

MATERIAL SAFETY DATA SHEET



NITROUS OXIDE

CHEMICAL PRODUCT

PRODUCT NAME: Nitrous Oxide

CHEMICAL NAME: Nitrous Oxide

CHEMICAL FAMILY: Oxidizer

SYMBOL: N2O

SYNONYMS: Dinitrogen monoxide, laughing gas, nitrogen monoxide, nitrous oxide USP

[USES]: Medical, industrial, food industry

INGREDIENT COMPOSITION INFORMATION

INGREDIENTS NAME	PERCENTAGE	OHSA PEL-TWA	ACGIH TLV-TWA
NITROUS OXIDE	>99%	None	50ppm

HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

CAUTION! High pressure oxidizing liquid and gas.
Vigorously accelerates combustion.
Can cause rapid suffocation.
Can cause anesthetic effects.
May cause frostbite.

POTENTIAL HEALTH EFFECTS INFORMATION:

ROUTES OF EXPOSURE:

INHALATION: Simple asphyxiant. Nitrous oxide is nontoxic, but may cause suffocation by displacing the oxygen in air. Exposure to oxygen-deficient atmosphere (<19.5%) may cause dizziness, drowsiness, nausea, vomiting, excess salivation, diminished mental alertness, loss of consciousness and death. Exposure to atmospheres containing 8% to 10% or less oxygen will bring about unconsciousness without warning and so quickly that the individuals cannot help or protect themselves. Lack of sufficient oxygen may cause serious injury or death.

Exposure to concentrations of 50% or greater will produce euphoria, loss of coordination, slurred speech, dulling of senses, loss of consciousness, and clinical anesthesia. These symptoms may resemble intoxication, hence the name "laughing gas". At higher concentrations, approaching 100%, inhalation may cause deep breathing, dizziness, nausea and central nervous system depression.

WARNING: This misuse of nitrous oxide can cause death by reducing the amount of oxygen necessary to support life. Nitrous oxide abuse can impair an individual's ability to make and implement life sustaining decisions.

EYE CONTACT. Contact with liquid or cold vapor can cause freezing of tissue.

SKIN CONTACT. Contact with liquid or cold vapor can cause frostbite

[SKIN ABSORPTION]: Not applicable

[INGESTION]: Not applicable

CHRONIC EFFECTS: Nitrous oxide has been associated with several effects from long term exposure. The most strongly sustained effect is neuropathy (degenerative changes to the nervous system). Complaints include numbness, tingling of hands and legs, loss of feeling in fingers, poor balance and muscular weakness. Epidemiological studies also suggest fetotoxic effects and higher incidents of spontaneous abortion in exposed personnel. Although no cause and effect relationship has been firmly established, exposure to the gas should be minimized.

MEDICAL CONDITIONS AGGRAVATED BY OVEREXPOSURE: Pregnant women should avoid exposure to nitrous oxide. See, Toxicological Information

OTHER EFFECTS OF OVEREXPOSURE: None.

CARCINOGENICITY: Nitrogen is not listed.

FIRST AID MEASURES

INHALATION: Persons suffering from lack of oxygen should be removed to fresh air. If victim is not breathing, administer artificial respiration. Vomiting may occur as the person awakes. In order to prevent aspiration, exposed individuals should be placed on their side with their head on the level or slightly lower than their body. If breathing is difficult, or dulling of senses is present, administer oxygen. Obtain prompt medical attention. Rescue personnel should be aware of the extreme fire hazards associated with oxidizer-enriched atmospheres.

EYE CONTACT: Contact with liquid or cold vapor can cause freezing of tissue. Gently flush eyes with lukewarm water. Obtain medical attention immediately.

SKIN CONTACT: Contact with liquid or cold vapor can cause frostbite. Immediately warm affected area with lukewarm water not to exceed 105°F (40°C)

INGESTION: Not applicable

NOTES TO PHYSICIAN: Nitrous oxide may suppress immunological function when administered for anesthetic purposes. This may reduce the resistance to infection and other immuno-dependent disease processes. Nitrous oxide may cause vitamin B-12 deficiency. Megaloblastic anemia and nervous system disorders can occur as a result of this chemically induced deficiency. More detailed information can be found in Toxicological Information.

FIRE FIGHTING MEASURES

FLASH POINT. Not applicable

AUTOIGNITION: Nonflammable

FLAMMABLE LIMITS IN AIR BY VOLUME:

LOWER: Not applicable **UPPER:** Not applicable

EXTINGUISHING MEDIA: Nitrous Oxide is nonflammable and will not support combustion. Use extinguishing media appropriate for surrounding fire.

SPECIAL FIRE FIGHTING INSTRUCTIONS: Evacuate all personnel from the danger area. If possible, shut off flow of nitrous oxide that is supporting the fire. Immediately cool containers with water spray from maximum distance. When cool, move containers from the area, if without risk.

UNUSUAL FIRE AND EXPLOSION HAZARDS: Oxidizing agent, vigorously accelerates combustion. Some materials that are noncombustible in air will burn in the presence of an oxidizing agent. Nitrous oxide may form explosive compounds when exposed to combustible materials or oil, grease and other hydrocarbon materials. Upon exposure to intense heat or flame, cylinder will vent rapidly and/or rupture violently. Most cylinders are designed to vent contents when exposed to elevated temperatures. Pressure in a container can build up due to heat and it may rupture if pressure relief devices should fail to function.

HAZARDOUS COMBUSTION PRODUCTS: None

[SENSITIVITY TO STATIC DISCHARGE]: None

[SENSITIVITY TO MECHANICAL IMPACT]: None

ACCIDENTAL RELEASE MEASURES

STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED: Evacuate all unnecessary personnel from the affected area. Shut off source of nitrous oxide, if possible. Remove sources of heat, ignition and, if possible, separate combustibles from the leak. Ventilate enclosed areas or remove cylinders to an outdoor location. If leaking from cylinder or its valve, contact your supplier.

HANDLING AND STORAGE

PRECAUTIONS TO BE TAKEN IN STORAGE: Store and use with adequate ventilation. Cylinders should be separated from flammable by a maximum distance of 20 ft. or by barrier of non-combustible material at least 5 ft high having a fire resistance rating of at least 1/2 hour. Cylinders should be stored upright with valve protection cap in place and firmly secured to prevent falling or being knocked over. Post "No Smoking or Open Flames" signs in the storage area. Protect cylinders from physical damage; do not drag, roll, slide or drop. Do not allow storage area temperature to exceed 125°F (52°C). Full and empty cylinders should be segregated. Use a first-in, first-out inventory system to prevent full containers from being stored for long periods of time. Because of its "laughing gas" anesthetic effect, nitrous oxide is often subject to theft and misuse. Cylinders should be stored and used in a controlled area..

PRECAUTIONS TO BE TAKEN IN HANDLING: Use a suitable hand truck for cylinder movement or four-wheel cart for liquid container movement. Never attempt to lift a cylinder by its valve protection cap. Keep cylinders and their valves free from oil and grease. Open valve slowly. If user experiences difficulty operating cylinder valve, discontinue use and contact supplier. Never insert an object (e.g., wrench, screwdriver, pry, bar, etc.) into valve cap openings. Doing so may damage valve, causing a leak to occur. Never strike an arc on a compressed gas cylinder or make a cylinder a part of an electrical circuit. Use an adjustable strap wrench to remove over-tight or rusted caps. For additional precautions in using helium see other Information.

EXPOSURE CONTROLS/PERSONAL PROTECTION

ENGINEERING CONTROLS:

Ventilation: Natural or mechanical to prevent accumulation in worker's breathing zone above exposure limits.

RESPIRATORY PROTECTION (SPECIFY TYPE):

General Use: Not required

Emergency Use: Self-contained breathing apparatus (SCBA) or positive pressure airline with mask to be used in oxygen deficient atmosphere. Air purifying respirators will not provide protection.

PROTECTIVE GLOVES: Work gloves are recommended when handling cylinders. If used, gloves must be clean and free of oil and grease.

EYE PROTECTION: Safety glasses are recommended when handling cylinders.

OTHER PROTECTIVE EQUIPMENT. Safety shoes recommended when handling cylinders.

PHYSICAL AND CHEMICAL PROPERTIES

MOLECULAR WEIGHT. 44.013

BOILING POINT (1 ATM): @ 101.325 kpa = -88.5°C

RELATIVE DENSITY (Air=1): gas @ 101.325 kpa @25°C (Air=1) = 1.530

TRIPLE POINT: -90.8°C

VAPOR PRESSURE @ 21.1°C = 52.38 bar

ABSOLUTE DENSITY: gas @ 101.325 kpa @ 25°C = 1.8122 kg/m³

EVAPORATION RATE (Butyl Acetate=1): Gas, not applicable

SOLUBILITY IN WATER: @ 101.325 kpa (total pressure of NZO + Aqueous tension @ 0°C 129.7 cm³/100cm³ water @ 25°C - 58.8cm³/100cm³ water

EXPANSION RATIO: Not applicable

[pH]: Not applicable

APPEARANCE, ODOR AND STATE: Colorless, odorless and tasteless gas at normal temperature and pressure. [COEFFICIENT OF WATER/OIL DISTRIBUTION]: Not applicable

[ODOR THRESHOLD]: Not known

STABILITY AND REACTIVITY

STABILITY: Stable

CONDITIONS TO AVOID: Excess heat. Decomposes at elevated temperature (1202 °F (650 °C) to nitrogen and oxygen. This reaction will occur at lower temperatures in the presence of catalytic surfaces such as silver, platinum, cobalt, copper oxides or nickel oxides.

INCOMPATIBILITY (Materials to Avoid): Flammable materials, hydrocarbons such as oils and grease asphalt, ethers, alcohols acids and aldehydes. Alkali metals, boron, tungsten carbide and aluminium.

REACTIVITY:

- A) HAZARDOUS DECOMPOSITION PRODUCTS: Nitrogen and oxygen
- B) HAZARDOUS POLYMERIZATION: Will not occur

TOXICOLOGICAL INFORMATION

Exposure to nitrous oxide has produced embryo fetal toxicity in animals as evidenced by reduced fetal weight, delayed ossification and increased incidence of visceral and skeletal variations. Exposure may be associated with increased incidence of abortion in humans.

Single prolonged exposure to high concentrations of nitrous

oxide has resulted in bone marrow injury and adverse effects in blood.

(IRRITANCY OF MATERIAL): None **(SENSITIZATION TO MATERIAL):** None

(REPRODUCTIVE EFFECTS): None

(TERATOGENICITY): None

(MUTAGENICITY): None

(SYNERGISTIC MATERIALS): None

ECOLOGICAL INFORMATION

No adverse ecological effects are expected. Nitrous Oxide does not contain any Class I or Class II ozone-depleting chemical.

Nitrous Oxide is not listed as a marine pollutant.

DISPOSAL CONSIDERATIONS

WASTE DISPOSAL METHOD: Do not attempt to dispose of residual or unused product in the cylinder. Return cylinder to supplier.

For emergency disposal, secure the cylinder and slowly discharge gas to the atmosphere in a well-ventilated area or outdoors away from all sources of ignition.

TRANSPORT INFORMATION

DOT/IMO SHIPPING NAME: Nitrous oxide

HAZARD CLASS: 2.2 (Nonflammable Gas)

PRODUCT RQ: Not applicable

SHIPPING LABEL(s): Nonflammable Gas and Oxidizer

PLACARD (When required): Nonflammable gas

SPECIAL SHIPPING INFORMATION : Cylinders should be transported in a secure position, in a well-ventilated vehicle.

The transportation of compressed gas cylinders in automobiles or in closed-body vehicles can present serious safety hazards and should be discouraged.

OTHER INFORMATION

SPECIAL PRECAUTIONS: All gauges, valves, regulators piping and equipment to be used in nitrous oxide service must be cleaned for oxygen service. Use piping and equipment adequately designed to withstand pressures to be encountered. Nitrous oxide may cause swelling of some elastomers. Use a check valve or other protective apparatus in any line or piping from the cylinder to prevent reverse flow.

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 their properties that can cause serious injury or death.

NFPA RATINGS:

HEALTH: =2
FLAMMABILITY: =0
INSTABILITY: =0
SPECIAL: =OX (Oxidizer)

HMIS RATINGS:

HEALTH: =2
FLAMMABILITY: =0
REACTIVITY: =0