MATERIAL SAFETY DATA SHEET

Company Name	**PRIDE- CHEM INDUSTRIES PTE LTD**
Address	**2 Tuas View Lane** **Singapore 637657**
In Case of Emergency: Phone	**(65) 6861 7641**
Fax	**(65) 6861 1055**
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Chemical Name **Ammonia, Anhydrous**	**PRIDE- CHEM INDUSTRIES PTE LTD DISCLAIMER: THE INFORMATION AND RECOMMENDATIONS PRESENTED HEREIN ARE BASED ON SOURCES BELIEVED TO BE RELIABLE. PRIDE - CHEM MAKES NO REPRESENTATION ON ITS COMPLETENESS OR ACCURACY. IT IS THE RESPONSIBILITY OF THE USER TO DETERMINE THE CHEMICAL'S SUITABILITY FOR ITS INTENDED USE, THE CHEMICAL'S SAFE USE, AND THE CHEMICAL'S PROPER DISPOSAL. NO REPRESENTATIONS AND/OR WARRANTIES, EITHER EXPRESSED OR IMPLIED, OF THE MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, OR OF ANY OTHER NATURE, ARE MADE ITH RESPENT TO THE INFORMATION PROVIDED IN THIS MSDS OR TO THE CHEMICAL TO WHICH INFORMATION MAY REFER. PRIDE-CHEM NEITHER ASSUMES NOR AUTHORIZES ANY OTHER PERSON TO ASSUME FOR IT, ANY OTHER ADDITONAL RESPONSIBILITY OR LIABILITY FOR THE USE OF, OR RELIANCE UPON, THIS INFORMATION.**

SECTION 1 : PRODUCT AND COMPANY INFORMATION

Characterization **Gas**	**NIOSH No.** **BO 0875000**
DOT Proper Shipping Name **Ammonia, Anhydrous**	**Chemical Formula** **NH_3**
DOT Hazard Class and Label Requirements **Non Flammable Gas**	**DOT Abstract Service (CAS) Number** **7664-41-7**
DOT Identification Number **UN 1005**	**DOT Emergency Guide Code** **15**

Synonyms

Anhydrous ammonia, ammonia gas.

SECTION 2 : COMPOSITION/INFORMATION ON INGREDIENTS

Hazardous Components

Ammonia 99.9% (a mixture of CO, hydrogen, CO_2, and Nitrogen (from air) obtained by steam re-forming or by partial combustion of natural gas; an end product of animal metabolism)
1 ppm = 0.71mg/m^3

SECTION 3 : HAZARDS IDENTIFICATION

Health	Fire	Reactive	Other	Degree of Hazard	Colour Coding	Other Codes
3	1	0	COR	0 = Minimum Hazard 1 = Slight Hazard 2 = Moderate Hazard 3 = Serious Hazard 4 = Severe Hazard	Health = Blue Fire = Red Reactivity = Yellow Other = White	OX = Oxidizer ACID = Acid ALK = Alkali COR = Corrosive W = Use No Water

SECTION 4 : FIRST AID MEASURES

Hazard Rating **Caution**	**Type of Hazard** **Cause burn to skin and eyes**
Product Inhalation **Severe irritation of nose, throat & upper respiratory tract with cough, wheezing & shortness of breath leading to chest pain headache, nausea and vomiting. Inhalation may be fatal as a result of spasm, inflammation and edema of larynx and bronchi, chemical pneumonitis and pulmonary edema. Cessation of respiration may lead to death if exposure continues.**	**Emergency and First-aid Procedures** **Remove from exposure, keep warm and at rest. If respondent is under respiratory distress, give oxygen. If breathing stops or shows signs of failing, apply artificial respiration. Obtain medical attention urgently. Transfer promptly to medical facility. Observation for 24-48 hours since pulmonary edema is possible.**
Product on Skin & Eyes **Corrosive to skin because it reacts with moisture to form caustic ammonia hydroxide. Long exposure may results in destruction of tissue.**	**Emergency and First-aid Procedures** **Do remove clothing. If possible immediately wash with water. Continue washing for at least 15 minutes, occasionally lifting eyelids, seek medical attention. Contaminated clothing should be washed thoroughly before re-use.**

Product Ingestion	Emergency and First-aid Procedures
Dizziness, nausea and severe irritation of throat & upper respiratory tract with cough, shortness of breath, chest pain, and vomiting.	Wash out mouth if possible. Obtain medical attention urgently.

SECTION 5 : FIRE FIGHTING MEASURES

Flash Point	Auto-Ignition temperature	Explosive Limit in Air % by Vol (LEL)
N.A.	1204ºF (650ºC)	LEL : 15% UEL : 28%

Extinguishing Media

Use extinguishing agent such as water spray or fog, carbon dioxide, or dry chemical extinguishers suitable for the type of surrounding fire.

Special Fire Fighting Procedures

Ammonia gas is difficult to ignite but presents an explosion hazard when exposed to flame or in fire. Gas is extremely irritating: wear full protective clothing and "NIOSH/MSHA approved" self-contained breathing apparatus (SCBA). Heat will build pressure and may rupture closed storage containers. Keep fire-exposed containers cool with water spray.

Fire & Explosive Hazard

Negligible fire hazard. Moderate explosion hazard. Containers may rupture or explode if exposed to heat.

SECTION 6 : ACCIDENTAL RELEASE MEASURES

Steps to be taken in case of Material Release or Spillage

Remove all ignition sources. Cleanup workers must wear protective clothing, goggles, respiratory protection & equipment to prevent body contact. Stop leak if you can without risk. Preferred clean-up procedure: Isolate valve. Dam up spill, cover with sand or inert porous material and transfer to appropriate sealable containers. If this is not possible, cover leakage with gunny sack soaked with weak acid and spray water to minimise leakage and "knock down" vapour. Flush clean-up area with water. Dilute acid, preferably 3% acetic acid may be used to neutralise final traces of ammonium hydroxide. For large spills, pick up spill with vacuum equipment or pump for disposal, or flush holding area with water, prior to neutralisation. Notify local authorities if flushed spillage unavoidably enters public sewer or water systems.

SECTION 7 : HANDLING AND STORAGE

Precautions to be taken in Handling and Storage

Store in cool dry place, preferably away from the main building, out of direct sunlight, and away from sources of heat and other chemicals, such as oxygen, halogens and acids. Bulk storage of ammonia is not recommended. Ammonia should be handled wearing protective clothing, eye protection with material like neoprene, rubber, buna-n or vinyl gloves. Keep container tightly closed. If there is exposure to high concentrations of vapour, approved breathing apparatus should be worn.

Unsuitable:	Suitable:
Copper and its alloy, aluminum or its alloy, galvanised surface, phenolic or polyester resins	Mild steel, stainless steel, neoprene, polyethylene

SECTION 8 : EXPOSURE CONTROLS/PERSONAL PROTECTION

Respiratory Protection

Exposure above 50ppm : Approved full face-respirator with an ammonia vapour cartridge. Greater protection is obtained from a self-contained breathing apparatus with full face piece and pressure demand or other positive pressure.

Ventilation

Local exhaust ventilation or general mechanical systems general is recommended.

Eyes Protection

Chemical goggles and/or Face mask

Skin Protection

Butyl Rubber gloves, hard hats, rubber boots with protective clothing or rubber apron to be worn when handling. Safety showers and eye-wash should be provided nearby where skin contact can occur.

Other Additional Protective Measures

Always wash hands thoroughly after handling chemical; never bring food, drink or smoking materials into vicinity of chemicals. Neutralisation supplies (3% acetic acid preferably) and abundant running water should be close at hand in working and storage areas.

SECTION 9 : PHYSCIAL AND CHEMICAL PROPERTIES

Boiling Point	Specific Gravity (H_20=1)
-28ºF (-33.4ºC)	0.77 at 0ºF
Vapour Pressure (atmosphere)	**Molecular Weight**
8.5 at 69ºF (20°C)	17
Vapour Density (Air=1)	**Freezing Point**
0.5967	-108ºF (-77.7ºC)

Solubility in water	**38% at 20°C**
Synonyms	**Anhydrous ammonia, ammonia gas**
Solubility	**Very miscible in water, alcohol, and ether, aqueous solution is highly alkaline**
Appearance and Odour	**Colourless gas with extremely pungent, intense, irritating, and even suffocating odour**

SECTION 10 : STABILITY AND REACTIVITY

Stability	**Conditions to Avoid**	**Ammonia is corrosive to copper and galvanised surfaces. Forms sensitive explosive mixtures with air and hydrocarbons. Explosive reaction with silver chloride, silver nitrate, silver azide and silver oxide.**
Stable	**Incompatibility**	**Acids, combustible materials, metals, oxidizing materials, metal salts, halo carbons, halogens, amines, reducing agents, cyanides, bases.**
Hazardous Polymerization	**Conditions to Avoid**	**Potentially violent or explosive reactions on contact with interhalogens. Do not mix with our materials, especially for cleaning purposes (never mix ammonia with bleach as toxic gas emissions can occur).**
May Occur	**Incompatibility**	**Ammonia catalyzes the polymerization of acrolein and other unsaturates, causing an increase in temperatures and pressure, which may explode containers. Emit toxic NH3 and NOx in heat conditions.**

Section 11 : TOXICOLOGICAL INFORMATION

Hazard Rating	**LD_{50} (Oral Rat)**	**LC_{50}**
Caution	**350mg/kg**	**2000 ppm/4hr**

OSHA Exposure Criteria	**NIOSH Exposure Criteria**	**Immediately Dangerous to Life & Health (IDLH)**	**ACGIH Exposure Criteria**
Permissible Exposure Limit (PEL) : 35ppm, 27mg/m^3 **(TWA) :** 50ppm, 35mg/m^3	**(REL) :** 25ppm, 18mg/m^3 **(STEL) :** 35ppm, 27mg/m^3	**300ppm**	**Threshold Limit Value (TLV) :** 25ppm, 17mg/m^3 **(STEL) :** 35ppm, 24mg/m^3

SECTION 12 : ECOLOGICAL INFORMATION

Acute Ecological Effects

Acute (short-term) toxic effects may include the death of animals, birds, or fish, and death or low growth rate in plants. Acute effects are seen 2 to 4 days after animals or plants are exposed to ammonia. Under natural conditions of pH and temperature, ammonia has a moderate acute toxicity to aquatic life.

Chronic Ecological Effects

Chronic (long-term) toxic effects may include shortened life span, reproductive problems, lower fertility, and changes in appearance or behavior in exposed animals. These effects can be seen long after first exposure(s) to toxic chemicals. Under natural conditions of pH and temperature, total ammonia has moderate chronic toxicity in aquatic life.

SECTION 13 : DISPOSAL CONSIDERATIONS

Waste Disposal Method

Leaking gas should be vented slowly into a fume cupboard or water fed scrubbing tower or column. Dispose in accordance with all applicable environmental regulation. Non-return cylinder that is used as empty cylinders will still contain hazardous residue.

SECTION 14 : TRANSPORT & PACKAGING INFORMATION

UN Number and Classification	**ADR/RID Classification**	**Tremcard Number**
UN1005 2.0.0	**Class 2**	**TEC (R) 1**

Road Transportation

Hazard warning sign	**Hazchem code**
1005 toxic gas	**2 PE**

Sea Transportation

IMDG page No.	**Class**	**Label**	**Packaging group**
2016	**2**	**Poison gas, Corrosive**	**N.A.**

Air Transportation

ICAO/IATA code (UN No.)	**Class**	**Label**	**Cargo aircraft max.quantity**
1005	**2**	**Gas poisonous; gas flammable**	**25 kilograms**

SECTION 15 : REGULATORY INFORMATION

N.A.

SECTION 16 : OTHER INFORMATION

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