SAFETY DATA SHEET

According to Regulation (EC) No. 1907/2006

Revision: 4	Issue Date: August 2020	Supersedes: Rev 3 of February 2019	First Issue: May 2010

Section I: Product and Manufacturer Information

Product Name: Ammonia, anhydrous
Manufacturer:

Caribbean Nitrogen Company Limited
Pacific Avenue Extension
Point Lisas Industrial Estate
Point Lisas, Couva, Trinidad and Tobago, W.I
Phone No: 868-636-8825 or 868-679-4262
Website: www.caribbeannitrogen.co.tt

CARIBBEAN NITROGEN COMPANY LIMITED

Emergency Contact Information:

Proman Operations
Atlantic Avenue
Point Lisas Industrial Estate
Point Lisas, Couva, Trinidad and Tobago, W.I
Phone No: +1 868 636 5993
Website: www.proman.org

PROMAN

Common Name: Ammonia, anhydrous

Formula: NH_3

Synonyms: Ammonia anhydrous; Anhydrous ammonia

% Weight 99.5 – 100
CAS NO 7664-41-7

Mol. Wt 17.03 g/mol

Uses: Industrial & Agricultural

Section II: Hazards Identification

Classification according to Regulation (EC) No 1272/2008	
Flammable gases (Category 2)	H221
Gases under pressure (Compressed gas)	H280
Acute Toxicity, Inhalation (Category 3)	H331
Skin Corrosion (Category 1B)	H314
Acute aquatic toxicity (Category 1)	H400
Chronic aquatic toxicity (Category 1)	H410

2.1 Classification of the substance or mixture

For the full text of the H-Statements mentioned in this Section, see Section 16.

Classification according to EU Directives 67/548/EEC or 1999/45/EC R10	
T Toxic	R23
C Corrosive	R34
N Dangerous for the environment	R50

For the full text of the R-phrases mentioned in this Section, see Section 16.

2.2 Label elements

Labelling according Regulation (EC) No 1272/2008

Pictogram

Signal word

Hazard statement(s)

H221	Flammable gas.
H280	Contains gas under pressure; may explode if heated.
H314	Causes severe skin burns and eye damage.
H331	Toxic if inhaled.
H410	Very toxic to aquatic life with long lasting effects.

Precautionary statement(s)

P210	Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
P261	Avoid breathing gas.
P273	Avoid release to the environment.
P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.
P305 + P351 + P338	IF IN EYES: Rinse cautiously with water for 15 minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P310	Immediately call a POISON CENTER or doctor/ physician.

Supplemental Hazard Statements: none

2.3 Other hazards

This substance/mixture contains no components considered to be either persistent, bio-accumulative and toxic (PBT), or very persistent and very bio-accumulative (vPvB) at levels of 0.1% or higher.

Section III: Composition/Information on Ingredients

3.1 Substances

Formula : NH_3
Molecular weight : 17.03 g/mol
CAS-No.: 7664-41-7
EC-No. : 231-635-3
Index-No.: 007-001-00-5

Hazardous ingredients according to Regulation (EC) No 1272/2008

Name	Product Identifier	Classification	Concentration
Ammonia, Anhydrous	CAS-No.: 7664-41-7 EC-No.: 231-635-3 Index-No.: 007-001-00-5	Flammable Gas 2; Pressurized Gas; Compressed Gas; Acute Toxicity 3; Skin Corr. 1B; Aquatic Acute 1; Aquatic Chronic 1; H221, H280, H314, H331, H410	<= 100 %

Hazardous ingredients according to Directive 1999/45/EC

Name	Product Identifier	Classification	Concentration
Ammonia, Anhydrous	CAS-No.: 7664-41-7 EC-No.: 231-635-3 Index-No.: 007-001-00-5	T, N, R10 - R23 - R34 - R50	<= 100 %

For the full text of the H-Statements and R-Phrases mentioned in this Section, see Section 16

Section IV: First Aid Measures	
Eyes:	Flush with water immediately for at least 15 minutes. Remove patient to uncontaminated area. In case of severe exposure, call physician promptly. Keep patient warm.
Skin:	Flush with water immediately for at least 15 minutes. Remove patient to uncontaminated area. In case of severe exposure, call physician promptly. Keep patient warm. Do not administer salves or ointments to the affected area.
Ingestion:	Call a physician promptly. If conscious, give a cup of water, but do not induce vomiting. Give neutralizing agents, such as citrus fruit juices or diluted vinegar.
Inhalation:	Remove patient to an uncontaminated area. Prompt artificial respiration with 100% oxygen may be required.
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11.	

Section V: Fire Fighting Measures			
Flash Point:	Not Applicable	**Auto ignition Temperature:**	651^0C / 1204^0F at 1 atm
Lower Explosive Limit:	16%	**Upper Explosive Limit:**	25%
Unusual Fire and Explosion Hazards:	Presence of oil or other combustible materials will increase the fire hazard.		
Extinguishing Media:	Stop flow of gas before extinguishing fire. All standard agents are acceptable. (Water, carbon dioxide (CO2), dry chemical, foam) Note: Ammonia has a strong attraction to water. Large quantities of heat may be generated.		
Special Firefighting Procedures and Equipment:	Stop flow of gas before extinguishing fire. Use water spray to keep fire-exposed containers cool when containing gas and to protect persons effecting the shut-off. Wear full protective clothing and self-contained breathing apparatus approved by NIOSH. Ammonia may be an explosion hazard in a confined space. Do not apply water directly to container with liquid as ammonia boils at -33.4^0C (direct water will heat container), and more vapors will be released.		

Section VI: Accidental Release Measures	
Large Spill:	Remain upwind of spill or leak. For liquid spill or gas leak, evacuate the area. Restrict access to the area until completion of cleanup. Eliminate ignition sources and provide ventilation. Responders must wear fully encapsulating, vapor protective clothing with Self Contained Breathing Apparatus (Level-A Hazmat suits) before responding to the ammonia spill/leak. Stop the leak if possible without risk to personnel. Ensure buddy-buddy system is employed. A water fog or mist pattern shall be used to knock down vapors or divert vapor cloud drift. Do not discharge this ammonia/water solution to municipal sewers, confined drains, or surface waters. Do not direct water at spill or source of leak.
Small Spill:	Remain upwind of spill or leak. In unknown concentrations SCBA must be worn. Keep ignition sources away. Small ammonia spills (less than one gallon) can be diluted with large volumes of water.
Environmental Precautions:	Contain spill using response equipment and prevent from release to environment. If spill could potentially enter any waterway, including intermittent dry creeks, contact the local authorities.
Methods and material for containment and clean up:	Provide adequate ventilation and remove ignition sources. Contain spillage (inclusive of contaminated water) using appropriate spill response equipment such as **universal** pads, socks, pillows and booms. Use cold water to absorb ammonia vapor in air. Dispose of materials in accordance with local, regional, national and international hazardous waste regulations.
Reference to other sections:	For appropriate disposal guidance, see Section XIII

Section VII: Handling and Storage	
Ventilation:	Natural ventilation should be provided. Use mechanical (general) ventilation if natural ventilation is found inadequate.
Handling:	Avoid heating containers. Use proper level of personal protective equipment as defined in Section VIII. Also see OSHA 29 CFR 1910.111. Never trap ammonia between closed valves.

Storage:	Store in cool, well-ventilated, location, away from all possible sources of ignition, combustible material and contamination. Also see OSHA 29 CFR 1910.111. Protect containers from excessive heat (Greater than 120^{0}F or 48.9^{0}C). Use only approved pressure vessels with appropriate safety devices. Never fill pressure storage tanks over 85% of vessel volume. Do not contact liquid ammonia pools, or leaks from containers, with direct streams of water. Avoid copper or copper-containing alloys such as brass, for tanks, vessels, pipe, or valves. Use iron or steel tanks and piping, and valves especially designed for ammonia service. Equipment, Pressure Vessels, Testing, Etc.: All equipment used to handle, store, transfer or apply anhydrous ammonia must be properly engineered, constructed and maintained in compliance with all applicable regulations, standards and Recognized and Generally Accepted Good Engineering Practice [RAGAGEP]. Pressure vessels, piping and appurtenances should be regularly inspected and tested using methods designed to reveal external and internal deterioration or defects that may impair the integrity of the equipment such that an unintended release of anhydrous ammonia may result. Consult with the Local Authorities and other experts, as applicable, concerning the methods that would be most appropriate given the particular circumstances.
Specific End Use:	Refer to Section I for uses.

Section VIII: Exposure Control/Personal Protection				
Ammonia:	ACGIH TWA 25ppm ACGIH STEL 35ppm	NIOSH IDLH 300ppm	OSHA STEL 35ppm (27mg/m^3)	OSHA TWA 50ppm (35mg/m^3)
Engineering Controls:	Use mechanical (general) or local exhaust ventilation if natural ventilation is found inadequate. If ventilation cannot reduce airborne concentrations below acceptable limits, appropriate PPE should be used.			
Eye and Face Protection:	Tight fitting unvented goggles with a face shield. Contact lenses should not be worn. Provide an emergency eye wash fountain and quick drench shower in the immediate work area.			
Protective Clothing:	Level "A" Hazmat Suit – Full encapsulating suit with self-contained breathing apparatus should be utilized for handling large liquid spills or vapor clouds. Use impervious clothing and rubber gloves for small liquid spills and normal loading and unloading operations.			
Respiratory Protection:	For known exposure levels use NIOSH approved air-purifying respirator with an appropriate cartridge or canister relating to the exposure concentration. Use the specific cartridge or canister for Ammonia gas. Use a self- contained breathing apparatus in the event Ammonia concentrations cannot be determined. Supplied air respirators are required for exposure of 300 ppm or greater. All respirators must meet NIOSH standards.			
Gloves:	Wear appropriate chemical resistant gloves with material types butyl rubber, neoprene, nitrile butadiene rubber (NBR), polyvinyl chloride (PVC).			
Environmental Exposure Controls:	Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.			

Section IX: Physical & Chemical Properties			
Physical State:	Gas	**Vapour Density:**	0.71 g/l @ 25^{0}C (77^{0}F)
Odour and Appearance:	**Pungent**, Irritating; colourless	**Evaporation Rate:**	Not Available
Odour Threshold:	0.7-5 ppm	**Boiling Point:**	-33.4^{0}C (-28^{0}F)
Specific Gravity:	0.68 @ -33.4^{0}C (-28.12^{0}F)	**Freezing Point:**	-77.7^{0}C (-108^{0}F)
Vapour Pressure mmHg:	6612 @ 20^{0}C (68^{0}F)	**Solubility in Water:**	510 - 530 g/L @ 20^{0}C (68^{0}F)
Viscosity (Dynamic):	0.266 cP @ -34^{0}C (-29.2^{0}F) (vapour)	**Explosive Limit:**	16-25 vol %
Explosive properties	No data available	**Oxidizing properties**	No data available
pH:	11.6 for 1% Aqueous solution	**% Volatile:**	100 at 20^{0}C (68^{0}F)
	11.1 for 0.1 Aqueous solution		
	10.6 for .01 Aqueous solution		
Relative Density	0.682 at -33.35^{0}C (-28^0 F)		

Section X: Stability & Reactivity	
Reactivity:	May accelerate the burning of other combustible materials. Vapours dissolve easily in water. Large amounts of heat may be released as solution forms.
Stability:	This product is stable under normal conditions of temperature and pressure.
Hazardous Polymerization:	Will not occur

Conditions to Avoid:	High temperatures and ignition sources.	
Materials to Avoid (Incompatible):	Separate from other chemicals, particularly oxidizing gases, silver oxide, mercury, chlorine, bromine, iodine, and acids. Also avoid: copper, tin, and zinc. Note: hazardous reactions have been documented for contact of anhydrous ammonia with: acetaldehyde, acrolein, boron, boron trioxide, bromine, chlorine, chlorites, chromium trioxide, ethylene oxide, fluoride, gold, hypochlorous acid, iodine, mercury, nitric acid nitrogen, tetroxide, nitrogen trichloride, nitrogen trifluoride, phosphorus trioxide, picric acid, potassium chlorate, potassium ferricyanide, silver, silver chloride. Liquefied gases in contact with water can explode violently.	
Hazardous Decomposition Products:	Normal combustion of Ammonia in air yields Nitrogen and water (steam). Under certain conditions of temperature and pressure some quantity of Hydrogen and Oxides of Nitrogen may also be formed.	
Section XI: Toxicological Information		
Significant Routes of Exposure:	Skin or eye contact, lungs (breathing). Ingestion (swallowing) is unlikely.	
Toxicity to Animals:	**Acute Oral Toxicity:**	No data available.
	Acute Inhalation Toxicity:	(rat, mouse) LC50=4,230 – 19,960 mg/m3 total NH_3/m^3 (1 hr)
	Acute Toxicity: Other Routes:	(rat, mouse) LC50= 45.5 - 195.1 mg/total NH_3/kg bw (1 hr intra venous)
	Acute Dermal Toxicity:	No data available.
	Repeated Dose Toxicity:	No mortality seen in rats, guinea pigs, rabbits, beagle dogs and monkeys in Inhalation studies at up to 770 mg/m^3. Acutely toxic by inhalation as defined by OSHA.
	Eye & Skin Irritation/Corrosion:	Skin: Corrosive
		Eye: Sub-acute and chronic exposure to 200-1,000 ppm produced eye damage. 100-200 ppm produced moderate to severe eye irritation.
	Developmental Toxicity/Teratogenicity:	No data available.
	Bacterial Genetic Toxicity In-Vitro: Gene Mutation:	Negative
	Non-Bacterial Genetic Toxicity In-Vitro: Chromosomal Aberration:	Chick fibroblasts: Induce chromosomal clumping, polyploidy and arrested spindle formation.
		No data showing that ammonia is mutagenic in mammals.
	Toxicity to Reproduction:	Temporarily Depressed Mean Daily Gain: (MDG) at 35 mg/kg in gilts
	Carcinogenicity:	No carcinogenic effects.
	Specific target organ toxicity (STOT) – single exposure	No data available.
	Specific target organ toxicity (STOT) – repeated exposure	No data available.
	Aspiration hazard	No data available.
Other Effects on Humans:	Nasal and pulmonary irritation at concentrations of above 100 ppm or higher.	
Special Remarks on Chronic Effects on Humans:	Repeated long-term exposure to lower concentrations may cause chronic irritation to the eyes and upper respiratory system.	
Special Remarks on Other Effects on Humans:	Exposure to liquid or high concentrations of gas is a severe irritant, and may cause burning and tearing of the eyes, runny nose, coughing, chest pains, and death. May cause severe delayed breathing difficulties. May cause temporary blindness and severe eye damage, and burning and blistering of the skin.	
	100-200 ppm produces moderate to severe eye irritation.	
	Human Experience: Inhalation; human volunteers: Nasal and pulmonary irritation at concentrations of 100ppm and higher.	

Section XII: Ecological Information		
Eco-toxicity:	**Acute Toxicity to Fish:**	96-h: LC50= 0.09 – 3.51 mg un-ionized NH_3/L
	Chronic Toxicity to Fish:	Various 12 d-5 yrs: NOEC=0.025-1.2 mg un-ionized NH_3/L.
	Acute Toxicity to Aquatic Invertebrates:	(Daphnia magna) 48 h LC50 = 2.94 mg un-ionized NH_3-N/L. ASTM E 129-80A.
	Chronic Toxicity to Aquatic Invertebrates:	(Daphnia magna & others) 21 d-76 weeks: NOEC = 0.163-0.42 mg un-ionized NH_3/L.
	Acute Toxicity to Aquatic Plants:	(Benthic diatoms) Up to 25 days: LOEC = 0.5-1.0 mg N/L (Chlorella vulgaris) 21 days: LOEC = 500 mg N/L. Slightly toxic to aquatic organisms as defined by USEPA.
	Toxicity to Soil Dwelling Organisms:	No data available.
	Toxicity to Terrestrial Plants:	Varies (4 mins -16 hrs): LOEC = 3-250 ppm
	Toxicity to other Non –Mammalian Terrestrial Species:	(G. domestious) 1 hr injections: LD50 = 2.72 mM
Environmental Fate:	**Stability in Water:**	Ke=25.6-47.3 cm/h at 15.2-15.0 OC. Removed from aquatic systems.
	Stability in Soil:	Mean sorption; sand: 19% loam: 28% clay, clay loam, and silt loam: 38%. Monitoring Data: levels of ammonia in urban areas are on average about 20 Φg/m^3. Non-urban sites have average levels of 4-5 Φg/m3. Areas close to point sources (e.g., large animal feedlots or industrial sites) may have local atmospheric concentrations exceeding 200 Φg/m^3**.**
	Mobility in Soil:	No data available.
Degradation Products:	**Biodegradation:**	Inorganic. Undergoes photolytic degradation.
	Photodegradation:	Aerobic. BOD created within days. Rapidly biodegraded. Bioaccumulation: Rapidly assimilated by animals and plants.

Section XIII: Disposal Considerations	
Product Disposal:	Disposal of Anhydrous or Aqueous Ammonia is subject to federal, state and local regulations.
	Receiving waters must not exceed established limitations for ammonia or its salts.
General Comments:	Users of this product should review their operations in terms of applicable federal, state and local laws and regulations.
Waste Treatment Methods:	Sewage disposal recommendations: This material is hazardous to the aquatic environment. Keep out of sewers and waterways. Waste disposal recommendations: Place in an approved container and dispose of contaminated materials at a licensed site. Additional information: Dispose of waste material in accordance with all local, regional, national and international regulations.

Section XIV: Transport Information		
	USDOT	**TDG - Canada**
Proper Shipping Name:	Ammonia, Anhydrous	Ammonia Anhydrous, Liquefied
Hazard Class:	2.2	2.3 (8)
Identification Number:	UN1005	UN1005
Packing Group (Technical Name):	Not Applicable	Not Applicable
Labeling / Placarding:	Non-flammable Gas	Toxic Gas (Corrosive)
Environmental Hazard	Ammonia is listed as an environmentally hazardous substance by the UN Models ADR, RID and as a marine pollutant by the IMDG.	

Special precautions for user:	MARKING: AMMONIA, ANHYDROUS or AMMONIA, ANHYDROUS LIQUEFIED
	If Anhydrous Ammonia has less than 0.2% water by weight, it must be shipped in an NQT Cargo tank. All Anhydrous Ammonia is an Inhalation Hazard.
	USDOT: Inhalation Hazard (contains 0.2% water) – to follow Identification Number. (If metallurgical or refrigeration grade omit "contains .. 0.2 and for truck shipments must show "Not for Q and T Tanks")
	TDG-Canada: Inhalation Hazard (Corrosive gas) If product exceeds the CERCLA Reportable Quantity, the notation "RQ" shall be added before and after before the basic shipping description.

Section XV: Regulatory Information

This safety datasheet complies with the requirements of Regulation (EC) No. 1907/2006. There is currently no data available with regards to Regulatory Information for this product.

Section XVI: Other Information

NFPA Hazard Ratings:	Health: 3 Flammability: 1 Instability: 0	**Hazard Rating:** 0 Insignificant 1 Slight 2 Moderate 3 High 4 Extreme

Full text of H-Statements referred to under sections 2 and 3.

Acute Tox.	Acute toxicity
Aquatic Acute	Acute aquatic toxicity
Aquatic Chronic	Chronic aquatic toxicity
Flam. Gas	Flammable gases
H221	Flammable gas.
H280	Contains gas under pressure; may explode if heated.
H314	Causes severe skin burns and eye damage.
H331	Toxic if inhaled.
H400	Very toxic to aquatic life.
H410	Very toxic to aquatic life with long lasting effects.

Full text of R-phrases referred to under sections 2 and 3

N	Dangerous for the environment
T	Toxic
R10	Flammable.
R23	Toxic by inhalation.
R34	Causes burns.
R50	Very toxic to aquatic organisms.

LOEC	Lowest-observed-effect-concentration.
NOEC	No-observed-effect-concentration.
IMDG	International Maritime Dangerous Goods.