

Material Safety Data Sheet

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No. 61
NITROGEN
 (Revision A)

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SECTION 1: MATERIAL IDENTIFICATION

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MATERIAL NAME: NITROGEN

DESCRIPTION: Gas supplied in cylinders (2000+ psig) or cold liquid supplied in vented Dewar containers.

OTHER DESIGNATIONS: N₂, CAS #7727-37-9, ASTM #D1933

MANUFACTURER/SUPPLIER: Available from several suppliers, including:

Air Products & Chemicals, Inc., Industrial Gas Division, PO Box 538, Allentown, PA 18105; Telephone: (215) 481-4911

Airco Industrial Gases of the Boc Group, Inc., 575 Mountain Avenue, Murray Hill, NJ 07974; Telephone: (201) 464-81000

Union Carbide Corp., Linde Div., 39 Old Ridgebury Rd., Danbury, CT 06817; Telephone: (203) 794-5300

HMIS

H 2

F 0

R 0

PPE*

* See Sect. 8



(Liquified)

R 1

I 1

S 2 (Liquid)

K 0

SECTION 2: INGREDIENTS AND HAZARDS

%

HAZARD DATA

Nitrogen, CAS #7727-37-9
 Oxygen, CAS # 7782-44-7

>99.5
 < 0.5

No TLV Established.

SECTION 3: PHYSICAL DATA

Boiling Point, 760 mm Hg ... -320.4°F (-195.8°C)

Vapor Density (Air = 1) ... 0.967

Solubility in Water @ 20°C, Vols./100 vols. ... 1.6

Density (liq.), g/cm³ ... 0.8

Melting Point ... -345.7°F (-209.86°C)

Critical Temperature ... -232.8°F (-147.1°C)

Critical Pressure, Atm ... 33.5

Molecular Weight ... 28.01

Expansion Ratio, Liquid to Gas @ 70°F ... 1:696

Appearance and odor: A colorless, odorless, tasteless gas or a cryogenic liquid.

SECTION 4: FIRE AND EXPLOSION DATA

LOWER UPPER

Flash Point and Method

Not Found

Autoignition Temp.

Not Found

Flammability Limits in Air

Nonflammable

Not Found

Not Found

Use extinguishing media that are appropriate to the surrounding fire. Do not discharge solid streams of water into liquid N₂. Use water spray to cool fire-exposed containers or, if desirable, to increase the rate of evaporation of the liquid if the increased rate can be controlled (cryogenic liquid will rapidly freeze water). Nitrogen is a nonflammable material that will not support combustion. It presents no unusual explosion hazard unless the compressed gas is exposed to fire; then containers may rupture violently. Nitrogen cylinders are equipped with pressure-relief devices that are designed to vent N₂ when they are exposed to elevated temperatures and pressures. When liquid nitrogen is spilled it can release a rapidly vaporizing cloud that will create an oxygen-deficient atmosphere.

SECTION 5: REACTIVITY DATA

Nitrogen is stable when stored in closed containers. It does not polymerize. Nitrogen is noncorrosive and is nearly inert at room temperature. At high temperatures it can combine with oxygen to form oxides, and with hydrogen to form ammonia. When heated with carbon in the presence of alkalis or barium oxide it may form cyanides. It can form nitrides with lithium, silicon, calcium, strontium, and barium when it is at a red heat. It has been reported that nitrogen can be oxidized explosively by ozone. Lithium and titanium at an elevated temperature can burn in a nitrogen atmosphere. Beryllium can be ignited in a mixed nitrogen-and-carbon dioxide atmosphere. Nitrogen will react with oxygen in the presence of sparking (from an electric arc or a gas-fired furnace) to produce nitric oxide gas.

SECTION 6. HEALTH HAZARD INFORMATION

Nitrogen is not listed as a carcinogen by the NTP, IARC, or OSHA.

This material is nontoxic and is classified as a simple asphyxiant by virtue of its displacement of oxygen. Symptoms of exposure depend on the degree and the duration of oxygen deficiency. They can include increased frequency and volume of breathing, increased pulse rate, muscular incoordination, fatigue, nausea, vomiting, and collapse. Inhalation of pure nitrogen atmosphere produces immediate loss of consciousness; death follows unless air/oxygen breathing can be quickly restored. Contact with liquid nitrogen or cold vapors can cause cryogenic burns (severe frostbite/freeze burns).

FIRST AID: CONTACT WITH LIQUID NITROGEN: Promptly flush areas affected with lots of tepid water to reduce freezing of tissue. (Do not apply direct heat to affected areas!) Do not rub frozen areas. Loosely apply dry, sterile, bulky dressings to protect area from infection and from further injury. Get medical help.*

INHALATION: Caution! Would-be rescuers need to be concerned with their own safety in oxygen-deficient areas. Use self-contained breathing equipment. Remove victim to fresh air. Quickly restore and/or support his breathing as required, administering oxygen if available. Get medical help.*

INGESTION: Get medical help.* **ACUTE EFFECTS:** Gas - Simple asphyxiation by displacement of oxygen. Liquid - Cryogenic burns. **PRIMARY ENTRY:** Inhalation

* **GET MEDICAL ASSISTANCE** - In plant, paramedic, community. Get medical help for further treatment, observation, and support after first aid.

SECTION 7. SPILL, LEAK, AND DISPOSAL PROCEDURES

Notify safety personnel of major nitrogen leaks or spills. Shut off leak if you can do so without risk. Evacuate all personnel from the danger area until ventilation can restore a safe oxygen level. Emergency personnel need self-contained breathing equipment. Minor leaks (which are dangerous in enclosed areas) can be detected by painting the suspected area of leakage with a soap solution. Prevent liquid nitrogen from contacting vulnerable steel structures and vehicle tires (see sect. 9). Allow spilled liquid to evaporate.

DISPOSAL: Remove a liquid nitrogen container or leaking cylinder outdoors or place into a hood with good forced ventilation. Allow gas to discharge at a moderate rate. Defective cylinders should be tagged to indicate defect. Close the valve and return the defective cylinder to supplier.

SECTION 8. SPECIAL PROTECTION INFORMATION

Provide adequate general and local exhaust ventilation to prevent workplace atmospheres from becoming oxygen deficient (minimum O₂ volume = 18%). Provide air-supplied or self-contained breathing equipment for emergency or nonroutine situations where the nitrogen level is excessive. Use a safety line and a standby worker when respirator-protected personnel enter a hazardously nitrogen-enriched area. (The standby worker should have a self-contained breathing apparatus immediately available.) Those working with liquid nitrogen should wear approved insulating gloves, safety glasses, and other protective clothing as required by use conditions to prevent any skin contact with liquid nitrogen. Cuffless trousers should be worn outside high-topped shoes. Safety shoes are recommended for those handling cylinders of gases.

Wear safety gloves and approved insulated gloves. Use air-supplied or self-contained breathing apparatus.

Contact lenses pose a special hazard; soft lenses may absorb irritants, and all lenses concentrate them.

SECTION 9. SPECIAL PRECAUTIONS AND COMMENTS

STORAGE SEGREGATION: Store in a cool, dry, well-ventilated, low fire-risk area. Protect containers against physical damage.

SPECIAL HANDLING/STORAGE: Protect containers from extremes of temperature and weather. (Do not allow any part of a compressed gas cylinder to be exposed to temperatures above 125°F [51.6°C]). Follow general safety procedures for handling and securing compressed gas cylinders. Liquid nitrogen storage areas should be kept clean and free from flammable materials. Make sure that liquid nitrogen containers are properly vented to prevent buildup of pressure. All pressure equipment and process lines should be designed so that the minimum burst pressure is at least four (4) times the expected maximum pressure. Certain materials are unsuitable for service in contact with liquid nitrogen because they become extremely brittle and can be readily shattered by impact.

DOT Classification: Nonflammable Gas

UN1066 (Compressed); UN1977 (Cryogenic Liquid)

LABEL: Nonflammable Gas

Data Source(s) Code: 1, 4-11, 14, 17, 25, 51, 63, 82, 84. CK

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Medical Review *[Signature]*