Praxair Material Safety Data Sheet

1. Chemical Product and Company Identification

Product Name:	Nitrous Oxide	**Trade Name:**	Nitrous Oxide
Product Use:	Many.		
Chemical Name:	Nitrous Oxide	**Synonym:**	Dinitrogen Monoxide, Nitrogen (I) Oxide, Factitious Air, Hyponitrous Acid Anhydride, Laughing Gas
Chemical Formula:	N_2O	**Chemical Family:**	Oxide. (Oxidizing agent.)
Telephone:	**Emergencies:** * 1-800-363-0042	**Supplier /Manufacture:**	Praxair Canada Inc. 1 City Centre Drive Suite 1200 Mississauga, ON L5B 1M2
		Phone:	905-803-1600
		Fax:	905-803-1682

**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 Praxair sales representative.*

2. Composition and Information on Ingredients

INGREDIENTS	% (VOL)	CAS NUMBER	LD_{50} (Species & Routes)	LC_{50} (Rat, 4 hrs.)	TLV-TWA (ACGIH)
Nitrous oxide	100	10024-97-2	Not applicable.	Not available.	50 ppm

3. Hazards Identification

Emergency Overview

WARNING! High pressure, oxidizing 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.

ROUTES OF EXPOSURE: Inhalation. Swallowing. Skin contact. Eye contact.

THRESHOLD LIMIT VALUE: TLV-TWA Data from 2004 Guide to Occupational Exposure Values (ACGIH). 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, euphoria, dizziness, drowsiness, and incorordination, and narcosis. Exposure to concentrations of 50% and greater will produce clinical anaesthesia. High concentration may cause asphyxia and death. Lack of oxygen can cause death.
SKIN CONTACT:	Cryogenic burns (similar to severe frostbite) may occur as a result of the rapid evaporation of the liquefied gas.
SKIN ABSORPTION:	No evidence of adverse effects from available information.

SWALLOWING:	An unlikely route of exposure. This product is a gas at room temperature and pressure, but frostbite of the lips and mouth may result from contact with the liquid.
EYE CONTACT:	Cryogenic burns to the eyes may occur as a result of contact with the liquefied gas.

EFFECTS OF REPEATED (CHRONIC) OVEREXPOSURE:
Metabolic injury to the nervous system has resulted from frequent exposure to anaesthetic concentrations of this material. Complaints include numbness, tingling of the hands and legs, loss of feeling in fingers, poor balance, and muscular weakness.

OTHER EFFECTS OF OVEREXPOSURE:
Exposure to this product 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 this product may be associated with an increased incidence of abortion in humans. Single prolonged exposure to high concentrations of this material has resulted in bone marrow injury and adverse effects on the blood.

MEDICAL CONDITIONS AGGRAVATED BY OVEREXPOSURE:
Haemostatic gases in general, and this product in particular, may suppress immunological function when administered for anaesthetic purposes. This may reduce the resistance to infection and other immuno-dependent disease processes.

SIGNIFICANT LABORATORY DATA WITH POSSIBLE RELEVANCE TO HUMAN HEALTH HAZARD EVALUATION:
None currently known.

CARCINOGENICITY:
Not listed as carcinogen by OSHA, NTP or IARC.

4. First Aid Measures

INHALATION:
If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

SKIN CONTACT:
If exposed to liquid, avoid breathing vapour. Immediately warm frostbite area with warm water (not to exceed 40 C). In case of massive exposure, remove clothing and shoes while showering with warm water. Get medical attention immediately.

SWALLOWING:
This product is a gas at normal temperature and pressure.

EYE CONTACT:
For contact with the liquid, immediately flush eyes throughly with warm water for at least 15 minutes. Hold the eyelids open and away from the eyeballs to ensure that all surfaces are flushed thoroughly. See a physician, preferably an ophthalmologist, immediately.

NOTES TO PHYSICIAN:
Nitrous oxide may cause vitamin B12 deficiency. Megaloblastic anemia and nervous system disorders can occur as a result of this chemically induced deficiency.

5. Fire Fighting Measures

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:

Oxidizing agent. Vigorously accelerates combustion. Use media appropriate for surrounding fire.

SPECIAL FIRE FIGHTING PROCEDURES:

WARNING Evacuate all personnel from danger area. Do not approach area without self-contained breathing apparatus and protective clothing. Immediately cool containers with water spray from maximum distance until cool then move containers away from fire area if without risk. If containers are leaking, reduce vapours with water spray or fog. Shut off leak if without risk. Move containers away form fire area if without risk.

UNUSUAL FIRE AND EXPLOSION HAZARD:

Oxidizing agent, may accelerate combustion. Contact with flammable materials may cause fire or explosion. Container may rupture due to heat of fire. Decomposes explosively at high temperature. Vapours form from this product and may spread. Flammable vapours form from this product can be ignited by pilot lights, other flames, smoking, sparks, heaters, electrical equipment, static discharges, or other ignition sources at locations distant from product handling point. Most containers are provided with a pressure relief device designed to vent contents when they are exposed to elevated temperature.

HAZARDOUS COMBUSTION PRODUCTS:

This product decomposes explosively at high temperature forming a mixture of nitrogen and oxygen in a 2:1 ratio respectively. This reaction will occur at lower temperatures in the presence of a catalytic surface such as silver, platinum, cobalt, copper oxides or nickel oxides.

SENSITIVITY TO IMPACT:

Avoid impact against container.

SENSITIVITY TO STATIC DISCHARGE:

Possible.

6. Accidental Release Measures

STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED:

WARNING! Immediately evacuate all personnel from danger area. Use self-contained breathing apparatus where needed. Contact with flammable materials may cause fire or explosion. Reduce vapours with fog or fine water spray. Shut off leak if without risk. Ventilate area of leak or move leaking container to well ventilated area. Flammable vapours may spread from spill. Before entering area, especially confined areas, check atmosphere with appropriate device.

WASTE DISPOSAL METHOD:

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

7. Handling and Storage

PRECAUTIONS TO BE TAKEN IN STORAGE:

Store and use with adequate ventilation. Separate flammable cylinders from oxygen, chlorine, and other oxidizers by at least 6 m or use a barricade of non-combustible material. This barricade should be at least 1.5 m high and have a fire resistance rating of at least ½ hour. Firmly secure cylinders upright to keep them from falling or being knocked over. Screw valve protection cap firmly in place by hand. Post "No Smoking or Open Flames" signs in storage and use areas. There must be no sources of ignition. All electrical equipment in storage areas must be explosion-proof. Storage areas must meet national electric codes for Class 1 hazardous areas. Store only where temperature will not exceed 52 C. Store full and empty cylinders separately. Use a first-in, first-out inventory system to prevent storing full cylinders for long periods. For full details and requirements, see NFPA 43C, "Code for the Storage of Gaseous Oxidizing Materials", published by the National Fire Protection Association.

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, 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. For other precautions, see Section 16.

For additional information on stroage and handling, refer to Compressed Gas Association (CGA) pamphlet P-1, *Safe Handling of Compressed Gases in Containers*, available from the CGA. Refer to Section 16 for the address and phone number along with a list of other available publications.

OTHER HAZARDOUS CONDITIONS OF HANDLING, STORAGE, AND USE:

High-pressure, oxidizing gas. Use piping and equipment adequately designed to withstand pressures to be encountered. ***Vigorously accelerates combustion.*** *Keep oil, grease, and combustibles away.* ***Store and use with adequate ventilation at all times.*** *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. Vent the system down in a safe and environmentally sound manner in compliance with all federal, provincial, and local laws; then repair the leak.* ***Never place a compressed gas cylinder where it may become part of an electrical circuit.***

8. Exposure Controls/Personal Protection

VENTILATION/ENGINEERING CONTROLS:

LOCAL EXHAUST:	Acceptable. See SPECIAL.
MECHANICAL (general):	Inadequate. See SPECIAL.
SPECIAL:	Use only in a closed system conditioned for nitrous oxide service.
OTHER:	See SPECIAL.

PERSONAL PROTECTION:

RESPIRATORY PROTECTION:	Use respirable fume respirator or air supplied respirator when working in confined space or where local exhaust or ventilation does not keep exposure below TLV. Select in accordance with the provincial regulations or guidelines. Selection should also be based on the current CSA standards Z94.4, "Selection, care and use of respirators". Respirators should be approved by NIOSH and MSHA.
SKIN PROTECTION:	Wear work gloves 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. Cuffless trousers should be worn outside the shoes. Select in accordance with the current CSA standard Z195, "Protective Foot Wear", and any provincial regulations, local bylaws or guidelines.

9. Physical and Chemical Properties

PHYSICAL STATE:	Gas. (Compressed Gas.)	**FREEZING POINT:**	-90.8°C (-131.4°F)	**pH:**	Not applicable.
BOILING POINT	-88.5°C (-127.3°F)	**VAPOUR PRESSURE**	5235.6 kPa (@ 20°C)	**MOLECULAR WEIGHT:**	44.0128 g/mole
SPECIFIC GRAVITY: LIQUID (Water = 1)	1.226 @ -89 C	**SOLUBILITY IN WATER,**	Slight.		
SPECIFIC GRAVITY: VAPOUR (air = 1)	1.53 @ 20 C	**EVAPORATION RATE** (Butyl Acetate=1):	Not applicable.	**COEFFICIENT OF WATER/OIL DISTRIBUTION:**	Not applicable.
VAPOUR DENSITY:	0.00195 g/ml @ 21.1 C	**% VOLATILES BY VOLUME:**	100% (v/v).	**ODOUR THRESHOLD:**	Not available.

APPEARANCE & ODOUR: Colourless. Odour: Sweet. (Slight.)

10. Stability and Reactivity

STABILITY:	The product is stable.
CONDITIONS OF CHEMICAL INSTABILITY:	Elevated temperatures and pressures and/or presence of a catalyst.
INCOMPATIBILITY (materials to avoid):	Oils, greases, flammable materials, alkali metals, powdered aluminum, boron, and tungsten carbide.
HAZARDOUS DECOMPOSITION PRODUCTS:	This product decomposes explosively at high temperature forming a mixture of nitrogen and oxygen in a 2:1 ratio respectively. This reaction will occur at lower temperatures in the presence of a catalytic surface such as silver, platinum, cobalt, copper oxides or nickel oxides.
HAZARDOUS POLYMERIZATION:	Will not occur.
CONDITIONS OF REACTIVITY:	None.

11. Toxicological Information

See section 3.

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

TDG/IMO SHIPPING NAME: Nitrous Oxide

HAZARD CLASS:	IDENTIFICATION #:	PRODUCT RQ:
CLASS 2.2: Non-flammable, non-corrosive and non-poisonous gas. CLASS 5.1: Oxidizing material.	UN1070	100 L

SHIPPING LABEL(s): Non-flammable, non-poisonous gas, Special/Oxidizer with Class 2 at bottom.

PLACARD (when required): Non-flammable, non-poisonous gas, Special/Oxidizer with Class 2 at bottom.

SPECIAL SHIPPING INFORMATION:

Cylinders should be transported in a secure position, in a well-ventilated vehicle. Cylinders transported in an enclosed, nonventilated compartment of vehicle can present serious safety hazards.

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.
CLASS C: Oxidizing material.
CLASS D-2A: Material causing other toxic effects (VERY TOXIC).

International Regulations

EINECS Not available.

DSCL (EEC)

International Lists No products were found.

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:

HEALTH **2**
FLAMMABILITY **0**
PHYSICAL HAZARD **0**

STANDARD VALVE CONNECTIONS FOR U.S. AND CANADA:

THREADED:	CGA-326
PIN-INDEXED YOKE:	CGA-910 (medical use)
ULTRA-HIGH-INTEGRITY CONNECTION:	CGA-712

Use the proper CGA connections. **DO NOT USE ADAPTERS.** Additional limited-standard connections may apply. See CGA pamphlets V-1 and V-7 listed below.

Ask your supplier about free Praxair safety literature as referred to in this MSDS and on the label for this product. Further information about this product can be found in the following pamphlets published by the Compressed Gas Association, Inc. (CGA), 4221 Walney Road, 5th Floor, Chantilly, VA 20151-2923, Telephone (703) 788-2700, Fax (703) 961-1831, website: www.cganet.com.

AV-1	Safe Handling and Storage of Compressed Gas
AV-8	Characteristics and Safe Handling of Cryogenic Liquid and Gaseous Oxygen
G-4.1	Cleaning Equipment for Oxygen Service
G-8.1	Standard for Nitrous Oxide Systems at Consumer Sites
G-8.2	Commodity Specification for Nitrous Oxide
P-1	Safe Handling of Compressed Gases in Containers
P-2	Characteristics and Safe Handling of Medical Gases
P-14	Accident Prevention in Oxygen-Rich, Oxygen-Deficient Atmospheres
SB-2	Oxygen-Deficient Atmospheres
SB-6	Nitrous Oxide Security and Control
V-1	Compressed Gas Cylinder Valve Inlet and Outlet Connections
V-7.1	Standard Method of Determining Cylinder Valve Outlet Connections for Medical Gas Mixtures
---	Handbook of Compressed Gases, Fourth Edition

PREPARATION INFORMATION:

DATE:	**10/15/2004**
DEPARTMENT:	**Safety and Environmental Services**
TELEPHONE:	**905-803-1600**

The opinions expressed herein are those of qualified experts within Praxair Canada Inc. 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 Praxair Canada Inc., it is the user's obligation to determine the conditions of safe use of the product.

Praxair Canada Inc. 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 nformation, (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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