Safety Data Sheet

SECTION 1 – IDENTIFICATION

Name, Address, and Telephone of the Responsible Party

Dyno Nobel Inc.
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Salt Lake City, Utah 84121
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SDS #: 1129
Date: 05/19/2015
Supersedes: 12/20/2012

Product Identifier
Product Form: Mixture
Product Name: Ammonia, Anhydrous

Other Means of Identification
Synonyms: Liquid Ammonia: R-Grade (Refrigeration Grade), Commercial Grade, Agricultural Grade; 82-0-0

Intended Use of the Product
Industrial use

Emergency Telephone Number
FOR 24 HOUR EMERGENCY, CALL CHEMTREC (USA) 800-424-9300
CANUTEC (CANADA) 613-996-6666

SECTION 2 – HAZARD(S) IDENTIFICATION

Classification of the Substance or Mixture
Classification (GHS-US)

Flam. Gas 2	H221
Liquefied gas	H280
Acute Tox. 3 (Inhalation: gas)	H331
Skin Corr. 1B	H314
STOT SE 3	H335

Label Elements
GHS-US Labeling
Hazard Pictograms (GHS-US) :


GHS04 GHS05 GHS06 GHS09

Signal Word (GHS-US) : Danger
Hazard Statements (GHS-US) : H221 - Flammable gas.
H280 - Contains gas under pressure; may explode if heated.
H314 - Causes severe skin burns and eye damage.
H331 - Toxic if inhaled.
H335 - May cause respiratory irritation.
H400 - Very toxic to aquatic life.

Precautionary Statements (GHS-US) : P202 – Do not handle until all safety precautions have been read and understood
P210 - Keep away from heat, sparks, open flames, hot surfaces. No smoking.
P260 - Do not breathe vapors, mist, spray, gas.
P264 - Wash hands, forearms, and other exposed areas thoroughly after handling.
P271 - Use only outdoors or in a well-ventilated area.
P273 - Avoid release to the environment.
P280 - Wear gloves, protective clothing, eye protection, face protection,

respiratory protection.
P301+P330+P331 - IF SWALLOWED: rinse mouth. Do NOT induce vomiting.
P303+P361+P353 – IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower.
P304+P340 - IF INHALED: Remove person to fresh air and keep at rest in a position comfortable for breathing.
P305+P351+P338 - IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P310 - Immediately call a poison center or doctor.
P321 - Specific treatment (see section 4 on this SDS).
P363 - Wash contaminated clothing before reuse.
P377 - Leaking gas fire: Do not extinguish, unless leak can be stopped safely.
P381 - Eliminate all ignition sources if safe to do so.
P403 - Store in a well-ventilated place.
P403+P233 - Store in a well-ventilated place. Keep container tightly closed.
P405 - Store locked up.
P501 - Dispose of contents/container in accordance with local, regional, national, territorial, provincial, and international regulations.

Other Hazards

Hazards Not Otherwise Classified (HNOC): Exposure may aggravate those with pre-existing eye, skin, or respiratory conditions. Flammable vapors can accumulate in head space of closed systems. Do not puncture or incinerate container. This product is extremely corrosive to epidermal and mucosal tissue.

Other Hazards: Not available

SECTION 3 - COMPOSITION/INFORMATION ON INGREDIENTS

Mixture

Name	Product identifier	% (w/w)	Ingredient Classification (GHS-US)
Ammonia	(CAS No) 7664-41-7	99.5	Flam. Gas 2, H221 Liquefied gas, H280 Acute Tox. 3 (Inhalation: gas), H331 Skin Corr. 1B, H314 Eye Dam. 1, H318 STOT SE 3, H335 Aquatic Acute 1, H400

Full text of H-phrases: see section 16

SECTION 4 - FIRST AID MEASURES

Description of First Aid Measures

General: The gas is extremely irritating to mucous membranes and lung tissue. Coughing, chest pain, and difficulty in breathing may result. Prolonged exposure may result in bronchitis, pulmonary edema, and chemical pneumonitis. Breathing high concentrations may result in death.

Inhalation: When symptoms occur: go into open air and ventilate suspected area. IF INHALED: Remove to fresh air and keep at rest in a position comfortable for breathing. Get medical attention immediately.

Skin Contact: If contact with gas is prolonged for more than a few minutes, severe burning pain and corrosive damage will occur. Contact with liquid will cause severe tissue damage. Get medical attention immediately.

Eye Contact: Immediately flush with large amounts of water, including under the eyelids. Seek medical attention immediately.. Speed and thoroughness in rinsing eyes are important to avoid permanent injury.

Ingestion: Do not induce vomiting. Rinse mouth out with water. Drink large amounts of water or milk. Seek medical attention immediately.

Most Important Symptoms and Effects Both Acute and Delayed
General: Remove promptly to fresh air. If breathing has stopped, apply artificial respiration. Apply oxygen as soon as possible. Seek medical attention immediately.
Inhalation: The gas is extremely irritating to mucous membranes and lung tissue. Coughing, chest pain, and difficulty in breathing may result. Prolonged exposure may result in bronchitis, pulmonary edema, and chemical pneumonitis. Breathing high concentrations may result in death.

Indication of Any Immediate Medical Attention and Special Treatment Needed
If exposed or concerned, get medical attention immediately.

SECTION 5 - FIRE-FIGHTING MEASURES

Extinguishing Media
Suitable Extinguishing Media: Use extinguishing media appropriate for surrounding fire. Water fog is preferred.
Unsuitable Extinguishing Media: Do not use a heavy water stream. Use of heavy stream of water may spread fire. Do not use water directly on liquid ammonia. Do not use carbon dioxide, ammonia will react with carbon dioxide to form a dense white cloud.
Special Hazards Arising From the Substance or Mixture
Fire Hazard: Not considered flammable but escaping ammonia gas can burn in the range of 16-25% in air.
Explosion Hazard: May form flammable/explosive vapor-air mixture.
Reactivity: May be corrosive to metals.

Advice for Firefighters
Water fog is best. (Ammonia will react with Carbon Dioxide to form a dense white cloud)
Special Fire Fighting Procedures: Use water spray or fog to keep fire-exposed containers cool. Do not completely extinguish flame unless gas flow is shut off! Ammonia burns to form oxides of nitrogen. Firefighters should wear self-contained breathing apparatus and full protective clothing.
Unusual Fire and Explosion Hazards: Although classified nonflammable, Ammonia does have an explosive range. Ammonia can be a dangerous fire and explosion hazard when mixed with air.

Precautionary Measures Fire: Exercise caution when fighting any chemical fire.
Firefighting Instructions: In case of leaking gas fire, eliminate all ignition sources if safe to do so. Leaking gas fire: Do not extinguish, unless leak can be stopped safely. Use water spray or fog for cooling exposed containers. In case of major fire and large quantities: Evacuate area. Fight fire remotely due to the risk of explosion. Do not allow run-off from firefighting to enter drains or water courses. Do not breathe fumes from fires or vapors from decomposition.
Protection During Firefighting: Do not enter fire area without proper protective equipment, including respiratory protection.
Hazardous Combustion Products: Ammonia and oxides of Nitrogen (Nitrogen Dioxide, Nitric Oxide).

Reference to Other Sections: Refer to section 9 for flammability properties.

SECTION 6 - ACCIDENTAL RELEASE MEASURES

Personal Precautions, Protective Equipment and Emergency Procedures
General Measures: Remove sources of heat or ignition, including internal combustion engines and power tools. Keep people away. Stay upwind and warn people downwind of possible exposure. Wear self-contained breathing apparatus if condition warrants. Provide adequate general and local exhaust ventilation to attain occupational exposure limits, to prevent the formation of explosive atmospheres; and to prevent the formation of an oxygen deficient atmosphere, particularly in a confined space area. Ammonia is severely corrosive to epidermal tissue. Wearing nonporous clothing: pants, sleeves, footwear, and gloves are recommended for protection against skin contact. Ammonia is severely corrosive to mucosal membranes (eyes, nose, throat). Remove contact lenses and wear chemical goggles. A face shield is also advised for additional skin protection where contact with liquid or vapor may occur.

For Non-Emergency Personnel
Protective Equipment: Use appropriate personal protection equipment (PPE).
Emergency Procedures: Evacuate unnecessary personnel.
For Emergency Personnel
Protective Equipment: Equip cleanup crew with proper protection.
Emergency Procedures: Ventilate area. Eliminate ignition sources. Evacuate unnecessary personnel. Stop leak if safe to do so.

Environmental Precautions
Prevent entry to sewers and public waters. Avoid release to the environment.

Methods and Material for Containment and Cleaning Up
For Containment: As an immediate precautionary measure, isolate spill or leak area in all directions. Stop the flow of material, if this is without risk. Use only non-sparking tools. Notify authorities if liquid enters sewers or public waters.
Reference to Other Sections
See heading 8, Exposure Controls and Personal Protection

SECTION 7 - HANDLING AND STORAGE

Precautions for Safe Handling
Additional Hazards When Processed: Handle empty containers with care because residual vapors are flammable. Flammable gas. Do not pressurize, cut, or weld containers. When heated to decomposition, emits toxic fumes. Corrosive vapors are released. Copper, silver, cadmium, zinc, alloys, and other reactive metals must not be used in ammonia systems as they can be rapidly corroded. Use only non-sparking tools. Contact with the liquefied gas may cause frostbite.
Hygiene Measures: Handle in accordance with good industrial hygiene and safety procedures. Wash hands and other exposed areas with mild soap and water before eating, drinking, or smoking and again when leaving work. Do not eat, drink or smoke when using this product. Wash hands and forearms thoroughly after handling. Wash contaminated clothing before reuse.
Conditions for Safe Storage, Including Any Incompatibilities
Technical Measures: Proper grounding procedures to avoid static electricity should be followed. Comply with applicable regulations. Use explosion-proof electrical, ventilating, and lighting equipment. Copper, silver, cadmium, zinc, alloys, and other reactive metals must not be used in ammonia systems as they can be rapidly corroded.
Storage Conditions: Store in a well-ventilated place. Keep container tightly closed. Keep in fireproof place. Store locked up. Keep/Store away from extremely high or low temperatures, direct sunlight, heat, ignition sources, incompatible materials.
Incompatible Materials: Gold, silver, mercury, Oxidizing agents, Halogens, Halogenated compounds, Acids, Copper, Zinc, Copper/Zinc alloys (Brass), Chlorates.
Specific End Use(s)
Industrial use.

SECTION 8 - EXPOSURE CONTROLS/PERSONAL PROTECTION

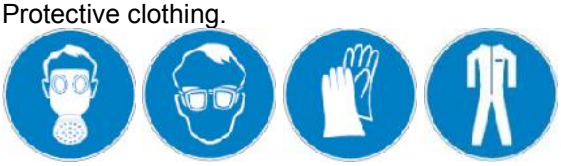
Control Parameters
For substances listed in section 3 that are not listed here, there are no established exposure limits from the manufacturer, supplier, importer, or the appropriate advisory agency including: ACGIH (TLV), NIOSH (REL), or OSHA (PEL).

Ammonia (7664-41-7)		
USA ACGIH	ACGIH TWA (ppm)	25 ppm
USA ACGIH	ACGIH STEL (ppm)	35 ppm
USA OSHA	OSHA PEL (TWA) (mg/m³)	35 mg/m³
USA OSHA	OSHA PEL (TWA) (ppm)	50 ppm
USA NIOSH	NIOSH REL (TWA) (mg/m³)	18 mg/m³
USA NIOSH	NIOSH REL (TWA) (ppm)	25 ppm
USA NIOSH	NIOSH REL (STEL) (mg/m³)	27 mg/m³
USA NIOSH	NIOSH REL (STEL) (ppm)	35 ppm
USA IDLH	US IDLH (ppm)	300 ppm

Exposure Controls

Appropriate Engineering Controls: Gas detectors should be used when flammable gases/vapors may be released. Emergency eye wash fountains and safety showers should be available in the immediate vicinity of any potential exposure. Use explosion-proof equipment. Ensure adequate ventilation, especially in confined areas. Ensure all national/local regulations are observed. Ground/bond container and receiving equipment.

Personal Protective Equipment: Insufficient ventilation: wear respiratory protection. Protective goggles. Gloves. Protective clothing.



Materials for Protective Clothing: Chemically, corrosion, and fire resistant materials and fabrics.

Hand Protection: Wear chemically resistant protective gloves. Insulated gloves.

Eye Protection: Chemical safety goggles and face shield.

Skin and Body Protection: Wear suitable protective clothing.

Respiratory Protection: Use a NIOSH-approved self-contained breathing apparatus whenever exposure may exceed established Occupational Exposure Limits.

Thermal Hazard Protection: Wear suitable protective clothing.

Other Information: When using, do not eat, drink or smoke.

SECTION 9 - PHYSICAL AND CHEMICAL PROPERTIES

Information on Basic Physical and Chemical Properties

Physical State	:	Gas
Appearance	:	Colorless liquefied gas
Odor	:	Pungent and extremely irritating odor.
Odor Threshold	:	Not available
pH	:	Not available
Evaporation Rate	:	Not available
Melting Point	:	Not available
Freezing Point	:	Not available
Boiling Point	:	-33 °C (-27.4 °F)
Flash Point	:	Not available
Auto-ignition Temperature	:	Not available
Decomposition Temperature	:	Not available
Flammability (solid, gas)	:	Not available
Lower Flammable Limit	:	16 %
Upper Flammable Limit	:	25 %
Vapor Pressure	:	124 psia @ 20°C (68°F)
Relative Vapor Density at 20 °C	:	0.6 (air = 1)
Relative Density	:	Not available
Specific Gravity	:	0.62 g/cm³ (5.15 lb/gal)
Solubility	:	Water: 51 g/100ml @ 20°C (68°F)
Partition Coefficient: N-Octanol/Water	:	Not available
Viscosity	:	Not available
Explosion Data – Sensitivity to Mechanical Impact	:	Not expected to present an explosion hazard due to mechanical impact.
Explosion Data – Sensitivity to Static Discharge	:	Not expected to present an explosion hazard due to static discharge.

SECTION 10 - STABILITY AND REACTIVITY

Reactivity: May be corrosive to metals.
Chemical Stability: Stable under normal conditions.
Possibility of Hazardous Reactions: Hazardous polymerization will not occur.
Conditions to Avoid: Avoid exposing containers to heat or flame. Keep separated from incompatible materials.
Incompatible Materials: Gold, silver, mercury, Oxidizing agents, Halogens, Halogenated compounds, Acids, Copper, Zinc, Copper/Zinc alloys (Brass), Chlorates.
Hazardous Decomposition Products: Ammonia and oxides of Nitrogen (Nitrogen Dioxide, Nitric Oxide).

SECTION 11 - TOXICOLOGICAL INFORMATION

Information on Toxicological Effects - Product
Acute Toxicity: Inhalation:gas: Toxic if inhaled.
LD50 and LC50 Data:

Ammonia, Anhydrous	
ATE US (gases)	2,010.05 ppmV/4h

Skin Corrosion/Irritation: Causes severe skin burns and eye damage.
Serious Eye Damage/Irritation: Causes serious eye damage.
Respiratory or Skin Sensitization: Not classified
Germ Cell Mutagenicity: Not classified
Teratogenicity: Not classified
Carcinogenicity: Not classified
Specific Target Organ Toxicity (Repeated Exposure): Not classified
Reproductive Toxicity: Not classified
Specific Target Organ Toxicity (Single Exposure): May cause respiratory irritation.
Aspiration Hazard: Not classified
Potential Adverse Human Health Effects and Symptoms: Toxic if inhaled.
Symptoms/Injuries After Inhalation: Toxic if inhaled. May cause respiratory irritation. Inhalation may cause immediate severe irritation progressing quickly to chemical burns. Coughing, chest pain, and difficulty in breathing may result. Prolonged exposure may result in bronchitis, pulmonary edema, and chemical pneumonitis. Breathing high concentrations may result in death.
Symptoms/Injuries After Skin Contact: Corrosive. Causes burns. Contact with the liquid may cause cold burns/frostbite.
Symptoms/Injuries After Eye Contact: Causes serious eye damage. Contact with the liquefied gas causes frostbite. Can cause blindness.
Symptoms/Injuries After Ingestion: Contact may cause immediate severe irritation progressing quickly to chemical burns. Ingestion is likely to be harmful or have adverse effects.
Chronic Symptoms: None known.
Information on Toxicological Effects - Ingredient(s)
LD50 and LC50 Data:

Ammonia (7664-41-7)	
LC50 Inhalation Rat	5.1 mg/l (Exposure time: 1 h)
LC50 Inhalation Rat	2000 ppm/4h (Exposure time: 4 h)

SECTION 12: ECOLOGICAL INFORMATION

Toxicity
Ecology - General: Very toxic to aquatic life. Toxic to aquatic life with long lasting effects.

Ammonia (7664-41-7)	
LC50 Fish 1	0.44 mg/l (Exposure time: 96 h - Species: Cyprinus carpio)
EC50 Daphnia 1	25.4 mg/l (Exposure time: 48 h - Species: Daphnia magna)

LC 50 Fish 2	0.26 - 4.6 mg/l (Exposure time: 96 h - Species: Lepomis macrochirus)
Persistence and Degradability	
Ammonia, Anhydrous	
Persistence and Degradability	May cause long-term adverse effects in the environment.
Bioaccumulative Potential	
Ammonia, Anhydrous	
Bioaccumulative Potential	Not established.
Ammonia (7664-41-7)	
Log Pow	-1.14 (at 25 °C)

Mobility in Soil Not available

Other Adverse Effects

Other Information: Avoid release to the environment.

SECTION 13 - DISPOSAL CONSIDERATIONS

Waste Disposal Recommendations: Dispose of waste material in accordance with all local, regional, national, provincial, territorial and international regulations.

Additional Information: Handle empty containers with care because residual vapors are flammable.

SECTION 14 - TRANSPORT INFORMATION

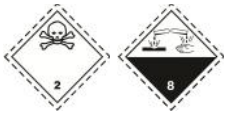
In Accordance with DOT

Proper Shipping Name : AMMONIA, ANHYDROUS
Hazard Class : 2.2
Identification Number : UN1005
Label Codes : 2.2

Marine Pollutant : Marine pollutant
ERG Number : 125

In Accordance with IMDG

Proper Shipping Name : AMMONIA, ANHYDROUS
Hazard Class : 2
Identification Number : UN1005
Label Codes : 2.3,8
EmS-No. (Fire) : F-C
EmS-No. (Spillage) : S-U

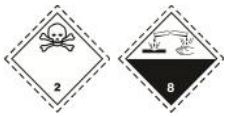


Marine pollutant : Marine pollutant

In Accordance with IATA

Proper Shipping Name : AMMONIA, ANHYDROUS
Identification Number : UN1005
Hazard Class : 2
Label Codes : 2.3,8

: 2CP



ERG Code (IATA)

In Accordance with TDG

Proper Shipping Name : ANHYDROUS AMMONIA
Hazard Class : 2.3
Identification Number : UN1005
Label Codes : 2.3,8

Marine Pollutant (TDG) : Marine pollutant

SECTION 15 - REGULATORY INFORMATION

US Federal Regulations

Ammonia, Anhydrous	
SARA Section 311/312 Hazard Classes	Fire hazard Immediate (acute) health hazard Sudden release of pressure hazard

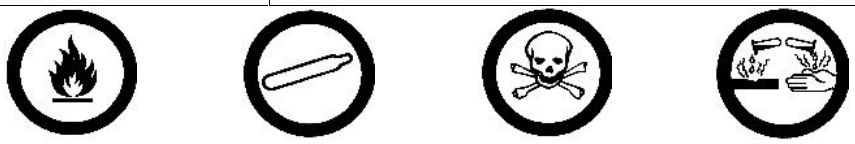
Ammonia (7664-41-7)	
Listed on the United States TSCA (Toxic Substances Control Act) inventory Listed on the United States SARA Section 302 Listed on United States SARA Section 313	
SARA Section 302 Threshold Planning Quantity (TPQ)	500
SARA Section 311/312 Hazard Classes	Fire hazard Immediate (acute) health hazard Sudden release of pressure hazard
SARA Section 313 - Emission Reporting	1.0 % (includes anhydrous Ammonia and aqueous Ammonia from water dissociable Ammonium salts and other sources, 10% of total aqueous Ammonia is reportable under this listing)

US State Regulations

Ammonia (7664-41-7)
U.S. - Massachusetts - Right To Know List U.S. - New Jersey - Right to Know Hazardous Substance List U.S. - Pennsylvania - RTK (Right to Know) - Environmental Hazard List U.S. - Pennsylvania - RTK (Right to Know) List

Canadian Regulations

Ammonia, Anhydrous	
WHMIS Classification	Class B Division 1 - Flammable Gas Class A - Compressed Gas Class D Division 1 Subdivision A - Very toxic material causing immediate and serious toxic effects Class E - Corrosive Material



Ammonia (7664-41-7)	
Listed on the Canadian DSL (Domestic Substances List) Listed on the Canadian IDL (Ingredient Disclosure List)	
IDL Concentration 1 %	
WHMIS Classification	Class A - Compressed Gas Class B Division 1 - Flammable Gas Class D Division 1 Subdivision A - Very toxic material causing immediate and serious toxic effects Class E - Corrosive Material

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and the SDS contains all of the information required by CPR.

SECTION 16: OTHER INFORMATION, INCLUDING DATE OF PREPARATION OR LAST REVISION

Revision Date : 05/19/2015

Other Information : This document has been prepared in accordance with the SDS requirements of the OSHA Hazard Communication Standard 29 CFR 1910.1200.

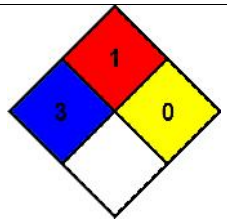
GHS Full Text Phrases:

Acute Tox. 3 (Inhalation:gas)	Acute toxicity (inhalation:gas) Category 3
Aquatic Acute 1	Hazardous to the aquatic environment - Acute Hazard Category 1
Aquatic Chronic 2	Hazardous to the aquatic environment - Chronic Hazard Category 2
Eye Dam. 1	Serious eye damage/eye irritation Category 1
Flam. Gas 2	Flammable gases Category 2
Liquefied gas	Gases under pressure Liquefied gas
Skin Corr. 1B	Skin corrosion/irritation Category 1B
STOT SE 3	Specific target organ toxicity (single exposure) Category 3
H221	Flammable gas
H280	Contains gas under pressure; may explode if heated
H314	Causes severe skin burns and eye damage
H318	Causes serious eye damage
H331	Toxic if inhaled
H335	May cause respiratory irritation
H400	Very toxic to aquatic life

NFPA Health Hazard : 3 - Short exposure could cause serious temporary or residual injury even though prompt medical attention was given.

NFPA Fire Hazard : 1 - Must be preheated before ignition can occur.

NFPA Reactivity : 0 - Normally stable, even under fire exposure conditions, and are not reactive with water.



Party Responsible for the Preparation of This Document

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Dyno Nobel SDS