

# Ellenbarrie Industrial Gases Limited Material Safety Data Sheet

## 1. Chemical Product and Company Identification

<b>Product Name:</b>	Nitrous Oxide	<b>Trade Name:</b>	Nitrous Oxide
<b>Chemical Name:</b>	Nitrous Oxide	<b>Synonym:</b>	Dinitrogen Monoxide, Laughing Gas,
<b>Chemical Formula:</b>	N <sub>2</sub> O	<b>Chemical Family:</b>	Oxide.
<b>Telephone:</b>	<b>Emergencies:</b>	<b>Supplier</b>	Ellenbarrie Industrial Gases Limited
	*033-25828791	<b>/Manufacture:</b>	3A, Ripon Street, Kolkata-700016
	*033-27094398	<b>Phone:</b>	033-22292441, 22291923, 22491922
	*08924-205105	<b>Fax:</b>	033-22493396

*\*Call emergency numbers 24 hours a day only for spills, leaks, fire, exposure, or accidents involving this product. For routine information, contact your supplier or Ellenbarrie Industrial Gases Limited sales representative.*

## 2. Composition and Information on Ingredients

INGREDIENTS	% (VOL)	CAS NUMBER	LD <sub>50</sub> (Species & Routes)	LC <sub>50</sub> (Rat, 4 hrs.)	TLV-TWA (ACGIH)
Nitrous Oxide	>99	10024-97-2	Not applicable.	Not available.	Simple asphyxiant.

## 3. Hazards Identification

### Emergency Overview

**CAUTION! High-pressure, oxidizing gas. Vigorously accelerates combustion. Can cause rapid suffocation. Can cause aesthetic effects. May cause nervous system and blood cell damage. Reproductive hazard. May cause dizziness and drowsiness. Self-contained breathing apparatus may be required by rescue workers. Under ambient condition, Nitrous Oxide is a colorless gas with a slightly sweet odor and taste.**

**ROUTES OF EXPOSURE:** Inhalation.

**THRESHOLD LIMIT VALUE:** TLV Data from 2004 Guide to Occupational Exposure Values (ACGIH) is 50 ppm.

### 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 vapour.

**EYE CONTACT:** No harm expected.

### 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.

### CARCINOGENICITY:

Nitrous Oxide not listed as carcinogen by OSHA, NTP or IARC.

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#### 4. First Aid Measures

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**INHALATION:**

If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, get qualified personnel to give oxygen. Get medical attention immediately.

**SKIN CONTACT:**

None expected.

**SWALLOWING:**

This product is a gas at normal temperature and pressure.

**EYE CONTACT:**

Immediately flush eyes with running water for at least 15 minutes, keeping eyelids open. See a physician, preferably an ophthalmologist, immediately.

**NOTES TO PHYSICIAN:**

*Nitrous oxide may cause vitamin B 12 deficiency. This deficiency causes 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 immuno-dependent disease processes.*

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#### 5. Fire Fighting Measures

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**FLAMMABLE:** No. **IF YES, UNDER WHAT CONDITIONS?** Not applicable.

**FLASH POINT (Test method)** Not applicable. **AUTOIGNITION TEMPERATURE:** Not applicable.

**FLAMMABLE LIMITS IN AIR, % by volume:** **LOWER:** Not applicable. **UPPER:** Not applicable.

**EXTINGUISHING MEDIA:**

This material cannot catch fire. Use media appropriate for surrounding fire.

**SPECIAL FIRE FIGHTING PROCEDURES:**

**CAUTION! High-pressure, Oxidizing gas.** Evacuate all personnel to a safe distance. Do not approach area without self contained breathing apparatus and protective clothing. Immediately deluge containers with water spray from maximum distance until cool, then move containers away from fire area if without risk. If cylinders are leaking, reduce vapours with water spray or fog; shut off leak of without risk.

**UNUSUAL FIRE AND EXPLOSION HAZARD:**

Oxidizing agent; vigorously accelerates combustion. Vapours from this product may travel or be moved by air currents to distances away from the product handling point. Contact with combustible material such as oil, grease and other hydrocarbon products, especially in presence of ignition sources such as pilot lamps, other flames, smoking, sparks, heaters, electrical equipment and static discharges may cause fire or explosion. Container may rupture due to heat of fire. No part of a container should be subjected to a temperature higher than 52oC. Most containers are provided with a pressure relief device designed to vent contents when they are exposed to elevated temperature.

**HAZARDOUS COMBUSTION PRODUCTS:**

Refer to Section 10.

**SENSITIVITY TO IMPACT:**

Avoid impact against container.

**SENSITIVITY TO STATIC DISCHARGE:**

Static discharges may cause fire or explosion.

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## 6. Accidental Release Measures

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### STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED:

**CAUTION! High-pressure liquid and gas.** Evacuate all personnel from danger area. Use self-contained breathing apparatus where needed. Nitrous Oxide is an asphyxiant. Lack of Oxygen can kill. Contact with flammable materials may cause fire or explosion. Shut off flow if you can do so without risk. Ventilate area or move cylinder to a well-ventilated area. Use self contained breathing apparatus where necessary. Test for sufficient oxygen, before allowing re-entry.

### WASTE DISPOSAL METHOD: Environmental Precautions

Prevent waste from contaminating the surrounding environment. Discard any product, residue, disposable container, or liner in an environmentally acceptable manner, in full compliance with federal, provincial, and local regulations. If necessary, call your local supplier for assistance.

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## 7. Handling and Storage

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### PRECAUTIONS TO BE TAKEN IN STORAGE:

Store and use with adequate ventilation. Firmly secure cylinders upright to keep them from falling or being knocked over. Screw valve protection cap firmly in place by hand. There must be no source of ignition. Store only where temperature will not exceed 52°C. Store full and empty cylinders separately and protect against fire and explosion damage. Use a first-in, first-out inventory system to prevent storing full cylinders for long periods. Post "NO SMOKING OR OPEN FLAMES" in areas of storage and use.

### PRECAUTIONS TO BE TAKEN IN HANDLING:

Protect cylinders from damage. Use a suitable hand truck to move cylinders; do not drag, roll, slide, or drop. Never attempt to lift a cylinder by its cap; the cap is intended solely to protect the valve. Never insert an object (e.g., wrench, screwdriver, and pry bar) into cap openings; doing so may damage the valve and cause a leak. Use an adjustable strap wrench to remove over-tight or rusted caps. Open valve slowly. If valve is hard to open, discontinue use and contact your supplier. Never apply flame or localized heat directly to any part of the cylinder. High temperatures may damage the cylinders or could cause the pressure relief system to fail prematurely, venting the cylinder contents. For other precautions, see section 16.

### OTHER HAZARDOUS CONDITIONS OF HANDLING, STORAGE, AND USE:

**High pressure gas!!!** Clean all gauges, valves, regulators, piping and equipments as in Oxygen service. Never substitute Carbon Dioxide equipment for Nitrous Oxide unless the equipment has been disassembled and cleaned for Oxygen service. Use piping and equipment adequately designed to withstand pressures to be encountered. Keep cylinders free from oil and grease. **Gas can cause rapid suffocation due to oxygen deficiency.** Store and use with adequate ventilation. Close valve after each use; keep closed even when empty. **Prevent reverse flow.** Reverse flow into cylinder may cause rupture. Use a check valve or other protective device in any line or piping from the cylinder. **When returning cylinder to supplier,** be sure valve is closed, then install valve outlet plug tightly. **Never work on a pressurized system.** If there is a leak close the cylinder valve. Blow the system down in a safe and an environmentally sound manner in compliance with all the federal and local laws and then repair leak. **Never place a compressed gas cylinder where it may become part of an electrical circuit.**

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## 8. Exposure Controls/Personal Protection

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### VENTILATION/ENGINEERING CONTROLS:

**LOCAL EXHAUST:** Use a local exhaust system, if necessary, to maintain an adequate supply of oxygen in the worker's breathing zone.

**MECHANICAL (general):** Acceptable if it can maintain an adequate supply of oxygen in the worker's breathing zone.

**SPECIAL:** None.

**OTHER:** None.

### PERSONAL PROTECTION:

**RESPIRATORY PROTECTION:** Use air supplied respirator or a full face, positive pressure, self contained breathing apparatus. Select in accordance with the provincial regulations or guidelines. Respirators should be approved by NIOSH and MSHA.

**SKIN PROTECTION:** Wear clean work gloves free from grease, oil or dust when handling cylinders.

**EYE PROTECTION:** Wear safety glasses when handling cylinders. Select in accordance with the current CSA standard Z94.3, "Industrial Eye and Face Protection", and any provincial regulations, local bylaws or guidelines.

**OTHER PROTECTIVE EQUIPMENT:** Metatarsal shoes for cylinder handling. Protective clothing where needed.

### 9. Physical and Chemical Properties

<b>PHYSICAL STATE:</b> Gas @ NTP	<b>MELTING POINT:</b> -131.48°C (-90.82°F)	<b>pH:</b>	Not applicable.
<b>BOILING POINT:</b> -127.26°C (-88.48°F)	<b>VAPOUR PRESSURE:</b> 759.7psia.	<b>MOLECULAR WEIGHT:</b>	44.0128 g/mole
<b>GAS DENSITY:</b> 1.947 kg/m <sup>3</sup> @ 21.1°C	<b>SOLUBILITY IN WATER v/v at 20°C:</b> 0.68	<b>DECOMPOSITION TEMPERATURE:</b>	650°C
<b>SPECIFIC GRAVITY:</b> 1.5297 @ 21.1 C VAPOUR (Air = 1)	<b>EVAPORATION RATE (Butyl Acetate=1):</b> High.	<b>COEFFICIENT OF WATER/OIL DISTRIBUTION:</b>	Not applicable.
<b>LIQUID DENSITY @ 25°C:</b> 0.742 g/cm <sup>3</sup>	<b>% VOLATILES BY VOLUME:</b> 100% (v/v).	<b>ODOUR THRESHOLD:</b>	Not available
<b>APPEARANCE &amp; ODOUR:</b> Colourless.	Slightly sweet		

### 10. Stability and Reactivity

<b>STABILITY:</b>	The product is stable.
<b>CONDITIONS TO AVOID:</b>	Contact with incompatible materials, heating to decomposition.
<b>INCOMPATIBILITY (materials to avoid):</b>	Flammable materials, hydrocarbon such as oil and grease, asphalt, ethers, alcohols, acids and aldehydes. Alkali metals, boron, tungsten carbide and powdered aluminium.
<b>HAZARDOUS DECOMPOSITION PRODUCTS:</b>	Nitrous Oxide decomposes explosively at 650°C to form 2 parts of Nitrogen and One part of Oxygen. In presence of catalytic surfaces like Silver, Platinum, Cobalt, and Copper or Nickel Oxides, this reaction occurs at lower temperatures .
<b>POSSIBILITY OF HAZARDOUS REACTIONS:</b>	May occur. May decompose explosively at high temperature

### 11. Toxicological Information

**ACUTE DOSE EFFECTS:** Not Available

**STUDY RESULTS: *Reproductive toxicity.*** Exposure to Nitrous Oxide has produced embryofetal 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 increase incidence of abortion in humans. ***Effects on Blood and Tissues.*** Single prolonged exposure to high concentrations of Nitrous Oxide has resulted in bone marrow injury and adverse effects on the blood.

### 12. Ecological Information

No adverse ecological effects expected. This product does not contain any Class I or Class II ozone-depleting chemicals. The components of this mixture are not listed as marine pollutants by TDG Regulations.

### 13. Disposal Considerations

**WASTE DISPOSAL METHOD:** Do not attempt to dispose of residual or unused quantities. Return cylinder to supplier.

## 14. Transport Information

**DOT/IMO SHIPPING NAME:** Nitrous Oxide, Compressed

**HAZARD CLASS:** CLASS: 2.2 **IDENTIFICATION #:** UN1070

Non-flammable, non-corrosive and, non-poisonous gas.

**SHIPPING LABEL(s):** Non-flammable, oxidizer

**PLACARD (when required):** Non-flammable, oxidizer

### SPECIAL SHIPPING INFORMATION:

Cylinders should be transported in a secure position, in a well-ventilated vehicle. Cylinders transported in an enclosed, non-ventilated compartment of vehicle can present serious safety hazards. Compressed gas cylinders shall not be refilled without the express written permission of the owner. Shipment of a compressed gas cylinder which has not been filled by the owner or with/her written consent is a violation of transportation regulations.

## 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, provincial, and local regulations.

**WHMIS (Canada)** CLASS A: Compressed gas.

### International Regulations

**TSCA** Nitrous Oxide is listed on the TSCA inventory.

**OSHA** Nitrous Oxide is not listed in Appendix A as a Highly Hazardous chemical

## 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.

### HAZARD RATING SYSTEM:

HMIS RATINGS:		NFPA RATINGS:	
HEALTH	1	HEALTH	2
FLAMMABILITY	0	FLAMMABILITY	0
PHYSICAL HAZARD	3	PHYSICAL HAZARD	0
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### CONNECTION and RECOMMENDED EQUIPMENT:

Use the proper connections. Additional limited-standard connections may apply. In semiconductor process gas and other suitable applications, it is recommended to use engineering controls such as cabinet gas enclosures, automatic gas panels (used to purge systems on cylinder change out), excess-flow valves throughout the gas distribution system, double containment for the distribution system and gas monitors.

**Disclaimer:** The opinions expressed herein are those of qualified experts within Ellenbarrie Industrial Gases Limited. We believe that the information contained herein is current as of the date of this Material Safety Data Sheet. Since the use of this information and the conditions of use of the product are not within the control of Ellenbarrie Industrial Gases Limited, it is the user's obligation to determine the conditions of safe use of the product.

Ellenbarrie Industrial Gases Limited requests the users of this product to study this Material Data Sheet (MSDS) and become aware of product hazards and safety information. To promote safe use of this product, a user should (1) notify its employees, agents and contractors of the information on this MSDS and any product hazards and safety information, (2) furnish this same information to each of its customers for the product, and (3) request such customers to notify their employees and customers for the product of the same product hazards and safety information.

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