1. Chemical Product and Company Identification

Product name	:	Nitrous Oxide
Supplier	:	Leland Limited, Inc. 2614 South Clinton Ave. South Plainfield, NJ 07080 1-908-668-1008 (9-5 EST)
Emergency calls (CHEMTREC)	:	1-800-424-9300 (Domestic) 1-703-527-3887 (International)

2. Hazards Identification

EMERGENCY OVERVIEW
CAUTION! High-pressure gas, oxidizing liquid and gas.
Vigorously accelerates combustion.
Can cause rapid suffocation.
Can cause anesthetic effects.
May cause dizziness and drowsiness.
May cause nervous system and blood cell damage.
Reproductive hazard.
May cause frostbite.
Self-contained breathing apparatus may be required by rescue workers.
Odor: Slightly sweet.

Threshold Limit Value	:	TLV-TWA, 50 ppm (ACGIH, 1999). TLV-TWAs should be used as a guide in the control of health hazards and not as fine lines between safe and dangerous concentrations.
Effects of a Single (acute) Overexposure	:	**Inhalation** - May cause excitation, dizziness, drowsiness, poor coordination, and narcosis. Exposure to concentrations of 50% or greater will produce clinical anesthesia. High concentrations may cause asphyxia and death from lack of oxygen. **Skin Contact** - No harm expected from gas. Liquid may cause frostbite **Swallowing** – An unlikely route of exposure. This product is a gas at normal temperature and pressure, but frostbite of the lips and mouth may result from contact with the liquid. **Eye Contact** - No harm expected from gas. Liquid may cause frostbite.
Effects of Repeated (chronic) Overexposure	:	Metabolic injury to the nervous system has resulted from frequent exposure to anesthetic concentrations of Nitrous Oxide. Complaints include numbness, tingling of hands and legs, loss of feeling in fingers, poor balance, and muscular weakness.
Other Effects of Overexposure	:	Nitrous Oxide is an asphyxiant. Lack of oxygen can kill.
Medical Conditions Aggravated by Overexposure	:	Pregnant women should avoid exposure to Nitrous Oxide.

Significant Laboratory Data with Possible Relevance to Human Health Hazard Evaluation	:	Exposure to Nitrous Oxide has produced embryo fetal toxicity in laboratory animals as evidenced by reduced fetal weight, delayed ossification, and increased incidence of visceral and skeletal variations. Exposure to Nitrous Oxide may be associated with an increased incidence of abortion in humans. Single prolonged exposure to high concentrations of Nitrous Oxide has resulted in bone marrow injury and adverse effects on the blood.
Carcinogenicity	:	Nitrous Oxide is not listed by NTP, OSHA, or IARC.

3. Composition, Information on Ingredients

Chemical Name	:	Nitrous Oxide
Content (vol%)	:	99.0 or more
Chemical Formula	:	N_2O
CAS Number	:	10024-97-2
OSHA PEL	:	Non currently established
ACGIH TLV-TWA	:	50 ppm

4. First Aid Measures

No action shall be taken involving any personal risk or without suitable training. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation.

Inhalation	:	Move exposed person to fresh air. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention immediately.
Skin Contact	:	Nitrous Oxide is harmless at atmospheric pressure. Flush with water.
Frostbite	:	Try to warm up the frozen tissues and seek medical attention.
Eye Contact	:	Nitrous Oxide is harmless at atmospheric pressure. Direct spray may cause irritation. In case of irritation, check for and remove any contact lenses. Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical attention immediately.
Swallowing	:	Not applicable
Protective Measures before starting First Aid	:	In a Nitrous Oxide leak, Oxygen concentration may be low. Before attempting first aid, ventilate the area thoroughly or wear a respirator.
Notes to Physician	:	Nitrous Oxide may cause vitamin B-12 deficiency. This chemically induced deficiency may result in megaloblastic anemia and damage to the nervous system. When administered for anesthetic purposes, Nitrous Oxide may suppress immunological function, reducing resistance to infection and to other immune-dependent disease processes.

5. Fire Fighting Measures

Flammability of the Product	:	Not applicable
Extinguishing Media	:	Nitrous Oxide cannot catch fire. Use extinguishing media for surrounding fire.
Special Fire Fighting Procedures	:	**WARNING! High-pressure, oxidizing, liquid and gas.** Evacuate all personnel from danger area. Do not approach area without self-contained breathing apparatus and protective clothing. Immediately deluge cylinders with water from maximum distance until cool, then move them away from fire area if without risk. If cylinders are leaking, reduce vapors with water spray or fog; shut off leak if without risk. On-site fire brigades must comply with OSHA 29 CFR 1910.156.
Unusual Fire and Explosion Hazards	:	Oxidizing agent; may accelerate combustion. Vapors form from this product and may travel or be moved by air currents to locations distant from the product handling point. Contact with combustible materials such as oil, grease, and other hydrocarbon products, especially in the presence of ignition sources such as pilot light, other flames, smoking, sparks, heaters, electrical equipment, and static discharges may cause fire or explosion. Heat of fire can build pressure in cylinder and cause it to rupture. *Recommended storage temperature: 0 ˚C to +40 ˚C.*
Hazardous Combustion products	:	None known.

6. Accidental Release Measures

Steps to be taken if Material is Released or Spilled	:	**CAUTION! High-pressure gas.** Nitrous Oxide is an asphyxiant. Lack of oxygen can kill. Evacuate all personnel from danger area. Use self-contained breathing apparatus where needed. Shut off flow if without risk. Ventilate area or move cylinder to a well-ventilated area. Test for sufficient oxygen, especially in confined spaces, before allowing reentry.
Protectors	:	If necessary, wear a respirator. If oxygen concentration is low, do not enter the area unprotected.
Environmental Affects	:	Nitrous oxide gas does not adversely affect the environment.
Waste Disposal Method	:	Discard any product, residue, disposable container or liner in an environmentally acceptable manner, in full compliance with federal, state, and local regulations. If necessary, call your local disposal authority for assistance.

7. Handling and Storage

Handling	:	Technical measures <u>Oxidation</u> Use pressure regulators, hoses, pressure gauges, etc., designed for Nitrous Oxide. Do not use Nitrous Oxide lines for other gases. Use pressure gauges having a label indicating non-oil. Keep Nitrous Oxide gas equipment and accessories (storage tanks, containers, pipes, valves, gauges, etc.) clean and free of oils, fats, organic substances, dust, dirt, rust, burrs, etc.. Completely remove before starting

operation.
If fats or oils get on hands or gloves, do not touch Nitrous Oxide areas of equipment. Check hands, gloves, and clothing for fats and oils. Fats or oils catching fire in the presence of Nitrous Oxide gas will cause explosive burning.
Do not use flammable gaskets for Nitrous Oxide gas supply.
Handling of Nitrous Oxide gas cylinders
Handle Nitrous Oxide gas cylinders carefully.
Before using Nitrous Oxide gas, confirm the name of the gas by checking the mark or the other items on the cylinder. Return gas cylinders containing gas other than Nitrous Oxide to the supplier.
Feed gas via a pressure regulator, not directly.
Use only specialized pressure regulators for Nitrous Oxide.
Before connecting a pressure regulator, check the thread type.
Before using a gas cylinder, check the pressure regulator, hoses, pipes, joints, etc., for leakage.
Do not refill cylinders.
Do not modify or erase marks or other items on cylinders. Do not peel off labels on cylinders.
Do not use gas cylinders in electric circuits.
Do not use burners or the like to directly heat the cylinder.
Avoid compressed Nitrous Oxide gas discharge.
Do not use gas cylinders for other purposes.
Other
Do not use Nitrous Oxide gas in place of compressed air.
Large numbers of Nitrous Oxide gas cylinders in enclosed areas may cause high oxygen concentrations. Use only in open or well ventilated areas.
Safe handling
Nitrous Oxide gas oxidizes more easily than ambient air. Keep Nitrous Oxide gas away from contact with alkaline metals, benzoic flavoring (powder), carbon dioxide, textiles, hydrogen plus catalysts, acetone, acetylene, alcohol, oil film, etc.
An organic or flammable substance comes in contact with Nitrous Oxide gas may cause explosions.
Porous organic substances such as cloth or wood retain oxygen for long periods and will burn vigorously. Keep such substances away from fire.
Many substances non-flammable or fire-resistant in ambient air easily catch fire in Nitrous Oxide gas.
Together with water, Nitrous Oxide promotes metal corrosion.

Storage : Storage Conditions
Keep Nitrous Oxide away from fire and spark sources.
Keep Nitrous Oxide gas cylinders away from flammable substances.
Do not store cylinders near electric lines or grounding.

Store cylinders in a dry and well ventilated area.
Keep cylinders away from corrosive fluid.
Keep cylinders away from direct sunlight at an ambient temperature of 0 to 40 ° C (32 to 104 ° F).
Do not expose cylinders to rough handling or falling.

8. Exposure Controls and Personal Protection

Engineering Controls	:	Use only with adequate ventilation. Use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits.
Personal Protection		
Eyes	:	To protect eyes, wear goggles/safety glasses.
Hands	:	When handling Nitrous Oxide gas cylinders, wear leather gloves.
Skin and Body	:	Not needed.
Respiratory Protection	:	Use air-purifying or air-supplied respirators, as appropriate, where local or general exhaust ventilation is inadequate during a release of gas. Adequate ventilation must keep worker exposure below applicable TLVs and ensure greater than 19.5% oxygen is present. An air-supplied respirator must be used in confined spaces. Respiratory protection must conform to OSHA rules as specified in 29 CFR 1910.134.
Other	:	Protective equipment for cylinder handling, select in accordance with OSHA 29 CFR 1910.132 and 1910.133.

9. Physical and Chemical Properties

Physical state	:	Gas at normal temperature and pressure
Color	:	Colorless
Odor	:	Slightly sweet
Explosiveness	:	Non-flammable
Molecular Weight	:	44.01 g/mole
Specific Gravity	:	1.53 (Air=1, 0 ° C, 0.1013MPa (1 atm))
Boiling/Condensation Point	:	-88.5 ° C (-127.4 ° F)
Melting/Freezing Point	:	-90.8 ° C (-131.5 ° F)
Critical Temperature		36.6 ° C (97.9 ° F)
Gas Density	:	1.978 kg/m^3 (@ 0 ° C, 0.1013MPa (1 atm))
Solubility in Water		0.68 N_2O/H_2O @20 ° C (68 ° F)

10. Stability and Reactivity

Stability and Reactivity	:	This product is stable.
Hazardous Decomposition Products	:	Excess heat. Nitrous Oxide decomposes explosively at 65 ° C (1202 ° F) into two parts nitrogen to one part oxygen. In the presence of catalytic surfaces such as silver, platinum, cobalt, and copper or nickel oxides, this reaction occurs at lower temperatures.
Hazardous Polymerization	:	Under normal conditions of storage and use, hazardous polymerization will not occur.
Conditions to Avoid	:	None currently known.

11. Toxicological Information

Exposure to Nitrous Oxide has produced embryo fetal toxicity in laboratory animals as evidenced by reduced fetal weight, delayed ossification, and increased incidence of visceral and skeletal variations. Exposure to Nitrous Oxide may be associated with an increased incidence of abortion in humans. Single prolonged exposure to high concentrations of Nitrous Oxide has resulted in bone marrow injury and adverse effects on the blood.

12. Ecological Information

Nitrous Oxide does not contain any Class I or Class II ozone-depleting chemicals.
Nitrous Oxide is not listed as a marine pollutant by DOT.

Global Warming Potential (GWP)	:	298 (100 years) Index detailing effects on global warming

13. Disposal Considerations

Discharge of Nitrous Oxide	:	To release Nitrous Oxide gas, select a well-ventilated safe place and check that no fire sources or flammable substances are present.
Disposal of Cylinders	:	If gas remains in cylinders, release gas with proper equipment and dispose of cylinders as incombustible waste. For empty cylinders, check for a puncture hole and dispose of as incombustible waste. Do not dispose of cylinders without first checking that all gas has been released.

14. Transport Information

DOT / IMO Shipping Name	:	Nitrous Oxide
Identification Number	:	UN 1070
Shipping Label(s)	:	Nonflammable gas, Oxidizer
Hazard Class	:	2.2
Placard (When required)	:	Nonflammable gas, Oxidizer
Special Shipping Information	:	See CFR 49, 172.101, 173.306 for exceptions of labeling.

15. Regulatory Information

The following selected regulatory requirements may apply to this product. Not all such requirements are identified. Users of this product are solely responsible for compliance with all applicable federal, state, and local regulations.

U.S. Federal Regulations	:	EPA (Environmental Protection Agency) **CERCLA**: Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (40 CFR Parts 117 and 302): **Reportable Quantity (RQ)**: None **SARA**: Superfund Amendment and Reauthorization Act:

Sections 302/304: Require emergency planning based on Threshold Planning Quantity (TPQ) and release reporting based on Reportable Quantities (RQ) of extremely hazardous substances (40 CFR Part 355):

Threshold Planning Quantity (TPQ): None

Extremely Hazardous Substances (40 CFR 355): None

Sections 311/312: Require submission of Safety Data Sheet (SDSs) and chemical inventory reporting with identification of EPA hazard categories. The hazard categories for this products are as follows:

IMMEDIATE: Yes	PRESSURE: Yes
DELAYED: Yes	REACTIVITY: No
	FIRE: Yes

Sections 313: Requires submission of annual reports of release of toxic chemicals that appear is 40 CFR Part 372.

Nitrous Oxide does not require reporting under Section 313.

40 CFR 68: Risk Management Program for Chemical Accidental Release Prevention: Requires development and implementation of risk management programs at facilities that manufacture, use, store, or otherwise handle regulated substances in quantities that exceed specified thresholds.

Nitrous Oxide is not listed as a regulated substance.

TSCA: Toxic Substances Control Act: Nitrous Oxide is listed on the TSCA inventory.

OSHA (Occupational Safety and Health Administration):

29 CFR 1910.119: Process Safety Management of Highly Hazardous Chemicals: Requires facilities to develop a process safety management program based on Threshold Quantities (TQ) of highly hazardous chemicals.

Nitrous Oxide is not listed in Appendix A as a highly Hazardous chemical.

State Regulations : **California**: This product is **not** listed by California under the Safe Drinking Water Toxic Enforcement Act of 1986 (Proposition 65).

Pennsylvania: This product is subject to the Pennsylvania Worker and Community Right-To-Know Act (35 P.S. Sections 7301-7320).

16. Other Information

Hazard Rating Systems :

NFPA Ratings
Health = 2
Flammability = 0
Reactivity = 0
Special = OX

HMIS Ratings
Health = 2
Flammability = 0
Reactivity = 0

Notice to reader : This Safety Data Sheet (SDS) is prepared based on the latest materials and data. It may be subject to change when new data is obtained. The SDS state precautions assuming that the product is used under normal conditions. Uses under special conditions should take these conditions into account to ensure safety. While the SDS has been prepared as comprehensively as possible, we cannot guarantee its applicability or effectiveness under all possible conditions or applications.