



**AIR LIQUIDE**

# MATERIAL SAFETY DATA SHEET

Prepared to U.S. OSHA, CMA, ANSI and Canadian WHMIS Standards

## 1. PRODUCT IDENTIFICATION

**CHEMICAL NAME; CLASS:** **LIQUID NITROGEN**

**SYNONYMS:** Nitrogen NF; LIN; Cryogenic Liquid Nitrogen; Nitrogen, Refrigerated Liquid

**CHEMICAL FAMILY NAME:** Inert Gas

**FORMULA:** N<sub>2</sub>

<b>PRODUCT USE:</b>	Document Number: 13002 Medical, food freezing, inerting and for general analytical/synthetic chemical uses.
<b>SUPPLIER/MANUFACTURER'S NAME:</b>	AIR LIQUIDE INDUSTRIAL U.S.
<b>ADDRESS:</b>	2700 Post Oak Drive Houston, TX 77056-8229
<b>EMERGENCY PHONE:</b>	CHEMTREC: 1-800-424-9300
<b>BUSINESS PHONE:</b>	
	General MSDS Information 1-713/896-2896 Fax on Demand: 1-800/231-1366

## 2. COMPOSITION and INFORMATION ON INGREDIENTS

CHEMICAL NAME	CAS #	mole %	EXPOSURE LIMITS IN AIR					
			ACGIH-TLV		OSHA-PEL		NIOSH IDLH ppm	OTHER ppm
			TWA ppm	STEL ppm	TWA ppm	STEL ppm		
Nitrogen	7727-37-9	99.99 %	There are no specific exposure limits for Nitrogen. Nitrogen is a simple asphyxiant (SA). Oxygen levels should be maintained above 19.5%.					
Maximum Impurities		<0.01%	None of the trace impurities in Liquid Nitrogen contribute significantly to the hazards associated with the product. All hazard information pertinent to Liquid Nitrogen has been provided in this Material Safety Data Sheet, per the requirements of the OSHA Hazard Communication Standard (29 CFR 1910.1200) and State equivalents standards.					

NE = Not Established.

See Section 16 for Definitions of Terms Used.

NOTE: ALL WHMIS required information is included in appropriate sections based on the ANSI Z400.1-1998 format. This product has been classified in accordance with the hazard criteria of the CPR and the MSDS contains all the information required by the CPR.

### 3. HAZARD IDENTIFICATION

**EMERGENCY OVERVIEW:** Liquid Nitrogen is a colorless, odorless, cryogenic liquid. The main health hazard associated with releases of this gas is asphyxiation, by displacement of oxygen. The cryogenic liquid will rapidly boil to the gas at standard temperatures and pressures. The liquefied gas can cause freezing of tissue, or cryogenic burns, similar to frostbite to eyes or skin upon contact.

**SYMPTOMS OF OVER-EXPOSURE BY ROUTE OF EXPOSURE:** The most significant routes of over-exposure for this gas are by inhalation, and contact with the cryogenic liquid.

**INHALATION:** High concentrations of this gas can cause an oxygen-deficient environment. Individuals breathing such an atmosphere may experience symptoms which include headaches, ringing in ears, dizziness, drowsiness, unconsciousness, nausea, vomiting, and depression of all the senses. Under some circumstances of over-exposure, death may occur. The following effects associated with various levels of oxygen are as follows:

<u>CONCENTRATION</u>	<u>SYMPTOM OF EXPOSURE</u>
12-16% Oxygen:	Breathing and pulse rate increased, muscular coordination slightly disturbed.
10-14% Oxygen:	Emotional upset, abnormal fatigue, disturbed respiration.
6-10% Oxygen:	Nausea and vomiting, collapse or loss of consciousness.
Below 6%:	Convulsive movements, possible respiratory collapse, and death.

**CONTACT WITH SKIN or EYES:** Contact of the liquid with the skin can lead to severe cryogenic burns or dermatitis (red, cracked, irritated skin), depending upon concentration and duration of exposure. Contact of the liquid with the eyes can cause pain, redness, severe cryogenic burns, and prolonged exposure could cause blindness. Contact with the undiluted liquid will cause frostbite, ulceration of the skin (which may be delayed in appearance for several hours), blistering, and pain. Contact with rapidly expanding gas poses a frostbite hazard.

**OTHER POTENTIAL HEALTH EFFECTS:** Contact with cryogenic liquid or rapidly expanding gases (which are released under high pressure) may cause frostbite. Symptoms of frostbite include change in skin color to white or grayish-yellow. The pain after contact with liquid can quickly subside.

**HEALTH EFFECTS OR RISKS FROM EXPOSURE: An Explanation in Lay Terms.** Over-exposure to Nitrogen may cause the following health effects:

**ACUTE:** The most significant hazard associated with this gas is inhalation of oxygen-deficient atmospheres. Symptoms of oxygen deficiency include respiratory difficulty, ringing in ears, headaches, shortness of breath, wheezing, headache, dizziness, indigestion, nausea, and, at high concentrations, unconsciousness or death may occur. The skin of a victim of over-exposure may have a blue color. Contact with cryogenic liquid or rapidly expanding gases (which are released under high pressure) may cause frostbite. Symptoms of frostbite include change in skin color to white or grayish-yellow. The pain after contact with liquid can quickly subside.

**CHRONIC:** There are currently no known adverse health effects associated with chronic exposure to this gas.

**TARGET ORGANS:** ACUTE: Respiratory system. CHRONIC: None known.



#### HAZARDOUS MATERIAL IDENTIFICATION SYSTEM

<b>HEALTH HAZARD</b>	<b>(BLUE)</b>	<b>3</b>
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<b>FLAMMABILITY HAZARD</b>	<b>(RED)</b>	<b>0</b>
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<b>PHYSICAL HAZARD</b>	<b>(YELLOW)</b>	<b>0</b>
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#### PROTECTIVE EQUIPMENT

EYES	RESPIRATORY	HANDS	BODY
	SEE SECTION 8		SEE SECTION 8

For Routine Industrial Use and Handling Applications

### 4. FIRST-AID MEASURES

**RESCUERS SHOULD NOT ATTEMPT TO RETRIEVE VICTIMS OF EXPOSURE TO LIQUID NITROGEN WITHOUT ADEQUATE PERSONAL PROTECTIVE EQUIPMENT. At a minimum, Self-Contained Breathing Apparatus should be worn.**

Remove victim(s) to fresh air, as quickly as possible. Trained personnel should administer supplemental oxygen and/or cardio-pulmonary resuscitation, if necessary. Only trained personnel should administer supplemental oxygen. Victim(s) must be taken for medical attention. Rescuers should be taken for medical attention, if necessary. Take copy of label and MSDS to physician or other health professional with victim(s).

## 4. FIRST-AID MEASURES (Continued)

**EYE EXPOSURE:** If liquid is splashed into eyes, or if irritation of the eye develops after exposure to liquid or gas, open victim's eyes while under gentle running water. Use sufficient force to open eyelids. Have victim "roll" eyes. **Minimum** flushing is for 15 minutes. Seek medical assistance immediately, preferably an ophthalmologist.

**SKIN EXPOSURE:** In case of frostbite remove any clothing that may restrict circulation to any frozen area. Do not rub frozen parts as tissue damage may occur. As soon as practicable, place any affected area in warm water bath which has a temperature that does not exceed 105°F (40°C). **NEVER USE HOT WATER. NEVER USE DRY HEAT.** If area of frostbite is extensive, and if possible, remove clothing while showering with warm water. If warm water is not available, or is impractical to use, wrap the affected parts gently in blankets. Alternatively, if the fingers or hands are frostbitten, place the affected area of the body in the armpit. Encourage victim to gently exercise the affected part while being warmed. Seek immediate medical attention.

Frozen tissue is painless and appears waxy, with a possible yellow color. Frozen tissue will become swollen, painful and prone to infection when thawed. If the frozen part of the body has been thawed by the time medical attention has been obtained, cover the area with a dry sterile dressing and a large bulky protective covering.

**MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE:** Pre-existing respiratory conditions may be aggravated by over-exposure to Liquid Nitrogen.

**RECOMMENDATIONS TO PHYSICIANS:** Treat symptoms and reduce over-exposure.

## 5. FIRE-FIGHTING MEASURES

**FLASH POINT:** Not applicable.

**AUTOIGNITION TEMPERATURE:** Not applicable.

**FLAMMABLE LIMITS (in air by volume, %):**

Lower (LEL): Not applicable.

Upper (UEL): Not applicable.

**FIRE EXTINGUISHING MATERIALS:** Non-flammable, inert cryogenic liquid. Use extinguishing media appropriate for surrounding fire.

**RESPONSE TO FIRE INVOLVING CRYOGEN:** Cryogenic liquids can be particularly dangerous during fires because of their potential to rapidly freeze water. Careless use of water may cause heavy icing. Furthermore, the relatively warm water greatly increases the evaporation rate of Nitrogen. If large concentrations of Nitrogen gas are present, the water vapor in the surrounding air will condense, creating a dense fog that may make it difficult to find fire exits or equipment. Liquid Nitrogen, when exposed to the atmosphere, will produce a cloud of ice/fog in the air upon its release.

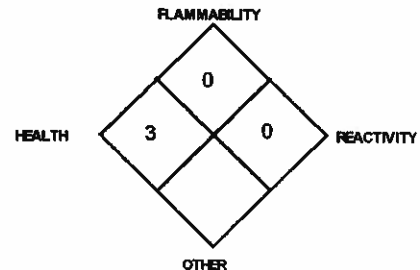
**UNUSUAL FIRE AND EXPLOSION HAZARDS:** Nitrogen does not burn; however, containers, when involved in fire, may rupture or burst in the heat of the fire. Liquid Nitrogen when accidentally released will vaporize rapidly, forming an oxygen deficient vapor cloud. Evacuate this vapor cloud area. Visibility may be obscured in its vapor cloud. Pressure in a container can build-up due to heat and it may rupture if pressure relief devices should fail to function. Contact with cold liquid or gaseous Nitrogen may cause frostbite.

Explosion Sensitivity to Mechanical Impact: Not Sensitive.

Explosion Sensitivity to Static Discharge: Not Sensitive.

**SPECIAL FIRE-FIGHTING PROCEDURES:** Structural fire-fighters must wear Self-Contained Breathing Apparatus and full protective equipment. If possible, remove Nitrogen cryogenic containers from fire area or cool with water. Do not direct water spray at the container vent. Evacuate area. Other information for pre-planning can be found in the North American Emergency Response Guidebook.

### NFPA RATING



## 6. ACCIDENTAL RELEASE MEASURES

**RESPONSE TO CRYOGENIC RELEASE:** Clear the affected area and allow the liquid to evaporate and the gas to dissipate. After the gas is formed, follow the instructions provided below. Alternatively, to increase the rate of vaporization, spray large amounts of water on to the leak from an upwind position. If the area must be entered by emergency personnel, SCBA, leather or insulated gloves, and safety shoes must be worn. Personnel responding to a release must avoid all contact with the liquid.

Minimum Personal Protective Equipment should be **Level B: leather or thermally insulated gloves and Self-Contained Breathing Apparatus.** Locate and seal the source of the leaking gas. Allow the gas, which is lighter than air to dissipate. Monitor the surrounding area for oxygen level. The atmosphere must have at least 19.5 percent oxygen before personnel can be allowed in the area without Self-Contained Breathing Apparatus.

If leaking incidentally from the container or valve, contact your supplier.

## 7. HANDLING and USE

**WORK PRACTICES AND HYGIENE PRACTICES:** Be aware of any signs of dizziness or fatigue; exposures to fatal concentrations of Liquid Nitrogen could occur without any significant warning symptoms, due to oxygen deficiency.

**STORAGE AND HANDLING PRACTICES:** Cryogenic containers should be stored in dry, well-ventilated areas away from sources of heat, ignition and direct sunlight. Store containers away from heavily trafficked areas and emergency exits. Store away from process and production areas, away from elevators, building and room exits or main aisles leading to exits. Protect containers against physical damage.

Containers should be stored upright and be firmly secured to prevent falling or being knocked-over. Containers can be stored in the open, but in such cases, should be protected against extremes of weather and from the dampness of the ground to prevent rusting. Cryogenic containers are equipped with pressure relief devices to control internal pressure. Under normal conditions, these containers will periodically vent small amounts of product. Some metals such as carbon steel may become brittle at low temperatures and will easily fracture. Prevent entrapment of liquid in closed systems or piping without pressure relief devices. Use a check valve or other protective device in the discharge line to prevent hazardous backflow. Never tamper with pressure relief valves and containers.

Keep the smallest amount on-site as necessary. Full and empty containers should be segregated. Use a first-in, first-out inventory system to prevent full containers from being stored for long periods of time.

**SPECIAL PRECAUTIONS FOR HANDLING CRYOGENIC CONTAINERS:** Cryogenic liquids can present significant safety hazards. Never allow any unprotected part of the body to touch uninsulated pipes or vessels which contain cryogenic fluids. The extremely cold metal of the container will cause the flesh to stick fast and tear when one attempts to withdraw from it. The following rules are applicable to work situations in which cryogenic containers are being used.

**Before Use:** Move containers a suitable hand-truck. Do not drag, slide or roll containers. Do not drop containers or permit them to strike each other. Secure containers firmly.

**During Use:** Use designated CGA fittings and other support equipment. Do not use adapters. Do not use oils or grease on valve fittings or equipment. Leak-check system with leak detection solution. Immediately contact the supplier if there are any difficulties associated with operating container valve.

**After Use:** Close main container valve. Mark empty container "EMPTY".

**NOTE:** Use only DOT or ASME code containers designed for cryogenic gas storage. Close valve after each use and when empty. Containers must not be recharged except by or with the consent of owner. For additional information, refer to Section 16, Other Information, for additional available literature.

**OTHER SPECIAL PRECAUTIONS:** Use piping and equipment adequately designed to withstand pressures and temperatures to be encountered. Use a check valve or other protective apparatus in any line or piping from the container to prevent reverse flow. To prevent cryogenic liquids or cold gas from being trapped in piping between valves, the piping shall be equipped with pressure relief devices. Only transfer lines designed for cryogenic liquids shall be used. It is recommended that all vents be piped to the exterior of the building.

**STANDARD VALVE CONNECTIONS FOR U.S. AND CANADA:** Use the proper CGA connections, DO NOT USE ADAPTERS:

<u>THREADED:</u>	CGA 295
<u>PIN-INDEXED YOKE:</u>	Not applicable.
<u>ULTRA HIGH INTEGRITY:</u>	Not applicable.

**PROTECTIVE PRACTICES DURING MAINTENANCE OF CONTAMINATED EQUIPMENT:** Follow practices indicated in Section 6 (Accidental Release Measures). Make certain application equipment is locked and tagged-out safely. Always use product in areas where adequate ventilation is provided.

## 8. EXPOSURE CONTROLS - PERSONAL PROTECTION

**VENTILATION AND ENGINEERING CONTROLS:** Use with adequate ventilation. Local exhaust ventilation is preferred, because it prevents gas dispersion into the work place by eliminating it at its source. If appropriate, install automatic monitoring equipment to detect the level of oxygen.

**RESPIRATORY PROTECTION:** Maintain oxygen levels above 19.5% in the workplace. Use supplied air respiratory protection if oxygen levels are below 19.5% or during emergency response to a release of Liquid Nitrogen. If respiratory protection is required, follow the requirements of the Federal OSHA Respiratory Protection Standard (29 CFR 1910.134), or equivalent State standards.

**HAND PROTECTION:** Wear loose-fitting, thermally insulated or leather gloves. Otherwise, wear glove protection appropriate to the specific operation for which Liquid Nitrogen is used. If necessary, refer to U.S. OSHA 29 CFR 1910.138 and appropriate Standards of Canada.

## 8. EXPOSURE CONTROLS - PERSONAL PROTECTION (Continued)

**BODY PROTECTION:** Use body protection appropriate for task. Safety shoes are recommended when handling containers, as well as long sleeve shirts and trousers. Safety shoes are recommended when handling cylinders. If a hazard of injury to the feet exists due to falling objects, rolling objects, where objects may pierce the soles of the feet or where employee's feet may be exposed to electrical hazards, use foot protection, as described in U.S. OSHA 29 CFR 1910.136.

## 9. PHYSICAL and CHEMICAL PROPERTIES

**GAS DENSITY @ 0°C (32°F) and 1 atm:** .072 lbs/cu ft (1.153 kg/m<sup>3</sup>)

**BOILING POINT:** -195.8°C (-320.4°F)

**FREEZING/MELTING POINT @ 10 psig:** -210°C (-345.8°F)

**SPECIFIC GRAVITY (air = 1) @ 21.1°C (70°F):** 0.906

**SOLUBILITY IN WATER vol/vol @ 0°C (32°F) and 1 atm:** 0.023

**EVAPORATION RATE (nBuAc = 1):** Not applicable.

**ODOR THRESHOLD:** Not applicable. Odorless.

**VAPOR PRESSURE @ (21.1°C) 70°F psig:** Not applicable.

**COEFFICIENT WATER/OIL DISTRIBUTION:** Not applicable.

**APPEARANCE, ODOR AND COLOR:** Liquid Nitrogen is a colorless, odorless cryogenic liquid.

**HOW TO DETECT THIS SUBSTANCE (warning properties):** There are no unusual warning properties associated with a release of Liquid Nitrogen, except the extreme cold, which may form a vapor cloud.

**pH:** Not applicable.

**MOLECULAR WEIGHT:** 28.01

**EXPANSION RATIO:** Not applicable.

**SPECIFIC VOLUME (ft<sup>3</sup>/lb):** 13.8

## 10. STABILITY and REACTIVITY

**STABILITY:** Normally stable in gaseous state. With cryogenic liquid, when exposed to air, oxygen in the air may condense into the Liquid Nitrogen. Liquid Nitrogen contaminated with oxygen may present the same hazards as Liquid Oxygen and could react violently with organic materials, such as oil and grease.

**DECOMPOSITION PRODUCTS:** None.

**MATERIALS WITH WHICH SUBSTANCE IS INCOMPATIBLE:** Titanium is the only element that will burn in Nitrogen. Lithium reacts slowly with Nitrogen at ambient temperatures. Also, use of Liquid Nitrogen in cryogenic grinding of fatty materials can lead to an explosion. A mixture of magnesium powder and Liquid Nitrogen reacts very violently when lit with a fuse, forming magnesium nitride. Liquid Nitrogen is not corrosive to metals, but the extreme cold can make some metals brittle.

**HAZARDOUS POLYMERIZATION:** Will not occur.

**CONDITIONS TO AVOID:** Contact with incompatible materials. Cryogenic containers exposed to high temperatures or direct flame can rupture or burst.

## 11. TOXICOLOGICAL INFORMATION

**TOXICITY DATA:** The following toxicology data for pure Nitrogen are listed below.

**Eye Irritation (rabbit):** Liquid Nitrogen poured into the eye for one or two seconds with the lids held apart, produced no discernible injury. When the exposure was extended to five seconds, slight lesions of the cornea were observed. By the next day, all eyes were entirely normal.

**SUSPECTED CANCER AGENT:** Nitrogen is not found on the following lists: FEDERAL OSHA Z LIST, NTP, CAL/OSHA, IARC; therefore it is not considered to be, nor suspected to be a cancer-causing agent by these agencies.

**IRRITANCY OF PRODUCT:** Contact with the cryogenic liquid or rapidly expanding gases can cause frostbite and damage to exposed skin and eyes.

**SENSITIZATION OF PRODUCT:** Nitrogen is not a sensitizer.

Listed below is information concerning the effects of Liquid Nitrogen on the human reproductive system.

**Mutagenicity:** Nitrogen is not reported to cause mutagenic effects in humans.

**Embryotoxicity:** Nitrogen is not reported to cause embryotoxic effects in humans.

**Teratogenicity:** Nitrogen is not reported to cause teratogenic effects in humans.

**Reproductive Toxicity:** Nitrogen is not reported to cause adverse reproductive effects in humans.

A *mutagen* is a chemical which causes permanent changes to genetic material (DNA) such that the changes will propagate through generation lines. An *embryotoxin* is a chemical which causes damage to a developing embryo (i.e. within the first eight weeks of pregnancy in humans), but the damage does not propagate across generational lines. A *teratogen* is a chemical which causes damage to a developing fetus, but the damage does not propagate across generational lines. A *reproductive toxin* is any substance which interferes in any way with the reproductive process.

**BIOLOGICAL EXPOSURE INDICES (BEIs):** Currently, Biological Exposure Indices (BEIs) have not been determined for Nitrogen.

## 12. ECOLOGICAL INFORMATION

**ENVIRONMENTAL STABILITY:** Nitrogen occurs naturally in the atmosphere. The gas will be dissipated rapidly in well-ventilated areas.

**EFFECT OF MATERIAL ON PLANTS or ANIMALS:** Any adverse effect on animals would be related to oxygen deficient environments, or the extreme cold of the cryogenic gas. No adverse effect is anticipated to occur to plant-life, except for frost produced in the presence of rapidly expanding gases, or freezing from direct exposure to the cryogenic liquid.

**EFFECT OF CHEMICAL ON AQUATIC LIFE:** As an inert gas, this product would have no effect on aquatic life.

## 13. DISPOSAL CONSIDERATIONS

**PREPARING WASTES FOR DISPOSAL:** Waste disposal must be in accordance with appropriate Federal, State, and local regulations. Return cryogenic containers with any residual product to Air Liquide. Do not dispose of locally.

For emergency disposal, discharge slowly to the atmosphere in a well-ventilated area or outdoors.

## 14. TRANSPORTATION INFORMATION

**THIS GAS IS HAZARDOUS AS DEFINED BY 49 CFR 172.101 BY THE U.S. DEPARTMENT OF TRANSPORTATION.**

**PROPER SHIPPING NAME:** Nitrogen, refrigerated liquid

**HAZARD CLASS NUMBER and DESCRIPTION:** 2.2 (Non-Flammable Gas)

**UN IDENTIFICATION NUMBER:** UN 1977

**PACKING GROUP:** Not Applicable

**DOT LABEL(S) REQUIRED:** 2.2 (Non-Flammable Gas)

**NORTH AMERICAN EMERGENCY RESPONSE GUIDEBOOK NUMBER (2000):** 120

**MARINE POLLUTANT:** Nitrogen is not classified by the DOT as a Marine Pollutant (as defined by 49 CFR 172.101, Appendix B).

**SPECIAL SHIPPING INFORMATION:** Cryogenic containers should be transported in a secure position, in a well-ventilated vehicle. The transportation of compressed gas cryogenic containers in automobiles or in closed-body vehicles present serious safety hazards and should be discouraged.

**NOTE:** Shipment of compressed gas cryogenic containers which have not been filled with the owners consent is a violation of Federal law (49 CFR, Part 173.301 (b)).

**TRANSPORT CANADA TRANSPORTATION OF DANGEROUS GOODS REGULATIONS:** This gas is considered as Dangerous Goods, per regulations of Transport Canada. The use of the above U.S. DOT information from the U.S. 49 CFR regulations is allowed for shipments that originate in the U.S. For shipments via ground vehicle or rail that originate in Canada, the following information is applicable.

**PROPER SHIPPING NAME:** Nitrogen, refrigerated liquid

**HAZARD CLASS NUMBER and DESCRIPTION:** 2.2 (Non-Flammable Gas)

**UN IDENTIFICATION NUMBER:** UN 1977

**PACKING GROUP:** Not Applicable

**HAZARD LABEL(S) REQUIRED:** 2.2 (Non-Flammable Gas)

**SPECIAL PROVISIONS:** None

**EXPLOSIVE LIMIT & LIMITED QUANTITY INDEX:** 0.12

**ERAP INDEX:** None

**PASSENGER CARRYING SHIP INDEX:** None

**PASSENGER CARRYING ROAD OR RAIL VEHICLE INDEX:** 75

**MARINE POLLUTANT:** Nitrogen is not a Marine Pollutant.

## 15. REGULATORY INFORMATION

### **ADDITIONAL U.S. REGULATIONS:**

**U.S. SARA REPORTING REQUIREMENTS:** Liquid Nitrogen is not subject to the reporting requirements of Sections 302, 304 and 313 of Title III of the Superfund Amendments and Reauthorization Act.

**U.S. SARA THRESHOLD PLANNING QUANTITY:** There are no specific Threshold Planning Quantities for this gas. The default Federal MSDS submission and inventory requirement filing threshold of 10,000 lb (4,540 kg) may apply, per 40 CFR 370.20.

**U.S. TSCA INVENTORY STATUS:** Nitrogen is listed on the TSCA Inventory.

**U.S. CERCLA REPORTABLE QUANTITIES (RQ):** Not applicable.

## 15. REGULATORY INFORMATION (Continued)

### ADDITIONAL U.S. REGULATIONS (continued):

#### OTHER U.S. FEDERAL REGULATIONS:

- Generally recognized as safe (GRAS), as a direct human food ingredient when used as a propellant, aerating agent and gas, per 21, CFR, 184.1540. Nitrogen NF is regulated by the FDA as a prescription drug.
- Nitrogen does not contain any Class I or Class II ozone depleting chemicals (40 CFR part 82).
- Depending on specific operations involving the use of Liquid Nitrogen, the regulations of the Process Safety Management of Highly Hazardous Chemicals may be applicable (29 CFR 1910.119). Under this regulation Nitrogen is not listed in Appendix A.
- Nitrogen is not listed as a Regulated Substance, per 40 CFR, Part 68, of the Risk Management for Chemical Releases.

**U.S. STATE REGULATORY INFORMATION:** Nitrogen is covered under the following specific State regulations:

Alaska - Designated Toxic and Hazardous Substances: No.

California - Permissible Exposure Limits for Chemical Contaminants: Nitrogen.

Florida - Substance List: No.

Illinois - Toxic Substance List: No.

Kansas - Section 302/313 List: No.

Massachusetts - Substance List: No.

Minnesota - List of Hazardous Substances: No.

Missouri - Employer Information/Toxic Substance List: No.

New Jersey - Right to Know Hazardous Substance List: Nitrogen.

North Dakota - List of Hazardous Chemicals, Reportable Quantities: No.

Pennsylvania - Hazardous Substance List: Nitrogen.

Rhode Island - Hazardous Substance List: Nitrogen.

Texas - Hazardous Substance List: No.

West Virginia - Hazardous Substance List: No.

Wisconsin - Toxic and Hazardous Substances: No.

**CALIFORNIA SAFE DRINKING WATER AND TOXIC ENFORCEMENT ACT (PROPOSITION 65:** Liquid Nitrogen is not on the California Proposition 65 lists.

### ADDITIONAL CANADIAN REGULATIONS:

**CANADIAN DSL/NDL INVENTORY STATUS:** Liquid Nitrogen is included in the DSL Inventory.

**CANADIAN ENVIRONMENTAL PROTECTION ACT (CEPA) PRIORITY SUBSTANCES LISTS:** Liquid Nitrogen is not on the CEPA Priorities Substances Lists.

**WHMIS CLASSIFICATION:** Liquid Nitrogen is categorized as a Controlled Product, Hazard Class A, as per the Controlled Product Regulations.

**OTHER CANADIAN REGULATIONS:** Not applicable.

## 16. OTHER INFORMATION

**MIXTURES:** When two or more gases or liquefied gases are mixed, their hazardous properties may combine to create additional, unexpected hazards. Obtain and evaluate the safety information for each component before you produce the mixture. Consult an Industrial Hygienist or other trained person when you make your safety evaluation of the end product. Remember, gases and liquids have properties which can cause serious injury or death.

Further information about Nitrogen can be found in the following pamphlets published by: Compressed Gas Association Inc. (CGA), 4221 Walney Road 5<sup>th</sup> floor, Chantilly, VA 20151-2923. Telephone: (703) 788-2700.

- G-10.1 "Commodity Specification for Nitrogen"
- P-1 "Safe Handling of Compressed Gases in Containers"
- P-9 "Inert Gases, Argon, Nitrogen and Helium"
- P-12 "Safe Handling of Cryogenic Liquids"
- P-14 "Accident Prevention in Oxygen-Rich, Oxygen-Deficient Atmospheres"
- SB-2 "Oxygen Deficient Atmospheres"
- AV-1 "Safe Handling and Storage of Compressed Gases"
- AV-5 "Safe Handling of Liquefied Nitrogen and Argon"
- "Handbook of Compressed Gases"

**PREPARED BY:**

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**AIR LIQUIDE**

This Material Safety Data Sheet is offered pursuant to OSHA's Hazard Communication Standard, 29 CFR, 1910.1200. Other government regulations must be reviewed for applicability to this gas. To the best of Air Liquide's knowledge, the information contained herein is reliable and accurate as of this date; however, accuracy, suitability or completeness are not guaranteed and no warranties of any type, either express or implied, are provided. The information contained herein relates only to this specific product. If this gas is combined with other materials, all component properties must be considered. Data may be changed from time to time. Be sure to consult the latest edition.