SURAJ AIR (INDIA) PRIVATE LIMITED
CIN: U24239KA2008PTC048191
(An ISO 9001: 2015 Certified Company)

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Material Safety Data Sheet
ANHYDROUS AMMONIA

1. Product Identification

Common name	:	Ammonia
Synonyms Name	:	Anhydrous Ammonia, Ammonia Gas, Liquid Ammonia
Trade Name	:	Anhydrous Ammonia
Chemical Formula	:	NH3
Molecular Mass	:	17.03 g/mol
CAS No.	:	7664-41-7
UN No.	:	1005
Category	:	Hazardous
Risk Classification No.	:	2.3 (Main), 2.1 (Subsidiary)

2. Physical Properties

Physical State	:	Liquefied Compressed Gas
Color	:	Colorless
Odor	:	Pungent
Specific Gravity	:	0.682 [at (-)33.35 ^{0}C] (Water=1)
Boiling Point	:	(-)33.35 ^{0}C
Melting Point	:	(-)77.7 ^{0}C
Vapor Density	:	0.597 [at 0 ^{0}C & 1 atm] (Air =1)
Vapor Pressure	:	0.76 MPa (7.6 bar) (at 20 ^{0}C)
Auto Ignition Temperature	:	651 ^{0}C
Minimum Ignition Energy	:	100 mJ
pH	:	11
Solubility (% by Mass)	:	Water - 47.3 Methanol Absolute - 29.3 Ethanol Absolute - 20.95

3. Chemical Properties

Corrosivity	:	Corrosive to Copper, Copper alloys & Galvanized surfaces
Incompatibilities	:	Acetaldehyde, acrolein, boron, chloric acid, chlorine monoxide, chlorites, nitrogen tetroxide, perchlorate, sulfur, tin and strong acids
Light Sensitivity	:	No
Decomposition Temperature	:	450-500 ^{0}C
Stability	:	Stable at room temperature
Polymerization	:	Will not occur

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4. Hazardous Identification ratings

Health	: 3	-	Severe Poison
Flammability	: 1	-	Slight
Reactivity	: 0	-	Stable
Specific	: ALK	-	Alkaline

Hazards Data

Health Hazards : Ammonia is a strongly irritant chemical for eyes, skin and respiratory tract. If the contamination is above the permissible limits, serious injury may result. Ammonia is not a systemic poison.

Fire and Explosion Hazards : Ammonia forms explosive mixtures with air within 16-25% by volume. The presence of oil or a mixture of ammonia with other combustible materials will increase the fire hazard. The explosive range is broadened by a mixture of oxygen replacing air and by temperature and pressure higher than atmospheric pressure.

Extinguishing Media : Dry Chemical, CO2, water spray or alcohol-resistant foam if gas flow cannot be stopped

5. Preventive Measure

Personal protective equipment's

Eye protection	:	Gas-tight goggles / full face masks
Respiratory protection	:	Self-contained breathing apparatus, positive pressure hose masks or chemical cartridge respirators
Head protection	:	Soft brimmed hats
Body skin and hand protection	:	Rubber gloves/other impermeable wears can be used for hand protection. In normal conditions, cotton clothing should be worn. In medium concentration, a rubber apron or rubber coat provide sufficient protection, but in areas of high ammonia concentration a complete gas suit should be worn.
Foot Protection	:	Rubber boots or safety-toed rubber booties should be used as required. Rubber boots should be thoroughly cleaned and ventilated after contamination.

6. Spills and leaks

- For spills and leaks, flush water.
- Prevent the leaks by using safety kits; if possible, otherwise remove the cylinder to a water sump or to isolated area and transfer the contents to another suitable container as quick as possible.

7. First Aid

Contact with skin and Mucous membrane

- Exposed person should be removed at once to an uncontaminated area.
- If skin contact is extensive and emergency showers available, move the patient under the shower immediately.
- Remove the contaminated cloths and shoes.

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- Never apply salves or ointments to the skin or mucous membrane burns during the 24 hour period followed by the injury.

Contact with the Eye

- If even small quantity of ammonia enter the eyes, they should be irrigated immediately with water for a minimum of 15 minutes. The eyelids should be held apart during the irrigation to ensure the contact of water with all tissues of eyes.
- Add 2-3 drops of pontocaine solution as a first aid and contact an eye specialist immediately.

Ingestion

If a patient is conscious and able, give large quantities of water. Do not induce vomiting if the patient is in shock, extreme pain or is unconscious. If vomiting begins, place the patient face down with a head lower than hips, this prevents vomitus from entering the lungs and causing further injury.

Inhalation

- Remove the exposed person to an uncontaminated area immediately. If the exposure has been to minor concentration for a limited time, usually no treatment is required.
- When there is a severe exposure to higher concentrations and if breathing is difficult, give artificial respiration. Contact a physician immediately.
- The patient should be kept comfortably warm at rest.
- Never attempt to give anything by mouth to an unconscious patient.

8. Handling and storage

Anhydrous ammonia is available in Cylinder / Tonners. Which is referred as Containers.

Handling of Container

- Container shall be adequately supported during handling.
- Use trolleys/ cradles of adequate strength for moving the container.
- Avoid rough handling of container such as dropping, bumping, rolling, playing etc...
- Do not use electric magnets for unloading or handling.
- Use holding equipment's for safer discharge.
- **The Tonner should be oriented so that the valves are one above the other and should be clamped securely.**
- Open the spindle slowly for discharging anhydrous ammonia.
- For discharging anhydrous ammonia (liquid):
    - From cylinder: place the cylinder at an inclined position
    - From tonner: connect the bottom valve.
- **For drawing of ammonia gas:**
    - From cylinder: place the cylinder in vertical position.
    - From tonner: connect the top valve.
- After discharge close the spindle immediately.
- If the Container as frozen during discharge, never use a pry to loosen the container

Storage of Container

- Store in a cool dry, well ventilated place.
- Keep the Container in an upright position as far as possible, if placed horizontally, arrange in a position that they cannot roll.
- Container should not be stored in a corrosive atmosphere.
- Container should not be stored along with any combustible materials.
- Empty Container should be separated from filled container

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9. Exposure controls/personal protection

Effects of various concentration of Ammonia vapor in air

Vapor concentration (ppm)	General Effect	Exposure period
1-5	Odor detectable by most persons	Prolonged repeated exposure produces no injury
25	No adverse effect for average worker	Maximum allowable concentration for 8 hour work day and 40 hour work week, to which it is believed that nearly all workers may be repeatedly exposed, day after day for lifetime without adverse effect.
35	No adverse effect for average worker	Exposure longer than 15 minute and should not occur more than 4 times per day, with least 60 minutes between successive exposures
400-700	Nose & throat irritation, eye irritation with tearing	Infrequent short (1/2 hour) exposure ordinarily produces no serious effect
2000-3000	Conclusive coughing severe eye irritation	No permissible exposure, may be fatal after short exposure
5000-10,000	Respirator spasm, rapid asphyxia	No permission exposure. Rapidly fatal.

10. Special transport precautions

- Avoid transport on vehicles where the load space is not separated from the driver's compartment.
- Ensure vehicle driver is aware of the potential hazards of the load and knows what to do in the event of an accident or an emergency. Before transporting product containers.
- Ensure there is adequate ventilation.
- Ensure that containers are firmly secured.
- Ensure containers valve is closed and not leaking.
- Ensure valve outlet cap nut or plug (where provided) is correctly fitted.
- Ensure valve protection device (where provided) is correctly fitted.

11. Labeling and shipping

Hazard Class : US Domestic: 2.2 (Non-Flammable Gas)
International: 2.3 (Poison Gas) subsidiary 8 (Corrosive)

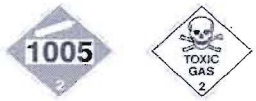
Proper Shipping Description: : US Domestic: UN1005, Ammonia, Anhydrous, 2.2, RQ, Inhalation Hazard
International: UN1005, Ammonia, Anhydrous, 2.3, (8), RQ, Poison-Inhalation Hazard Zone "D"

Placard : US Domestic: Non-Flammable Gas,
International: Poison Gas, Corrosive (Subsidiary)

Identification No : UN 1005

National Fire Protection Assoc. Hazardous Rating and Hazardous Materials Identification System Labels: : Anhydrous Ammonia
HEALTH = 3
FLAMMABILITY = 1
REACTIVITY = 0
PERSONAL PROTECTION = H

Pictorial representation :



12. Information on toxicological effects

Acute toxicity	:	Inhalation: TOXIC IF INHALED		
LC50 inhalation rate	:	7338 ppm/hr	**ATE US (gases)**	: 700.0 ppmV/4hr
ATE US (vapors)	:	3.000mg/l/4hr	**ATE US (dust, mist)**	: 0.500mg/l/hr

13. Ecological information

Toxicity Ecology- general	:	VERY TOXIC TO AQUATIC LIFE. No ecological damage caused by this product.
Ecology- soil	:	Because of its high volatility, the product is unlikely to cause ground or water pollution.
Effect on ozone layer	:	None.
Effect on the global warming	:	No known effects from this product.
Other adverse effects	:	May cause pH changes in aqueous ecological systems.

14. Persistence and degradability: The substance is biodegradable. Unlikely to persist.

15. Disposal Consideration

Whatever cannot be saved for recovery or recycling should be managed in an appropriate and approved waste facility. Waste must be disposed of in accordance with federal, state and local environmental control regulation.

16. Other information

Warning!!

HAZARDOUS LIQUID AND GAS UNDER PRESSURE

Precautions:

- Do not change the color of Container.
- Do not fill this Container with any other gas.
- Keep Container away from heat and sun. Store in cool, dry and well ventilated area.
- Do not store Container with flammable or explosive material.
- Do not use oil or lubricants on valves.
- Ensure leak-proof connections.
- Close the spindle immediately after emptying.
- Prevent vacuum formation in Container.
- Do not drag, drop or roll the Container.
- Use adequate Container handling equipment.
- Secure the valve with valve guard.
- In case of leakage, flush with water and isolate the Container. Stop the leakage using ammonia safety kit.

Special advice:

- Do not breathe gas.
- Avoid contact with eyes, skin and clothing.
- In case if contact, flush with water immediately for at least 15minutes, contact a doctor.

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17. Sources used

The information herein is taken from the latest, standard industry recognized references. The procedure applies to only under standard / specific condition.

For any suggestions / recommendations please feel free to contact us.

Issued by	Approved by	Reviewed by	Prepared by
QMS CO	Executive Officer	Manager	Assistant Manager

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