LIQUID AIR CORPORATION
INDUSTRIAL GASES DIVISION

Material Safety Data Sheet

	PRODUCT NAME Liquid Nitrogen		
	TELEPHONE (415) 977-6500 EMERGENCY RESPONSE INFORMATION ON PAGE 2		
LIQUID AIR CORPORATION INDUSTRIAL GASES DIVISION One California Plaza, Suite 350 2121 N. California Blvd. Walnut Creek, California 94596	TRADE NAME AND SYNONYMS Please see last page.		CAS NUMBER 7727-37-9
	CHEMICAL NAME AND SYNONYMS Liquid Nitrogen		
ISSUE DATE AND REVISIONS: OCTOBER 1, 1985 CORPORATE SAFETY DEPT.	FORMULA Liquefied N_2	MOLECULAR WEIGHT 28.013	CHEMICAL FAMILY Inert

HEALTH HAZARD DATA (SEE NOTE ON LAST PAGE)

TIME WEIGHTED AVERAGE EXPOSURE LIMIT Nitrogen is defined as a simple asphyxiant. Oxygen levels should be maintained at greater than 18 molar percent at normal atmospheric pressure which is equivalent to a partial pressure of 135 mm Hg (ACGIH, 1984-85).

SYMPTOMS OF EXPOSURE *

Effects of exposure to high concentrations so as to displace the oxygen in air necessary for life may include any, all or none of the following:

- o Loss of balance or dizziness;
- o Tightness in the frontal area of the forehead;
- o Tingling of the tongue, fingertips or toes;

(Continued on last page.)

TOXICOLOGICAL PROPERTIES

Nitrogen is nontoxic but the liberation of a large amount in a confined area could displace the amount of oxygen in air necessary to support life.

Frostbite effects are a change in color of the skin to gray or white possibly followed by blistering.

Listed as Carcinogen or Potential Carcinogen	National Toxicology Program	I.A.R.C. Monographs	OSHA
	Yes ☐ No ☒	Yes ☐ No ☒	Yes ☐ No ☒

RECOMMENDED FIRST AID TREATMENT

PROMPT MEDICAL ATTENTION IS MANDATORY IN ALL CASES OF OVEREXPOSURE TO NITROGEN. RESCUE PERSONNEL SHOULD BE EQUIPPED WITH SELF-CONTAINED BREATHING APPARATUS.

Inhalation: Conscious persons should be assisted to an uncontaminated area and inhale fresh air. Quick removal from the contaminated area is most important. Unconscious persons should be moved to an uncontaminated area, given mouth-to-mouth resuscitation and supplemental oxygen. Medical assistance should be sought immediately.

For dermal contact or frostbite, flush affected areas with lukewarm water. DO NOT USE HOT WATER. A physician should see the patient promptly if the cryogenic "burn" has resulted in blistering of the dermal surface or deep tissue freezing.

HAZARDOUS MIXTURES OF OTHER LIQUIDS, SOLIDS, OR GASES
None

PHYSICAL DATA

BOILING POINT -320.445°F (-195.803°C)	LIQUID DENSITY AT BOILING POINT 50.48 lb/ft^3 (808.607 kg/m^3)
VAPOR PRESSURE @ 70°F (21.1°C) above the critical temp. of -232.51°F (-146.95°C)	GAS DENSITY AT 70°F 1 atm .07245 lb/ft^3 (1.1605 kg/m^3)
SOLUBILITY IN WATER @ 68°F (20°C) Bunsen coefficient = .01557	FREEZING POINT -346.004°F (-210.002°C)
APPEARANCE AND ODOR Clear, colorless, odorless liquid	

FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (METHOD USED) N/A	AUTO IGNITION TEMPERATURE N/A	FLAMMABLE LIMITS % BY VOLUME N/A
EXTINGUISHING MEDIA Nonflammable, inert		ELECTRICAL CLASSIFICATION Nonhazardous
SPECIAL FIRE FIGHTING PROCEDURES N/A		
UNUSUAL FIRE AND EXPLOSION HAZARDS N/A		

REACTIVITY DATA

STABILITY Unstable		CONDITIONS TO AVOID
Stable	X	
INCOMPATIBILITY (Materials to avoid) None		
HAZARDOUS DECOMPOSITION PRODUCTS None		
HAZARDOUS POLYMERIZATION May Occur		CONDITIONS TO AVOID
Will Not Occur	X	

SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED See note on last page.
WASTE DISPOSAL METHOD See note on last page.

EMERGENCY RESPONSE INFORMATION
IN CASE OF EMERGENCY INVOLVING THIS MATERIAL, CALL DAY OR NIGHT (800) 231-1366
OR CALL CHEMTREC AT (800) 424-9300

SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION (Specify type) Positive pressure air line with mask or self-contained breathing apparatus should be available for emergency use.

VENTILATION	LOCAL EXHAUST	SPECIAL
See Local Exhaust on last page.	See last page.	
	MECHANICAL (Gen.)	OTHER

PROTECTIVE GLOVES
Loose fitting, insulated

EYE PROTECTION
Safety goggles or glasses plus face shield

OTHER PROTECTIVE EQUIPMENT
Safety shoes

SPECIAL PRECAUTIONS*

SPECIAL LABELING INFORMATION
DOT Shipping Name: Nitrogen, refrigerated liquid (cryogenic liquid) I.D. No.: UN 1977
DOT Shipping Label: Nonflammable Gas DOT Hazard Class: Nonflammable gas

SPECIAL HANDLING RECOMMENDATIONS

See note on last page re Spill or Leak Procedures. Also see CGA Safety Bulletin SB-2 and CGA pamphlets P-9, P-12 and P-14.

SB-2 Oxygen Deficient Atmospheres

P-9 The Inert Gases - Argon, Nitrogen and Helium

P-12 Safe Handling of Cryogenic Liquids

P-14 Accident Prevention in Oxygen-Rich and Oxygen-Deficient Atmospheres

For additional handling recommendations consult L'Air Liquide's Encyclopedia de Gaz or Compressed Gas Association Pamphlet P-1.

SPECIAL STORAGE RECOMMENDATIONS

See note on last page re Spill or Leak Procedures. Also see CGA Safety Bulletin SB-2 and CGA pamphlets P-9, P-12 and P-14.

Do not store cylinders in sub-surface or closed (poorly ventilated) areas. Nitrogen gas can cause suffocation without warning.

For additional storage recommendations consult L'Air Liquide's Encyclopedia de Gaz or Compressed Gas Association Pamphlet P-1.

SPECIAL PACKAGING RECOMMENDATIONS

Liquid nitrogen cannot be handled in carbon or low alloy steels. Eighteen-eight and 18-10 stainless steels are acceptable as are copper and its alloys, nickel and its alloys, brass, bronze, silicon alloys, Monel®, Inconel®, and beryllium. Also see CGA Safety Bulletin SB-2 and CGA pamphlets P-9 and P-12.

OTHER RECOMMENDATIONS OR PRECAUTIONS

Liquefied gas cylinders should not be refilled except by qualified producers of these products. Shipment of a compressed gas container which has not been filled by the owner or with his (written) consent is a violation of Federal Law (49CFR).

* Various Government agencies (i.e. Department of Transportation, Occupational Safety and Health Administration, Food and Drug Administration and others) may have regulations concerning the transportation, handling, storage or use of this product which may not be contained herein. The customer or user of this product should be familiar with these regulations.

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ADDITIONAL DATA

TRADE NAME AND SYNONYMS: (Continued)

Liquid Nitrogen; LIN; Nitrogen, refrigerated liquid (cryogenic liquid)

HEALTH HAZARD DATA: (Continued)

Note: Except where specified, the health hazard data and most of the other data in this material safety data sheet are for gaseous nitrogen. One volume of liquid nitrogen at its boiling point and atmospheric pressure will vaporize into approximately 695 volumes of gaseous nitrogen at 70°F (21.1°C) and 1 atmosphere.

SYMPTOMS OF EXPOSURE: (Continued)

- o Weakened speech leading to the inability to utter sounds;
- o Rapid reduction in the ability to perform movements;
- o Reduced consciousness of the surroundings;
- o Loss of tactile sensations;
- o Heightened mental activity.

It should be recognized that it is possible that none of the above symptoms may occur in nitrogen asphyxia so that there are no definite warning symptoms.

Contact with the cryogenic liquid or cold piping containing the liquid can cause tissue freezing or frostbite on dermal contact or if splashed into the eyes.

* For additional information, refer to L'Air Liquide's Encyclopedie des Gaz.

NOTE re SPILL OR LEAK PROCEDURES:

Liquid nitrogen is delivered to a customer into stationary vacuum-jacketed vessels at the customer's location or in portable vacuum-jacketed "liquid" cylinders.

Stationary customer-site vessels should be operated in accordance with the manufacturer's and Liquid Air Corporation's instructions. Do not attempt to repair, adjust, or in any other way modify the operation of these vessels. If there is a malfunction or other type of operational problem with the vessel, contact the closest Liquid Air Corporation location immediately.

Liquid nitrogen cylinders should be used only in well-ventilated areas and in accordance with the manufacturer's and Liquid Air Corporation's instructions. These cylinders must always be kept in an upright position. Specialized hand trucks are needed for their movement. A "first in-first out" inventory system should be used with these cylinders.

LOCAL EXHAUST: (Continued)

To prevent accumulation of high concentrations so as to reduce the oxygen level in the air to less than 18 molar percent.