated area. Avoid release to the environment. |
| Other information | The Material Safety Data Sheet (MSDS) for this hazardous chemical can be ordered by phone (11) 3821-7000, or by e-mail: laboratorio@usiquimica.com.br |

Other hazards which do not result in classification:

Contact with sodium hypochlorite releases chlorine gas into the environment.

**3. - COMPOSITION AND INFORMATION ON INGREDIENTS**

Mixture: AMMONIUM HYDROXIDE (NH₄OH). Ammonium hydroxide is a mixture obtained from the reaction between anhydrous ammonia (NH₃), demineralized water or reverse osmosis water.

Common chemical name or generic name: AMMONIUM / AMMONIUM HYDROXIDE.

Synonym: AMMONIA AQUOSA SOLUTION, SOLUTION OF CONCENTRATED AMMONIUM GAS, SOLUTION OF AMMONIUM HYDROXIDE.

Chemical Abstract Service (n° CAS): 1336-21-6.

Chemical composition of the substance: Minimum, 20.0% ammonia in solution.

Ingredients or impurities that contribute to the hazard:

Ammonia anhydrous gas (CAS 7664-41-7): 99.5%, minimum.

4. - FIRST AID MEASURES

Inhalation: Remove injured person to uncontaminated and aerated area and administer oxygen, if available. Apply resuscitation maneuvers in case of cardiorespiratory arrest.

Caution: In case of mouth-to-mouth breathing there may be chemical burns in the person being treated. Immediately call the nearest hospital.

Skin Contact: Remove contaminated clothing and shoes quickly and flush affected parts with plenty of running water for 15 minutes. Do not rub the location.

Eye contact: Immediate medical attention is essential. The first 10 seconds are critical to avoid blindness. Flush eyes with running water for 15 minutes, lifting the eyelids to allow maximum removal of the product. After this care, refer immediately to the ophthalmologist.

Ingestion: Due to the physical characteristics of Ammonia, accidents due to ingestion are unlikely, but burns may occur in the mouth, pharynx, esophagus and stomach. Never give anything by mouth to unconscious or convulsive people. The conscious and alert casualty may ingest water. Do not induce vomiting. If vomiting occurs spontaneously, the victim should lie on his or her side to prevent pulmonary aspiration. Obtain medical attention if symptoms occur.

Most important symptoms and effects, both acute and delayed.

Actions to avoid: Do not induce vomiting. Do not administer liquids to a torporous, unconscious or convulsive crisis.

Brief description of the main symptoms and effects: Ammonium hydroxide is toxic by inhalation (Ammonia gases) and has a caustic effect when in contact with the body.

Acute effects: Inhalation may cause burns to nasal mucosa, pharynx and larynx, cough, chest pain, bronchial spasm with respiratory difficulty and pulmonary edema. Ammonium hydroxide when in contact with the skin can cause tissue necrosis and deep burns. Eye contact causes tearing, conjunctivitis, and irritation and corneal ulceration that may result in temporary or permanent blindness.

Chronic effects: Prolonged or repeated contact with the skin may cause dermatitis. Chronic bronchitis may occur on chronic inhalation exposure.

Notes to Physician: Rapid penetration of liquid ammonia into eye tissues may lead to corneal perforation, late cataracts, glaucoma, iritis, and retinal atrophy. Accidental inhalation of irritant gases require medical observation for the prevention of late-onset pulmonary edema within 48 hours of inhalation. Acute chemical pneumonitis may occur in ammonia inhalation at high concentrations, even in short exposures.

5. - FIRE FIGHTING MEASURES

Suitable Extinguishing Media: Product is not combustible. When involved in fire, use appropriate extinguishing media to combat it, depending on the fuel involved in the fire. The best procedure is to stop the flow of liquid by closing valves.

Preference is given to using water, and other products such as foam or dry powder may also be used. Remove all electrical sources. Use water to cool containers exposed to fire and discontinue the flow for personal protection. Water reduces the concentration of gases and liquid, since it is soluble in water.

Unsuitable extinguishing media: Avoid the use of halogenated products.

Specific hazards: In the presence of oil and other combustible materials increases the risk of fire. Under heat action, it can decompose by releasing toxic nitrous gases.

Fire-fighting measures: In case of fire there is a possibility of decomposition with the release of toxic gases. Wear self-contained mask or air-operated mask, and PVC "A" clothing. Containers exposed to fire, toxic gases. Use a self-contained mask with ammonia gas or air-fed mask and PVC "A" clothing. Refrigerate containers exposed to fire.



USQUÍMICA

MATERIAL SAFETY DATA SHEETMSDS

Ammonia Solution in various concentrations

REVISION DATE: 03/20/2018

6. - CONTROL MEASURES FOR SPILLAGE OR LEAKAGE

Personal precautions, protective equipment and emergency procedures.

For non-emergency personnel: Avoid contact with the product and inhalation of vapors. Distancing yourself from the risk area if possible under the guidance of a trained professional.

For emergency service personnel: Proper use of PPE is required and knowledge of the safe handling and risks of ammonium hydroxide is required.

Environmental precautions: May contaminate waterways, making them unsuitable for any purpose. In cases of leakage, to protect the environment, it is necessary to retain the liquid; directing it to a retention tank, where the waste equalization will be carried out for disposal. The treatment can be done by neutralizing the alkalinity of the liquid from the chemical treatment. Neutralization reactions can generate heat and fumes, which can be controlled by the rate of addition of the reagent.

Methods and materials for containment and cleaning up: Spray water to reduce the concentration of Ammonia gases around the spill before staining the spill.

Recovery: If possible, carry out the product transfer.

Neutralization: It results in release of heat.

Disposal: Try to reuse the product if possible or neutralize the waste before disposing of it properly.

Prevention of secondary hazards: Review guidelines contained in the previous fields.

7. - HANDLING AND STORAGE

Recommendations for safe handling: When handling the product in plastic bottles or drums, prevent physical damage to the packaging.

Store in a covered, dry, ventilated area, waterproof floor or on wooden pallets and away from incompatible materials.

Attention to possible perforations with pointed elements contained in the pallets.

Before handling the product, it should be checked that the containers are in safe condition for use, without cracking on the body or the lid, also checking that the valves in the storage tank are in good condition. During handling, avoid proximity to sources of heat or electric spark. Prevent physical damage to tanks, pipes, etc. Isolate from incompatible substances.

Prevention of worker exposure: Masks with ammonia (or combined) filters should be used in case of small spills or spills.

In large spills or spills is necessary the use of masks autonomous or with air command. Submit every system to periodic maintenance control. Preventive maintenance can prevent leaks. Keep staff permanently trained.

Fire and explosion prevention: Keep in cool conditions. The release of gases begins with increasing temperature and decomposition occurs above 132.4 ° C.

Precautions for Safe Handling: To reduce the possibility of a health hazard, ensure sufficient ventilation or on-site exhaust ventilation to control the ambient concentration at low levels. Always use personal protective equipment, such as specific clothing and adequate respiratory protection, with filters suitable for ammonia (NH₃) gas vapors. Combined filters are not indicated since their saturation is very fast. It is also possible to use autonomous masks or with air adduction.

Advice on safe handling: Follow safety regulations for handling and personal protection.

Storage

Appropriate technical measures: A deep knowledge of ammonium hydroxide is necessary to store it safely and safely.

Storage conditions including any incompatibility: Follow the manufacturer's instructions.

Adequate: The places destined to the storage of the product should be exclusively reserved for this purpose. Empty containers should be separated from the flood. Always use ammonia compatible material (tubing: Carbon steel - ASTM A 106 Gr C;

Tanks: Carbon Steel - standard - ASTM A 285 / A 515 / A 516; Valves - ASTM A 105 / ASTM A 216 GR WCB).

To avoid: Packagings should be stored in a ventilated place away from sources of heat, flammable substances and must be clean and covered. Also avoid the risk of falls and mechanical shocks.

Of risk signaling: Plates containing the indication of CORROSIVE PRODUCT.

Incompatible products and materials: See previous information.

Safe packaging materials:

Recommended: Ammonium hydroxide can be stored in stationary tanks, polyethylene IBCs or carbon steel / stainless steel (ideal for products with concentrations higher than 28%), plastic bottles, glass jars or plastics (for small quantities).

Unsuitable: Avoid incompatible material.



USQUÍMICA

MATERIAL SAFETY DATA SHEETMSDS

Ammonia Solution in various concentrations

REVISION DATE: 03/20/2018

8. - EXPOSURE CONTROL AND PERSONAL PROTECTION

Engineering control measures: Handle the product in a well-ventilated place with natural or mechanical ventilation, in order to keep the concentration of vapors / dust below the tolerance limit. Provide mechanical ventilation and direct exhaust system to the outside environment. These measures help reduce the exposure to the product. It is recommended to make emergency showers and eyewash available on the work area. Engineering control measures are most effective in reducing product exposure. To reduce the potential for potential health hazards, ensure sufficient ventilation or exhaust in the vicinity to control the concentration of the environment at low levels.

Specific control parameters:

Occupational exposure limits:

20 ppm / 14mg / m³ (LT - NR 15 - Annex 11) - ammonia.

25 ppm / 17mg / m³ (LT - ACGIH) - ammonia.

Biological indicators: See table I of NR 7 of Portaria 3214/78 of the Ministry of Labor and Employment (www.mte.gov.br).

Other limits and values: Not considered.

Individual protection measures:

Respiratory protection: Mask with filter for ammonia vapors (NH₃). In large concentrations, use self-contained masks, or masks with controlled air.

Hand protection: Wear PVC gloves (long barrel).

Eye Protection: Wear wide-eyed vision goggles and, if possible, with face shield.

Skin and body protection: Wear chemical resistant clothing, which may be enhanced with a trevira cap.

Special Precautions: Provide shower and eye wash area. Never eat, drink or smoke in the work area. Practice good personal hygiene especially before eating and drinking. If possible, avoid smoking. Separate contaminated clothing, ensuring that it is washed thoroughly before reuse. Chemicals should only be handled by trained and qualified persons. All PPE according to NR-6 must have the CA (Certificate of Approval). Strictly follow the operational and safety procedures in the work recommended by the organization. In the places where chemical products are handled, the monitoring of workers' exposure must be carried out, according to the PPRA (Environmental Risk Prevention Program) Portaria 3.214 / 78 of MTB - NR-09).

Hygiene measures: Keep workplaces in good working order. Periodically inform the personnel of the safe handling of the product.

9. - PHYSICAL AND CHEMICAL PROPERTIES

Appearance: Liquid.

Color: Colorless.

Odor: Spicy and strongly penetrating, characteristic of ammonia.

pH: 11.6 (1.0 N solution).

Concentration: between 20,0% and 28,0 - Basic (strongly alkaline).

Specific temperatures or temperature ranges in which changes in physical state occur:

Boiling point: 33 ° C.

Melting point: - 58 ° C.

Decomposition temperature: 132.4 ° C.

Flash point: Not available.

Auto-ignition temperature: Not available.

Explosion limits:

LEI: (lower explosion limit): 16% vol.

LES: (upper explosion limit): 25% vol.

Vapor Density: 0.5963 (-33.5 ° C and 760 mmHg).

Density: 0.894 to 0.921 g / mL (solution between 20.0% to 28.0%, NH₃ (m / m) at 20 ° C).

Solubility in water: 0.456 g NH₃ / g at 25 ° C and 760 mmHg.

Evaporation Rate: Not available.

Flammability: Not available.

Vapor pressure: Not available.

Vapor Density: Not available.

Relative density: Not available.

Partition coefficient: n-octanol / water: Not available.



USIQUÍMICA

MATERIAL SAFETY DATA SHEETMSDS

Ammonia Solution in various concentrations

REVISION DATE: 03/20/2018

Viscosity: Not available.

10. - STABILITY AND REACTIVITY

Reactivity: Ammonium hydroxide is an alkaline product that releases heat when reacted with acid. The product is also incompatible with acids, strong oxidants, peroxides, chlorine and bromine.

Stability: Ammonium hydroxide is stable when stored and used under normal conditions of storage and handling up to 50 ° C when it begins to release ammonia gas. Above 132.4 ° C can decompose by releasing nitrogen and hydrogen.

Possibility of hazardous reactions: Avoid contact with high temperatures and fire, do not provoke reactions with incompatible substances.

Conditions to avoid: Strong heating.

Incompatible materials: Sodium hypochlorite, iodine and strong acids.

Hazardous Decomposition Products: Thermal decomposition of NH₄OH can produce toxic nitrous gases (NO_x) and ammonia.

11. - TOXICOLOGICAL INFORMATION

Acute toxicity: Inhalation may cause burns in the nasal mucosa, pharynx and larynx, cough, chest pain, bronchial spasms with respiratory difficulty and pulmonary edema.

Skin corrosion / irritation: Ammonium hydroxide when in contact with skin may cause tissue necrosis and deep burns. Prolonged or repeated contact with the skin may cause dermatitis.

Serious eye damage / eye irritation: Eye contact causes tearing, conjunctivitis, and irritation and corneal ulceration that may result in temporary or permanent blindness.

Respiratory or skin sensitization: The product is corrosive to the respiratory tract.

Germ cell mutagenicity:

The product is not expected to show mutagenicity in germ cells.

Carcinogenicity: Available toxicological studies are insufficient for conclusions.

Reproductive toxicity: The product is not expected to be reproductive toxicity.

Specific target organ toxicity - single exposure:

Because it is an aqueous solution it is rapidly absorbed by the upper airways where it will exert its irritating action. At high concentrations the ammonia acts as asphyxiant and can affect the central nervous system (CNS) causing spasms. The odor is perceptible at 20 ppm (average).

Specific target organ toxicity - repeated exposure:

Ammonium hydroxide is a corrosive product and can cause pulmonary edema whose symptoms can be delayed within 48 hours after exposure.

Danger of aspiration: The main complications resulting from ingestion are gastrointestinal bleeding, perforation in the oropharynx and shock state secondary to heavy bleeding, acidosis and / or disseminated intravascular coagulation.

12. - ECOLOGICAL INFORMATION

Environmental effects, behaviors and impacts of the product:

Ecotoxicity:

LC₅₀ Trout = 625 mg / L (24 hours).

LC₅₀, several fish species = <1 mg / L (96 hours).

EC₅₀ Daphnia magna + 24.4 - 189 mg / L (48 hours).

Persistence and degradability: In soil, ammonia is rapidly oxidized by microorganisms into nitrate ions. In water, it can be nitrified by microorganisms or adsorbed onto particles of sediment, substantially biodegradable in water. In air, it can be neutralized by acidic air pollutants.

Bioaccumulative potential: Low bioaccumulative potential.

Mobility in soil: Very soluble in water. The NH₄⁺ ion is adsorbed on the soil. The adsorption of ammonia to sediments and suspended organic matter increases with organic matter concentration, metal ion concentration, and pH decrease. The microbial population and the absorption by the plants also interfere in this process.

Other adverse effects: There are no known adverse effects other than those reported.

13. - DISPOSAL CONSIDERATIONS

Recommended methods for final destination:

Treatment and disposal of product residues should be made in an appropriate environment by trained personnel with the



USIQUÍMICA

MATERIAL SAFETY DATA SHEETMSDS

Ammonia Solution in various concentrations

REVISION DATE: 03/20/2018

use of special equipment and PPE recommended to avoid contact with the product, its vapors or mists. Leaks should be contained and collected for subsequent disposal after neutralization.

Product:

Ensure that all Federal, State and local agencies are properly notified of spills and disposal methods. CONAMA Resolution 005/1993, Law No. 12,305, of August 2, 2010 (National Policy on Solid Waste). Neutralize slowly and thoroughly with acid if possible.

Product residues:

Consult regulatory environmental agencies for advice on acceptable provisions practices. Contact the relevant local authorities. May be incinerated when in accordance with local regulations. Or dispose of in an approved chemical waste landfill.

Used packaging:

Empty containers should be drained and capped prior to handling and transport operations. If the packaging is not properly washed and decontaminated, it is considered to contain product.

14. - TRANSPORT INFORMATION

National and international regulations

Terrestrial:

Resolution No 5232 of 14 December 2016 - Agência Nacional de Transportes Terrestres (ANTT) - (National Land Transportation Agency) - *Approves the Supplementary Instructions to the Regulation of the Transport of Dangerous Goods and its modifications.*

UN number: 2672.

Proper shipping name: AMMONIA, aqueous solution, with a relative density between 0.880 and 0.957 at 15oC, with more than 10% and up to 35% ammonia.

Risk class: 8.

Number of risk: 80.

Packing group: III

Waterway:

DPC – Diretoria de Portos e Costas – (Ports and Coasts Directory) - (Transportation in Brazilian waters)

Normas de Autoridade Marítima (NORMAM) – (Maritime Authority Regulations)

NORMAM 01/DPC: Embarkation Vessels in Open Sea Navigation

UN number: 2672.

Proper shipping name: AMMONIA, aqueous solution, with a relative density between 0.880 and 0.957 at 15oC, with more than 10% and up to 35% ammonia.

Risk class: 8.

Number of risk: 80.

Packing group: III

Air:

ANAC – Agência Nacional de Aviação Civil – (National Civil Aviation Agency) - Resolution n ° 129 of January 8, 2009

RBAC N°175 – (Regulamento Brasileiro da Aviação Civil) – (Brazilian Civil Aviation Regulation) - Transport of dangerous goods in civil aircraft.

IS N° 175-001 – INSTRUÇÃO SUPLEMENTAR – IS (SUPPLEMENTARY INSTRUCTION)

ICAO – “International Civil Aviation Organization” – Doc 9284-NA/905

IATA – “International Air Transport Association”

Dangerous Goods Regulation (DGR)

UN number: 2672.

Proper shipping name: AMMONIA, aqueous solution, with a relative density between 0.880 and 0.957 at 15oC, with more than 10% and up to 35% ammonia.

Risk class: 8.

Number of risk: 80.

Packing group: III

15. - REGULATORY INFORMATION

Specific regulations for the chemical:



Federal Decree No. 2.657, of July 3, 1998;

Standard ABNT-NBR 14725: 2014;

Ordinance No. 229, of May 24, 2011 - Alters Regulatory Standard No. 26.

16. - OTHER INFORMATION

The information on this sheet corresponds to the current state of our knowledge and our product experience and is not exhaustive. It applies to the product under the conditions specified, unless otherwise noted. In the case of combinations or mixtures, make sure that no new hazards can occur. In no case does this information exempt the user of the product from complying with all the legislative, regulatory and administrative texts related to the product, safety, hygiene and protection of human and environmental health.

references:

AMERICAN CONFERENCE OF GOVERNMENTAL INDUSTRIALS HYGIENISTS. TLVs® and BEIs®: Based on "Documentation" of Occupational Exposure Limits (TLVs®) for Chemicals and Physical Agents & Biological Exposure Indices (BEIs®).

BRAZIL. MINISTÉRIO DO TRABALHO E EMPREGO (MTE)- (MINISTRY OF LABOR AND EMPLOYMENT). Regulatory standard (NR) n ° 7: Occupational health medical control program. Brasília DF. Jun. 1978.

BRAZIL. MINISTÉRIO DO TRABALHO E EMPREGO (MTE). Regulatory standard (NR) n°15: Unhealthy activities and operations. Brasília, DF. Jun. 1978.

EPA dos EUA. 2011. EPI Suite™ para Microsoft® Windows, v 4.10. United States: Environmental Protection Agency, Washington. 2011. Available in:

<<http://www.epa.gov/oppt/exposure/pubs/episuite.htm>>. Access in: January, 2018.

Globally Harmonized System of Classification and Labelling of Chemicals (GHS). 7. rev. United Nations, 2017.

HSDB – HAZARDOUS SUBSTANCES DATA BANK. Available in: <<http://toxnet.nlm.nih.gov/cgi-bin/sis/htmlgen?HSDB>>. Access in: January, 2018.

IARC – INTERNATIONAL AGENCY FOR RESEARCH ON CANCER. Available in:

<<http://monographs.iarc.fr/ENG/Classification/index.php>>. Access in: January, 2018.

IPCS – INTERNATIONAL PROGRAMME ON CHEMICAL SAFETY – INCHEM. Available in:

<<http://www.inchem.org/>>. Access in: January, 2018.

IUCLID – INTERNATIONAL UNIFORM CHEMICAL INFORMATION DATABASE. [S.I.]: European chemical Bureau. Available in:

<<http://ecb.jrc.ec.europa.eu>>. Access in: January, 2018.

NIOSH – NATIONAL INSTITUTE OF OCCUPATIONAL AND SAFETY. International Chemical Safety Cards. Available in:

<<http://www.cdc.gov/niosh/>>. Access in: January, 2018.

NITE-GHS JAPAN – NATIONAL INSTITUTE OF TECHNOLOGY AND EVALUATION. Available in:

<http://www.safe.nite.go.jp/english/ghs_index.html>. Access in: January, 2018.

U.S. ENVIRONMENTAL PROTECTION AGENCY. ECOSAR – Ecological Structure-Activity Relationships. Version 1.11.

Available in: <<http://www.epa.gov/oppt/newchems/tools/21ecosar.htm>>. Access in: January, 2018.