

**AMMONIA SOLUTION 20 to 28%**

REVISION DATE: 20/09/2022

1. - PRODUCT AND COMPANY IDENTIFICATION**Product name:** Ammonium hydroxide, 20 to 28% solution.**Internal Code of product identification:** 113.01.0.**Company name:** USIQUÍMICA DO BRASIL LTDA.**Address:** Rua da Lagoa, 431 - Cumbica - Guarulhos - SP.**Company Phone:** (11) 3821-7000 - PBX system.**Emergency phone:** SUATRANS - COTEC - Environmental Emergency.

DDG (0800) 0111-767 - (0800) 7071-767 - 24 HOURS.

193 – Firefighters.

Main recommended uses for the substance: Textile, agricultural, rubber, leather, lubricants, food, cosmetics, wastewater treatment, film production, photo development, paint industries, among others.**2. - HAZARD IDENTIFICATION****Classification of the substance or mixture (according to ABNT NBR 14.725-2):**

Corrosive to metals - Category 1.

Skin corrosion and irritation - Category 1C.

Eye injuries - Category 1.

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

Hazard to the aquatic environment - Acute - category 1.

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

LABEL ELEMENTS	DATA
Product identification and supplier emergency telephone number.	Commercial Name: AMMONIA SOLUTION, AMMONIUM HYDROXIDE SOLUTION (NH ₄ OH). Synonym: AMMONIA (AQUEOUS SOLUTION OF). Emergency phone: SUATRANS - COTEC - Environmental Emergency. DDG (0800) 0111-767 - (0800) 7071-767 - 24 HOURS.
Chemical composition	NH ₃ , 20 to 28% (mass/mass). H ₂ O, 80 to 72 % (mass/mass).
Hazard pictograms	
Warning words	DANGER
Danger phrases	May be corrosive to metals. Causes severe skin burns and eye damage. Causes serious eye damage. May cause irritation to the respiratory tracts. Very toxic to aquatic organisms.
Caution Phrases	Wash carefully after use. Use the necessary PPEs. 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 dangerous chemical product can be requested by calling (11) 3821-7000, or by e-mail: laboratorio@usiquimica.com.br

Other hazards which do not result in classification:

In contact with sodium hypochlorite, chlorine gas is released into the environment.

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3. - COMPOSITION AND INFORMATION ON THE 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 HYDROXIDE/AMMONIAC.

Synonym: AMMONIA AQUEOUS SOLUTION, CONCENTRATED AMMONIA GAS SOLUTION, AMMONIUM HYDROXIDE SOLUTION.

Chemical Abstract Service (CAS No): 1336-21-6.

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

Ingredients or impurities that contribute to the danger:

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

4. - FIRST AID MEASURES

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

Caution: In case of mouth-to-mouth resuscitation, there may be a chemical burn on the person providing care. Immediately forward to the nearest hospital.

Skin contact: Quickly remove contaminated clothing and shoes and wash affected areas with plenty of running water for 15 minutes. Don't scrub the spot.

Eye Contact: Immediate service is essential. The first 10 seconds are critical to avoiding blindness. Washing eyes with running water for 15 minutes, lifting eyelids to allow maximum removal of product. After these cares, refer immediately to the ophthalmologist.

Ingestion: Due to the physical characteristics of Ammonia, accidents due to ingestion are unlikely, however, burns may occur in the mouth, pharynx, esophagus and stomach. Never give anything by mouth to unconscious or convulsive people. Conscious and alert victims can drink water. Do not induce vomiting. If vomiting occurs spontaneously, the victim must be laid on their side to prevent pulmonary aspiration. Forward it to the doctor informing the product's characteristics. Most important symptoms and effects, both acute and delayed.

Actions to be avoided: Do not induce vomiting. Do not administer liquids to torporous, unconscious or convulsive patients.

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 can cause burns to the nasal mucosa, pharynx and larynx, cough, chest pain, bronchial spasm with difficulty breathing and pulmonary edema. Ammonium hydroxide, when in contact with the skin, can produce tissue necrosis and deep burns. Contact with eyes causes tearing, conjunctivitis, and corneal irritation and ulceration that can result in temporary or permanent blindness.

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

Notes to the physician: The rapid penetration of liquid ammonia into eye tissues can cause corneal perforation, late cataracts, glaucoma, iritis, and retinal atrophy. Accidents due to the inhalation of irritating gases require medical observation to prevent late onset pulmonary edema, up to 48 hours after inhalation. Acute chemical pneumonitis may occur when ammonia is inhaled at high concentrations, even on short exposures.

5. - FIREFIGHTING MEASURES

Suitable extinguishing measures: The product is not combustible. When involved in fire, use appropriate extinguishing media to fight it, depending on the fuel involved in the fire. The best procedure is to stop the flow of liquid by closing valves. Give preference to using water, and other products such as foam or dry chemical powder may also be used. Remove all electrical sources.

Use water to cool fire exposed containers and stop flow for personal protection. Water reduces the concentration of gases and liquid, since it is soluble in water.

Inappropriate extinguishing measures: Avoid using halogenated products.

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

Firefighting team protection measure: In case of fire there is a possibility of decomposition with release of toxic gases. Wear a self-contained mask or a mask with air flow, and level "A" PVC clothing. Chill

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containers exposed to fire, toxic gases. Use a self-contained mask with an ammonia gas filter or a mask with supplied air and level "A" PVC clothing. Refrigerate containers exposed to fire.

6. - CONTROL MEASURES FOR SPILLING OR LEAKING**Personal precautions, protective equipment and emergency procedure.**

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

For the staff of the emergency department: It is necessary to correctly use PPE and to have knowledge about safe handling and the risks that ammonium hydroxide offers.

Precautions to the environment: It can contaminate watercourses, making them unfit for any purpose. In cases of leakage, to protect the environment, it is necessary to retain the liquid; directing it to a holding tank, where the waste will be equalized for disposal. The treatment can be done by neutralizing the alkalinity of the liquid through chemical treatment. Neutralization reactions can generate heat and fumes, which can be controlled by the reagent addition rate.

Methods and materials for containment and cleaning: Before stopping the spill, use water spray to reduce the concentration of Ammonia gases around the spilled area.

Recovery: If possible, transfer the product.

Neutralization: Heat release results.

Disposal: Try to reuse the product, if possible, or neutralize the residue before taking it to the proper final disposal.

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

7. - HANDLING AND STORAGE

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

Store preferably in a covered, dry, ventilated area, on an impermeable floor or on wooden pallets, away from incompatible materials. Pay attention to possible perforations with sharp elements contained in the pallets.

Before handling the product, it must be checked that the packaging is in safe conditions for use, without cracks in the body or in the lid, also checking that the storage tank valves are in good condition. During handling, avoid proximity to heat sources or electrical sparks. Prevent physical damage to tanks, piping, etc. Isolate from incompatible substances.

Prevention of worker's exposure: Masks with Ammonia filters (or combinations) must be used in case of small leaks or spills. In large leaks or spills, it is necessary to use self-contained or supplied air masks. Submit the entire system to periodic maintenance control. Preventive maintenance can prevent leaks. Keep staff permanently trained.

Prevention of fire and explosion: Keep at low temperatures. The release of gases starts with the increase in temperature and its decomposition occurs above 132.4 °C.

Precautions for safe handling: To reduce the possibility of a health risk, ensure sufficient ventilation or the existence of exhaust in the room to control the ambient concentration at low levels. Always use individual protection equipment, such as specific clothing and adequate respiratory protection, with filters suitable for ammonia gas vapors (NH₃). Combined filters are not indicated since they saturate very quickly. You can also use self-contained or air-added masks.

Orientation for safe handling: Follow safety standards regarding handling methods and individual protection. **Storage**

Appropriate technical measures: A thorough knowledge of ammonium hydroxide is required in order to store it safely and without risk.

Storage conditions including any incompatibilities: Follow the equipment manufacturer's guidance. **Appropriate:** The places intended for the storage of the product must be exclusively reserved for this purpose. Empty packages must be separated from full ones. Always use specified material compatible with ammonia (piping: Carbon steel- ASTM A 106 Gr C;

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

To avoid: The packages must be stored in a ventilated place, away from heat sources, flammable substances and must be clean and in a covered area. The risk of falls and mechanical shocks must also be avoided.

Risk signaling: Plates containing the indication of CORROSIVE PRODUCT.

Incompatible product and materials: See previous information.

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Safe materials for packaging:

Recommendations: Ammonium hydroxide can be stored in stationary tanks, polyethylene or carbon/stainless steel IBCs (ideal for products with concentrations greater than 28%), plastic drums, glass or plastic bottles (for small quantities).
Unsuitable: Avoid incompatible material.

8. - EXPOSURE CONTROLS AND PERSONAL PROTECTION

Measures of engineering control: Handling the product in a place with good 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 to reduce exposure to the product. It is recommended to make emergency showers and eye washes available in the work area. Engineering control measures are most effective in reducing product exposure. To reduce the possibility of potential health hazard, ensure sufficient ventilation or exhaustion is in place to control ambient concentration to low levels.

Parameters of specific control:

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

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

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

Other limits and values: Not considered.

Personal protection measures:

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

Hand protection: Use PVC gloves (long barrel).

Eye protection: Wear wide-vision safety glasses and, if possible, a face shield.

Protection of the skin and body: Use clothes suitable for the operation with chemical products, which can be increased with a trevira cover.

Special precautions: Equip the area with showers and eye wash basins. 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 effectively washed before reuse. Chemical products must only be handled by trained and qualified people. All PPE, according to NR-6 must have the CA (Certificate of Approval). Strictly follow the operational and safety procedures recommended by the organization for work. In places where chemical products are handled, monitoring of workers' exposure must be carried out, according to PPAR (Environmental Risk Prevention Program) Ordinance 3.214/78 of MTB-NR-09).

Hygiene measures: Keep workplaces within hygiene standards. Periodically make employees aware 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 (1.0N solution).

Concentration: between 20.0% to 28.0 - Basic (strongly alkaline).

Specific temperatures or temperature ranges at which physical state changes occur: Boiling point: 33°C.

Melting point: - 58 °C.

Decomposition temperature: 132.4 °C.

Flash point: Not available.

Auto-ignition temperature: Not available.

Explosive Limits:

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

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

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

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

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

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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.
Viscosity: Not available.

10. - STABILITY AND REACTIVITY

Reactivity: Ammonium hydroxide is an alkaline product that releases heat when it reacts 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 storage and handling conditions up to a temperature of 50°C, when it begins to release ammonia gas. Above 132.4 °C it can decompose releasing nitrogen and hydrogen.

Possibility of hazardous reactions: Avoid contact with high temperatures and fire, do not cause 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 can cause burns to the nasal mucosa, pharynx and larynx, cough, chest pain, bronchial spasms with difficulty breathing and pulmonary edema.

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

Severe ocular lesions/eye irritation:

Contact with eyes causes tearing, conjunctivitis, and corneal irritation and ulceration that can 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 germ cell mutagenicity.

Carcinogenicity: Available toxicological studies are insufficient for conclusions.

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

Specific target organ toxicity- single exposure:

Because it is an aqueous solution, it is quickly absorbed by the upper airways where it will exert its irritating action. In high concentrations, ammonia acts as an asphyxiant and can affect the central nervous system (CNS) causing spasms. The odor is noticeable 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 up to 48 hours after exposure.

Aspiration hazard: The main complications resulting from ingestion are gastrointestinal bleeding, perforations in the oropharynx and a state of shock secondary to profuse bleeding, acidosis and/or disseminated intravascular coagulation.

12. - ECOLOGICAL INFORMATION

- Environmental effects, behaviors and impacts of the product:

Ecotoxicity: Aquatics:

LC₅₀ Trout = 625 mg/L (24 hours).

LC₅₀ various species of fish = <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 to nitrate ions. In water, it can be nitrified by microorganisms or adsorbed on sediment particles, substantially biodegradable in water. In the air, it can be neutralized by acid air pollutants.

Bioaccumulative potential: Low bioaccumulative potential.

Mobility in soil: Very soluble in water. The NH₄⁺ ion is adsorbed by the soil. The adsorption of ammonia to sediments and

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Suspended organic matter increases with organic matter concentration, metal ion concentration, and with decreasing pH. The microbial population and uptake by plants also interfere in this process.
Other adverse effects: No other adverse effects other than those exposed are known.

13. - CONSIDERATIONS ON FINAL DISPOSAL**Recommended methods for final disposal:**

The treatment and disposal of product residues must be done in a suitable environment, by people trained in the use of special equipment and the recommended PPE's to avoid contact with the product, its vapors or mists. Leaks must be contained and collected for later disposal after neutralization.

Product:

Ensure all Federal, State and local agencies receive proper notice of spills and disposal methods. CONAMA Resolution 005/1993, Law No. 12,305, as of August 2, 2010 (National Solid Waste Policy). Neutralize slowly and carefully with acid if possible.

Product waste:

Consult environmental regulatory agencies for advice on acceptable regulatory practices. Come in contact with relevant local authorities. It can be incinerated when in compliance with local regulations. Or dispose of in an approved chemical waste landfill.

Used Package:

Empty containers must be drained and covered before handling and transport operations. If the package is not properly washed and decontaminated, it is considered to contain the product.

14. - TRANSPORT INFORMATION**National and International Regulations****Land:**

Resolution No. 5947/2021 of the Brazilian National Land Transport Agency (ANTT), Approves the Complementary Instructions to the Regulation of Land Transport of Dangerous Goods and its amendments.

UN number: 2672.

Appropriate name for shipment: AMMONIA, aqueous SOLUTION, with a relative density between 0.880 and 0.957 at 15°C, with more than 10% and not more than 35% of ammonia.

Risk class: 8.

Risk number: 80.

Packing Group: III

Waterway:

DPC – Directorate of Ports and Coasts (Transport in Brazilian waters) Maritime Authority Regulations (NORMAM) NORMAM 01/DPC: Vessels Used in Open-seas Navigation

UN number: 2672.

Appropriate name for shipment: AMMONIA, aqueous SOLUTION, with a relative density between 0.880 and 0.957 at 15 °C, with more than 10% and not more than 35% of ammonia.

Risk class: 8.

Risk number: 80.

Packing Group: III

- Air Transport:

ANAC - National Civil Aviation Agency - Resolution No. 129 as of January 8, 2009

RBAC N°175 - (BRAZILIAN CIVIL AVIATION REGULATION) - TRANSPORTATION OF DANGEROUS ITEMS IN CIVIL AIRCRAFT

IS No. 175-001-SUPPLEMENTARY INSTRUCTION-IS

ICAO - "International Civil Aviation Organization" - Doc 9284-NA/905

IATA - "International Air Transport Association"

Dangerous Goods Regulation (DGR)

UN number: 2672.

Appropriate name for shipment: AMMONIA, aqueous SOLUTION, with a relative density between 0.880 and 0.957 at 15 °C, with more than 10% and not more than 35% of ammonia.

Risk class: 8.

Risk number: 80.

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Packing Group: III

15. - REGULATORY INFORMATION**Specific regulations for the chemical product:**

Federal Decree No. 2,657, as of July 3, 1998;

Standard ABNT-NBR 14725:2014;

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

16. - OTHER INFORMATION

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

Bibliographical References:

AMERICAN CONFERENCE OF GOVERNMENTAL INDUSTRIALS HYGIENISTS. TLVs® and BEIs®: Based on "Documentation" of Occupational Exposure Limits (TLVs®) for Chemical Substances and Physical Agents & Biological Exposure Indices (BEIs®). Translation Brazilian Association of Occupational Hygienists. São Paulo, 2016.

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**AMMONIA SOLUTION 05/06%**

REVISION DATE: 09/19/2022

1. - PRODUCT AND COMPANY IDENTIFICATION**Product name:** Ammonia solution 05/06%.**Internal Code of product identification:** 186.01.0**Company name:** USIQUÍMICA DO BRASIL LTDA.

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

Company Phone: (11) 3821-7000 - PBX system.**Emergency phone:** SUATRANS - COTEC - Environmental Emergency.

DDG (0800) 0111-767 - (0800) 7071-767 - 24 HOURS.

193 – Firefighters.

Main recommended uses for the substance: Textile, agricultural, rubber, leather, lubricants, food, cosmetics, wastewater treatment, film production, photo development, paint industries, among others.

2. - HAZARD IDENTIFICATION

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

Toxicity - Oral - Category 4.

Acute Toxicity - Inhalation - Category 2. Skin corrosion/irritation - Category 1.

Serious eye damage / eye irritation - Category 1. Toxicity to specific target organs -

Single Exposure- Category 3. Hazardous to the aquatic environment - Acute -

Category 1.

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

LABEL ELEMENTS	DATA
Product identification and supplier emergency telephone number.	Commercial Name: AMMONIA SOLUTION 05/06%. Synonym: AMMONIA (AQUEOUS SOLUTION OF), Ammoniacal water, aquamonía, hydrated ammonia. Emergency phone: SUATRANS - COTEC - Environmental Emergency. DDG (0800) 0111-767 - (0800) 7071-767 - 24 HOURS.
Chemical composition	NH4OH
Hazard pictograms	
Warning words	DANGER
Danger phrases	H302 Harmful if swallowed. H314 Causes severe skin burns and eye damage. H318 Causes serious eye damage. H330 Fatal if inhaled. H335 May cause irritation to the respiratory tracts. H400 Very toxic to aquatic life with long lasting effects.
Caution Phrases	P260 Do not breathe dust/fume/gas/mist/vapors/spray. P261 Avoid breathing dust/fume/gas/mist/vapors/spray. P264 Wash thoroughly after handling. P270 Do not eat, drink or smoke when using this product. P271 Use only outdoors or in a well-ventilated area. P273 Avoid release to the environment. P280 Wear protective gloves/ protective clothing/ eye protection/ face protection.



MATERIAL SAFETY DATA SHEET - MSDS

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	<p>P284 [In case of inadequate ventilation]. Use respiratory protective equipment.</p> <p>P301+P312 IF SWALLOWED: If you feel unwell, contact a TOXICOLOGICAL INFORMATION CENTER/doctor/...</p> <p>P301+P330+P331 IF SWALLOWED: Rinse mouth. DO NOT induce vomiting.</p> <p>P303+P361+P353 IN CASE OF SKIN CONTACT (or with the hair): Remove immediately all contaminated clothing. Rinse skin with water/shower P304+P340 IF INHALED: Remove the person to a ventilated area and keep the person in a rest position that does not make it difficult to breathe.</p> <p>P305 + P351 - IN CASE OF EYE CONTACT: Rinse thoroughly with water for several minutes. If contact lenses are used, remove them if it is easy. Continue rinsing.</p> <p>P310 Immediately call a POISON CENTER or physician.</p> <p>P312 Call a POISON CENTER/doctor if you feel unwell.</p> <p>P320 Specific treatment is urgent (see... on this label).</p> <p>P321 Specific treatment (see... on this label).</p> <p>P330 Rinse mouth.</p> <p>P391 Pick up spilled material.</p> <p>P403+P233 Store in a well-ventilated place. Keep container tightly closed.</p> <p>P405 Store locked up.</p> <p>P501 Dispose of contents/container in accordance with federal, state and local regulations.</p>
Other information	The Material Safety Data Sheet (MSDS) for this dangerous chemical product can be requested by calling (11) 3821-7000, or by e-mail: laboratorio@usiquimica.com.br

Other hazards which do not result in classification:

In contact with sodium hypochlorite, chlorine gas is released into the environment.

3. - COMPOSITION AND INFORMATION ON THE 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 HYDROXIDE/AMMONIAC.

Synonym: AMMONIA (AQUEOUS SOLUTION OF), Ammonia water, aquamonía, hydrated ammonia

Chemical Abstract Service (CAS no.): 1336-21-6.

Chemical composition of the substance: 05.6 - 05.8% ammonia in solution.

Ingredients or impurities that contribute to the danger: Ammonia gas anhydrous (CAS 7664-41-7)

4. - FIRST AID MEASURES

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

Cautious: In case of mouth-to-mouth resuscitation, there may be a chemical burn on the person providing care. Immediately forward to the nearest hospital.

Skin contact: Quickly remove contaminated clothing and shoes and wash affected areas with plenty of running water for 15 minutes. Do not rub the area.

Eye Contact: Immediate service is essential. The first 10 seconds are critical to avoiding blindness. Washing eyes with running water for 15 minutes, lifting eyelids to allow maximum removal of product. After these cares, refer immediately to the ophthalmologist.

Ingestion: Due to the physical characteristics of Ammonia, accidents due to ingestion are unlikely, however, burns may occur in the mouth, pharynx, esophagus and stomach. Never give anything by mouth to unconscious or convulsive people. Conscious and alert victims can drink water. Do not induce vomiting. if the vomiting

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occur spontaneously, the victim should be laid on the side to prevent pulmonary aspiration. Forward it to the doctor informing the product's characteristics.

Most important symptoms and effects, both acute and delayed

Actions to be avoided: Do not induce vomiting. Do not administer liquids to torporous, unconscious or convulsive patients.

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 can cause burns to the nasal mucosa, pharynx and larynx, cough, chest pain, bronchial spasm with difficulty breathing and pulmonary edema. Ammonium hydroxide, when in contact with the skin, can produce tissue necrosis and deep burns. Contact with eyes causes tearing, conjunctivitis, and corneal irritation and ulceration that can result in temporary or permanent blindness.

Chronic effects: Prolonged or repeated skin contact may cause dermatitis.

Notes to the physician: The rapid penetration of liquid ammonia into eye tissues can cause corneal perforation, late cataracts, glaucoma, iritis, and retinal atrophy. Accidents due to the inhalation of irritating gases require medical observation to prevent late onset pulmonary edema, up to 48 hours after inhalation. Acute chemical pneumonitis may occur when ammonia is inhaled at high concentrations, even on short exposures.

5. - FIREFIGHTING MEASURES

Suitable extinguishing measures: The product is not combustible. When involved in fire, use appropriate extinguishing media to fight it, depending on the fuel involved in the fire. The best procedure is to stop the flow of liquid by closing valves. Give preference to using water, and other products such as foam or dry chemical powder may also be used. Remove all electrical sources.

Use water to cool fire exposed containers and stop flow for personal protection. Water reduces the concentration of gases and liquid, since it is soluble in water.

Water in the form of mist; Dry chemical powder; Foam for hydrocarbons.

Inappropriate extinguishing measures: Avoid using halogenated products.

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

Firefighting team protection measure: In case of fire there is a possibility of decomposition with release of toxic gases. Wear a self-contained mask or a mask with air flow, and level "A" PVC clothing. Refrigerate containers exposed to fire, toxic gases. Use a self-contained mask with an ammonia gas filter or a mask with supplied air and level "A" PVC clothing. Refrigerate containers exposed to fire.

Additional Information:

Special recommendations: Contain the ammonia leak and use water in the form of mist; use self-contained respiratory protection; Low fire risk product due to difficulty in ignition when exposed to heat or flames; extinguish the fire only if the product leak is small.

6. - CONTROL MEASURES FOR SPILLING OR LEAKING**Personal precautions, protective equipment and emergency procedure**

For non-emergency service personnel: Isolate leak from ignition sources. Prevent sparks or flames. Do not smoke. Evacuate the area within 50 meters. Do not touch damaged containers or spilled material unless wearing appropriate clothing. Avoid inhalation, eye and skin contact. Use personal protective equipment as described in Section 8.

For the staff of the emergency department: Use complete PPE with impervious boots, clothing and gloves, airtight chemical safety glasses and adequate respiratory protection.

Precautions to the environment: It can contaminate watercourses, making them unfit for any purpose. In cases of leakage, to protect the environment, it is necessary to retain the liquid; directing it to a holding tank, where the waste will be equalized for disposal. The treatment can be done by neutralizing the alkalinity of the liquid through chemical treatment. Neutralization reactions can generate heat and fumes, which can be controlled by the reagent addition rate.

Methods and materials for containment and cleaning: Use natural or spill containment barriers. Collect spilled product and place in suitable containers. Absorb remaining product with earth, dry sand or other non-combustible material and place in appropriate containers and remove to a safe place. Do not allow water to enter the containers. For final disposal, proceed according to Section 13 of this MSDS.

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Differences in the action of large and small leaks: There is no distinction between the actions of large and small leaks for this product.

Recovery: If possible, transfer the product.

Neutralization: Heat release results.

Disposal: Try to reuse the product, if possible, or neutralize the residue before taking it to the proper final disposal.

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

7. - HANDLING AND STORAGE

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

Before handling the product, it must be checked that the packaging is in safe conditions for use, without cracks in the body or in the lid, also checking that the storage tank valves are in good condition. During handling, avoid proximity to heat sources or electrical sparks. Prevent physical damage to tanks, piping, etc. Isolate from incompatible substances.

Handle in a ventilated area or with a general ventilation/local exhaust system. Avoid formation of dust and mist. Avoid inhaling the product in case of formation of dust or mist. Avoid contact with incompatible materials. Wear protective gloves, protective clothing, eye protection, face protection as directed in Section 8.

Prevention of worker's exposure: Masks with Ammonia filters (or combinations) must be used in case of small leaks or spills. In large leaks or spills, it is necessary to use self-contained or supplied air masks. Submit the entire system to periodic maintenance control. Preventive maintenance can prevent leaks. Keep staff permanently trained.

Prevention of fire and explosion: Keep at low temperatures. The release of gases starts with the increase in temperature and its decomposition occurs above 132.4 °C.

Precautions for safe handling: To reduce the possibility of a health risk, ensure sufficient ventilation or the existence of exhaust in the room to control the ambient concentration at low levels. Always use individual protection equipment, such as specific clothing and adequate respiratory protection, with filters suitable for ammonia gas vapors (NH₃). Combined filters are not indicated since they saturate very quickly. You can also use self-contained or air-added masks.

Orientation for safe handling: Follow safety standards regarding handling methods and individual protection. Storage

Appropriate technical measures: A thorough knowledge of ammonium hydroxide is required in order to store it safely and without risk.

Store preferably in a covered, dry, ventilated area, on an impermeable floor or on wooden pallets, away from incompatible materials. Pay attention to possible perforations with sharp elements contained in the pallets.

Storage conditions including any incompatibilities: Follow the equipment manufacturer's guidance. **Appropriate:** The places intended for the storage of the product must be exclusively reserved for this purpose. Empty packages must be separated from full ones. Always use specified material compatible with ammonia (piping: Carbon steel - ASTM A 106 Gr C;

Tanks: Carbon Steel - normalized - ASTM A 285/A 515/A 516; Valves - ASTM A 105 / ASTM A 216GRWCB).

To avoid: The packages must be stored in a ventilated place, away from heat sources, flammable substances and must be clean and in a covered area. The risk of falls and mechanical shocks must also be avoided.

Risk signaling: Plates containing the indication of CORROSIVE PRODUCT. Incompatible product and materials: See previous information.

Safe materials for packaging:

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

Unsuitable: Avoid incompatible material.

8. - EXPOSURE CONTROLS AND PERSONAL PROTECTION

Measures of engineering control: Handling the product in a place with good 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 to reduce exposure to the product. It is recommended

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make available emergency showers and eyewash facilities in the work area. Engineering control measures are most effective in reducing product exposure. To reduce the possibility of potential health hazard, ensure sufficient ventilation or exhaustion is in place to control ambient concentration to low levels.

Parameters of specific control:**Occupational exposure limits:**

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

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

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

Other limits and values: Not considered.

Personal protection measures:

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

Hand protection: Use PVC gloves (long barrel).

Eye protection: Wear wide-vision safety glasses and, if possible, a face shield.

Protection of the skin and body: Use clothes suitable for the operation with chemical products, which can be increased with a trevira cover.

Special precautions: Equip the area with showers and eye wash basins. 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 effectively washed before reuse. Chemical products must only be handled by trained and qualified people. All PPE's, according to NR-6, must have the CA (Certificate of Approval). Strictly follow the operational and safety procedures recommended by the organization for work. In places where chemical products are handled, monitoring of workers' exposure must be carried out, according to PPRA (Environmental Risk Prevention Program) Ordinance 3.214/78 of MTB-NR-09).

Hygiene measures: Keep workplaces within hygiene standards. Periodically make employees aware 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: 10.5 - 13.0 - Method (IT.CQ-0009)

Specific temperatures or temperature ranges at which physical state changes occur: **Boiling point:**

28.3°C 101.3 kPa (30% NH₃).

Melting point: -72.4 °C (30% NH₃).

Decomposition temperature: Not available.

Flash point: Not available.

Auto-ignition temperature: 651°C (ammonia vapors).

Explosive Limits: Not available.

LEI: (lower explosion limit): Not available.

LES: (upper explosive limit): Not available.

Vapor Density: 0.6.

Density: 0.970 - 0.980 - Method (IT.CQ-0009)

Solubility in water: Water solubility: all proportions. Soluble in alcohol.

Evaporation rate: 0.80 to 25°C.

Flammability: Not available.

Vapor pressure: Not available.

Vapor Density: Not available.

Relative Density: Not available.

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

Viscosity: Not available.

10. - STABILITY AND REACTIVITY

Reactivity: Ammonium hydroxide is an alkaline product that releases heat when it reacts with acid.

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Stability: Stable under normal temperature and pressure conditions.

Possibility of hazardous reactions: Violently reacts with acids, strong oxidants, halogens, acrylic acid, dimethyl sulfate, silver oxide, silver nitrate, hypochlorite, isocyanates and mercury.

Conditions to avoid: Strong heating.

Incompatible materials: Sodium hypochlorite, iodine and strong acids. The product is also incompatible with acids, strong oxidants, peroxides, chlorine and bromine.

Hazardous decomposition products: Burning can produce ammonia gas and nitrogen oxides.

11. - TOXICOLOGICAL INFORMATION

Acute toxicity: Inhalation can cause burns to the nasal mucosa, pharynx and larynx, cough, chest pain, bronchial spasms with difficulty breathing and pulmonary edema.

Product classified as acutely toxic by mouth and inhalation.

LD50 (oral, rat): 530 mg/kg

LC50 (inhalation, rats, 4h): 0.5 a 2 mg/L

Skin corrosion/irritation: Vapor in the presence of moisture is a skin irritant. Spilled liquid can cause chemical burns and blisters if contact is prolonged.

Severe ocular lesions/eye irritation:

The ammonia vapors given off by the solutions can cause irritation and watering of the eyes, severe damage can occur at high concentrations. Spilled liquid can cause permanent eye damage.

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

Germ cell mutagenicity:

The product is not expected to show germ cell mutagenicity.

Carcinogenicity: Available toxicological studies are insufficient for conclusions.

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

Specific target organ toxicity- single exposure:

Exposure to high concentration ammonia vapors for short periods can cause severe lung damage and can be fatal.

Pulmonary edema can occur 48 hours after severe exposure and proves to be fatal. **Specific target organ toxicity -**

repeated exposure:

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

Aspiration hazard: The main complications resulting from ingestion are gastrointestinal bleeding, perforations in the oropharynx and a state of shock secondary to profuse bleeding, acidosis and/or disseminated intravascular coagulation.

12. - ECOLOGICAL INFORMATION

- Environmental effects, behaviors and impacts of the product:

Ecotoxicity: Aquatics: Very toxic to aquatic organisms.

CE50 (*Daphnia magna*, 48h): 0.66 mg/L

Free (non-ionized) ammonia on the surface of water is toxic to aquatic life, however the ammonium ion that predominates in most water is not toxic. In the event of water contamination with ammonia, ammonium salts that may be formed do not pose a toxic risk. Raising the pH above 7.5 will induce an increase in the level of non-ionized ammonia. LC50 (fish, various species) were <1 mg/L. Studies in fish have shown that repeated exposures produced adverse effects on growth rate at concentrations greater than 0.0024 mg/L.

Persistence and degradability: In soil, ammonia is rapidly oxidized by microorganisms to the nitrate ion. In fresh water, it can be nitrified by microorganisms or absorbed onto sedimentary particles and colloids, substantially biodegradable in water. In the atmosphere, it can be degraded by photolysis or neutralized by polluting acids in the air.

Bioaccumulative potential: Low bioaccumulative potential.

Mobility in soil: The NH_4^+ ion is adsorbed by the soil. Ammonia adsorption to sediments and suspended organic matter increases with organic matter concentration, metal ion concentration, and with decreasing pH. The microbial population and uptake by plants also interfere in this process.

Other adverse effects: No other adverse effects other than those exposed are known.

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13. - CONSIDERATIONS ON FINAL DISPOSAL**Recommended methods for final disposal:**

The treatment and disposal of product residues must be done in a suitable environment, by people trained in the use of special equipment and the recommended PPE's to avoid contact with the product, its vapors or mists. Leaks must be contained and collected for later disposal after neutralization.

Product:

Ensure all Federal, State and local agencies receive proper notice of spills and disposal methods. CONAMA Resolution 005/1993, Law No. 12,305, as of August 2, 2010 (National Solid Waste Policy). Neutralize slowly and carefully with acid if possible.

Product waste:

Consult environmental regulatory agencies for advice on acceptable regulatory practices. Come in contact with relevant local authorities. It can be incinerated when in compliance with local regulations. Or dispose of in an approved chemical waste landfill.

Used Package:

Empty containers must be drained and covered before handling and transport operations. If the package is not properly washed and decontaminated, it is considered to contain the product.

14. - TRANSPORT INFORMATION**National and International Regulations****Land:**

Resolution No. 5947/2021 of the Brazilian National Land Transport Agency (ANTT), Approves the Complementary Instructions to the Regulation of Land Transport of Dangerous Goods and its amendments.

UN number: Product not covered by current regulations on the transport of dangerous products.

Appropriate name for shipment: -

Risk class: -

Risk number: -

Packing Group: -

Waterway:

DPC – Directorate of Ports and Coasts (Transport in Brazilian waters) Maritime Authority Regulations (NORMAM)

NORMAM 01/DPC: Vessels Used in Open-seas Navigation

UN number: Product not covered by current regulations on the transport of dangerous products.

Appropriate name for shipment: -

Risk class: -

Risk number: -

Packing Group: -

- Air Transport:

ANAC - National Civil Aviation Agency - Resolution No. 129 as of January 8, 2009

RBAC N°175 - (BRAZILIAN CIVIL AVIATION REGULATION) - TRANSPORTATION OF DANGEROUS ITEMS IN CIVIL AIRCRAFT

IS No. 175-001 - SUPPLEMENTARY INSTRUCTION - IS

ICAO - "International Civil Aviation Organization" - Doc 9284-NA/905

IATA - "International Air Transport Association"

Dangerous Goods Regulation (DGR)

UN number: Product not covered by current regulations on the transport of dangerous products.

Appropriate name for shipment: -

Risk class: -

Risk number: -

Packing Group: -

15. - REGULATORY INFORMATION

Specific regulations for the chemical product: Federal

Decree No. 2,657, as of July 3, 1998;

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Standard ABNT-NBR 14725:2014;
Ordinance No. 229, as of May 24, 2011 – Changes Regulatory Standard No. 26.

16. - OTHER INFORMATION

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

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