

1. Identification

Product Identifier : Nitrous Oxide
 Other means of identification : Dinitrogen Oxide, Nitrogen Oxide, Nitrous Oxide, N₂O, Laughing gas, UN 1070
 Product use : Synthetic, Analytical chemistry
 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

OSHA/HCS status : This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).
 Classification of the substance or mixture : Oxidizing Gases
 Gases under pressure – Compressed gas
 Specific target organ toxicity (single exposure) (narcotic effects)

GHS label elements

Hazard pictograms :



Signal word : Danger
 Hazards statements : Contains gas under pressure; may explode if heated
 May cause or intensify fire; oxidizer
 May displace oxygen and cause rapid suffocation.
 May cause drowsiness and dizziness.
 May cause frostbite.

Precautionary statements

General : Read and follow all Safety Data Sheets (SDS'S) before use. Read label before use. Keep out of reach of children. If medical advice is needed, have product container or label at hand. Close valve after each use and when empty. Use equipment rated for cylinder pressure. Do not open valve until connected to equipment prepared for use. Use a back flow preventative device in the piping. Use only equipment of compatible materials of construction. Open valve slowly. Use only with equipment cleaned for Oxygen service.
 Prevention : Keep away from clothing, incompatible materials and combustible materials. Keep reduction valves free from grease and oil. Use only outdoors or in a well-ventilated area. Avoid breathing gas. Use and store only outdoors or in a well ventilated place.
 Response : In case of fire: Stop leak if safe to do so.
 IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER or doctor/physician if you feel unwell.

- Storage : Store locked up. Protect from sunlight. Protect from sunlight when ambient temperature exceeds 40C/104F. Store in a well-ventilated place.
- Disposal : Dispose in accordance with all applicable regulations.
- Hazards not otherwise classified : In addition to any other important health or physical hazards, this product may displace oxygen and cause rapid suffocation.

3. Composition, Information on Ingredients

- Substance/Mixture : Substance
- Chemical Name : Dinitrogen oxide
- Synonyms : Dinitrogen Oxide, Nitrogen Oxide, Nitrous Oxide, N₂O, Laughing gas, UN 1070
- CAS Number : 10024-97-2
- Content (vo%) : 99.5 % or more

There are no additional ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health or the environment and hence require reporting in this section.

Occupational exposure limits, if available, are listed in Section 8.

4. First Aid Measures

Description of necessary first aid measures

- Inhalation : Remove exposed person to fresh air and keep at rest in a position comfortable for breathing. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. If not breathing, if breathing is irregular, or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Get medical attention. If necessary, call a poison center or physician. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband. In case of inhalation of decomposition products in a fire, symptoms may be delayed. The exposed person may need to be kept under medical surveillance for 48 hours.
- Skin Contact : Flush contaminated skin with plenty of water. Remove contaminated clothing and shoes. Get medical attention if symptoms occur. Wash clothing before reuse. Clean shoes thoroughly before reuse.
- Eye Contact : Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Check for and remove any contact lenses. Continue to rinse for at least 10 minutes. Get medical attention if irritation occurs.
- Ingestion : Since this product is a gas, refer to the inhalation section.

Most important symptoms/effects, acute and delayed

Potential acute health effects

- Inhalation : Can cause central nervous system (CNS) depression. May cause drowsiness and dizziness. Exposure to decomposition products may cause a health hazard. Serious effects may be delayed following

	exposure.
Skin Contact	: May cause skin irritation. Contact with rapidly expanding gas may cause burns or frostbite.
Eye Contact	: May cause eye irritation. Contact with rapidly expanding gas may cause burns or frostbite.
Frostbite	: Try to warm up the frozen tissues and seek medical attention.
Ingestion	: Can cause central nervous system (CNS) depression. As this product is a gas, refer to the inhalation section.

Over-exposure signs/symptoms

Inhalation	: Adverse symptoms may include the following: nausea or vomiting, headache, drowsiness/fatigue, dizziness/vertigo, unconsciousness
Skin Contact	: No specific data.
Eye Contact	: No specific data.
Ingestion	: No specific data.

Indication of immediate medical attention and special treatment needed, if necessary

Notes to physician	: In case of inhalation of decomposition products in a fire, symptoms may be delayed. The exposed person may need to be kept under medical surveillance for 48 hours.
Specific treatments	: No specific treatment.
Protection of first-aiders	: 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.

5. Fire Fighting Measures**Extinguishing media**

Suitable extinguishing media	: Use an extinguishing agent suitable for the surrounding fire.
Unsuitable extinguishing media	: None known.
Specific hazards arising from the chemical	: Contains gas under pressure. Oxidizing material. This material increases the risk of fire and may aid combustion. Contact with combustible material may cause fire. In a fire or if heated, a pressure increase will occur and the container may burst or explode.
Hazardous thermal decomposition products	: Decomposition products may include the following materials: Nitrogen Oxides
Special protective actions for fire-fighters	: Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training. Contact supplier immediately for specialist advice. Move containers from fire area if this can be done without risk. Use water spray to keep fire-exposed containers cool. If involved fire, shut off flow immediately if it can be done without risk.

Special protective equipment for fire-fighters : Fire-fighters should wear appropriate equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

6. Accidental Release Measures

Personal precautions, protective equipment and emergency procedures

- For non-emergency personnel : No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Shut off all ignition sources. No flares, smoking or flames in hazard area. Avoid breathing gas. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment.
- For emergency responders : If specialized clothing is required to deal with the spillage, take note of any information in Section 8 on suitable and unsuitable materials. See also the information in "For non-emergency personnel".
- Environmental precautions : Ensure emergency procedures to deal with accidental gas releases are in place to avoid contamination of the environment. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air).

Methods and materials for containment and cleaning up

- Small spill : Immediately contact emergency personnel. Stop leak if without risk. Use spark-proof tools and explosion-proof equipment.
- Large spill : Immediately contact emergency personnel. Stop leak if without risk. Use spark-proof tools and explosion-proof equipment. Note: see Section 1 for emergency contact information and Section 13 for waste disposal.

7. Handling and Storage

Precautions for safe handling

- Protective measures : Put on appropriate personal protective equipment (see Section 8). Contains gas under pressure. Avoid contact with eyes, skin and clothing. Avoid breathing gas. Use only with adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Keep away from clothing, incompatible materials and combustible materials. Keep reduction valves free from grease and oil. Empty containers retain product residue and can be hazardous. Do not puncture or incinerate container. Use equipment rated for cylinder pressure. Close valve after each use and when empty. Protect cylinders from physical damage; do not drag, roll, slide, or drop. Use a suitable hand truck for cylinder movement.
- Advice on general occupational hygiene : Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. See also Section 8 for additional information on hygiene measures.
- Conditions for safe storage, including any : Store in accordance with local regulations. Store in a segregated and approved area. Store away from direct sunlight in a dry, cool and

incompatibilities

well-ventilated area, away from incompatible materials (see Section 10). Store locked up. Separate from acids, alkaline, reducing agents and combustibles. Keep container tightly closed and sealed until ready for use. Cylinders should be stored upright, with valve protection cap in place, and firmly secured to prevent falling or being knocked over. Cylinder temperatures should not exceed 40C (104F).

8. Exposure Controls and Personal Protection

Control parameters

Occupational exposure limits

Ingredient name	Exposure limits
Dinitrogen Oxide	ACGIH TLV (United States, 6/20/13) TWA: 90 mg/m ³ , 8 hours TWA: 50 ppm, 8 hours NIOSH REL (United States, 4/20/13) TWA: 46 mg/m ³ , 10 hours TWA: 25 ppm, 10 hours

Appropriate 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.

Environmental exposure control : Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.

Individual protection measures

Hygiene measures : Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking, using the lavatory and at the end of your shift. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.

Eye/Face protection : Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists, gases or dusts. If contact is possible, the following protection should be worn, unless the assessment indicates a higher degree of protection: safety glasses with side-shields.

Skin protection

Hand protection : Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary. Considering the parameters specified by the glove manufacturer, check during use that the gloves are still retaining their protective properties. It should be noted that the time to

- breakthrough for any glove material may be different for different glove manufacturers. In the case of mixtures, consisting of several substances, the protection time of the gloves cannot be accurately estimated.
- Body protection : Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.
- Other skin protection : Appropriate footwear and any additional skin protection measures should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.
- Respiratory protection : Use a properly fitted, air-purifying or air-fed respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.

9. Physical and Chemical Properties

Appearance

- Physical state : Gas [Compressed gas]
- Color : Colorless
- Molecular weight : 44.01 g/mol
- Molecular formula : N₂O
- Boiling/condensation point : -88.5C (-127.3F)
- Melting/freezing point : -90.8C (-131.4F)
- Critical temperature : 36.55C (97.8F)
- Odor : Characteristic
- Odor threshold : Not available.
- pH : Not available.
- Flash point : [Product does not sustain combustion.]
- Burning time : Not applicable.
- Burning rate : Not applicable.
- Evaporation rate : Not available.
- Flammability (solid, gas) : Extremely flammable in the presence of the following materials or conditions: reducing materials, combustible materials and organic materials.
- Lower and upper explosive (flammable) limits : Not available.
- Vapor pressure : 745 psig
- Vapor density : 1.53 (Air = 1) Liquid Density@BP: 76.8 lb/ft³ (1230 kg/m³)
- Specific Volume : 8.6957 ft³/lb
- Gas Density : 0.115 lb/ft³
- Relative density : Not applicable.
- Solubility : Not available.
- Solubility in Water : 1.2 g/l
- Partition coefficient: n-octanol/water : 0.36

Auto-ignition temperature : Not available.
 Decomposition temperature : Not available.
 SADT : Not available.
 Viscosity : Not applicable.

10. Stability and Reactivity

Reactivity : No specific test data related to reactivity is available for this product or its ingredients.
 Chemical stability : The product is stable.
 Possibility of hazardous reactions : Hazardous reactions or instability may occur under certain conditions of storage or use. Conditions may include the following: contact with combustible materials
 Reactions may include the following: risk of causing fire
 Conditions to avoid : No specific data.
 Incompatibility with various substances : Extremely reactive or incompatible with the following materials: oxidizing materials, reducing materials and combustible materials.
 Hazardous decomposition products : Under normal conditions of storage and use, hazardous decomposition products should not be produced.
 Hazardous polymerization : Under normal conditions of storage and use, hazardous polymerization will not occur.

11. Toxicological Information

Information on toxicological effects

Acute toxicity : Not available.
 Irritation / Corrosion : Not available.
 Sensitization : Not available.
 Mutagenicity : Not available.
 Carcinogenicity : Not available.
 Reproductive toxicity : Not available.

Classification :	Product name	OSHA	IARC	NTP
	Dinitrogen Oxide	-	3	-

Teratogenicity : Not available.

Specific target organ toxicity (single exposure) :	Product name	Category	Route of exposure	Target organs
	Dinitrogen Oxide	3	Not applicable	Narcotic effects

Specific target organ toxicity (repeated exposure) : Not available.

Aspiration hazard : Not available.

Information on the likely routes of exposure : Not available.

Potential acute health effects

Eye contact : May cause eye irritation. Contact with rapidly expanding gas may cause burns or frostbite.

Inhalation : Can cause central nervous system (CNS) depression. May cause drowsiness and dizziness. Exposure to decomposition products may

cause a health hazard. Serious effects may be delayed following exposure.

- Skin contact : May cause skin irritation. Contact with rapidly expanding gas may cause burns or frostbite.
- Ingestion : Can cause central nervous system (CNS) depression. Since this product is a gas, refer to the inhalation section.

Symptoms related to the physical, chemical and toxicological characteristics

- Eye contact : No specific data.
- Inhalation : Adverse symptoms may include the following: nausea or vomiting, headache, drowsiness/fatigue, dizziness/vertigo, unconsciousness
- Skin contact : No specific data.
- ingestion : No specific data.

Delayed and immediate effects and also chronic effects from short and long term exposure

Short term exposure

- Potential immediate effects : Not available.
- Potential delayed effects : Not available.

Long term exposure

- Potential immediate effects : Not available.
- Potential delayed effects : Not available.

Potential chronic health effects – Not available.

- General : No known significant effects or critical hazards.
- Carcinogenicity : No known significant effects or critical hazards.
- Mutagenicity : No known significant effects or critical hazards.
- Teratogenicity : No known significant effects or critical hazards.
- Developmental effects : No known significant effects or critical hazards.
- Fertility effects : No known significant effects or critical hazards.

Numerical measures of toxicity

- Acute toxicity estimates : Not available.

12. Ecological Information

- Toxicity : Not available.
- Persistence and degradability : Not available.

Bioaccumulative potential

Product/Ingredient name	Log P _{ow}	BCF	Potential
Dinitrogen Oxide	0.36	-	low

Mobility in soil

- Soil/Water partition coefficient (K_{oc}) : Not available.
- Other adverse effects : No known significant effects or critical hazards.

13. Disposal Considerations

- Discharge of Nitrous Oxide : Gradually release in open air.

- 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 / IMDG : Nitrous Oxide
- Shipping Name
- UN Number : UN 1070
- Hazard Class : 2.2 (5.1)
- 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 : None of this products components are listed under SARA Sections 302/304 (40 CFR 355 Appendix A), SARA Section 313 (40 CFR 372.65), CERCLA (40 CFR 302.4), TSCA 12(b), or require an OSHA process safety plan.

- SARA 311/312 : Fire hazard : Yes
- Hazardous Categories : Sudden release of pressure : Yes
- : Reactive : No
- : Immediate (acute) health hazard : Yes
- : Delayed (chronic) health hazard : No

- State Regulations : Massachusetts : This material is listed.
- : New York : This material is not listed.
- : New Jersey : This material is listed.
- : Pennsylvania : This material is listed.
- : California : This material is not listed.

- International Regulations : Canada inventory : This material is listed or exempted.
- : Australia inventory (AICS) : This material is listed or exempted.
- : China inventory (IECSC) : This material is listed or exempted.

Japan inventory	This material is listed or exempted.
Korea inventory	This material is listed or exempted.
Malaysia inventory (EHS Register)	Not determined.
New Zealand inventory of Chemicals (NZIoC)	This material is listed or exempted.
Philippines inventory (PICCS)	This material is listed or exempted.
Taiwan inventory (CSNN)	Not determined.

16. Other Information

Hazard Rating Systems

: **NFPA Ratings**

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

HMIS Ratings

Health = 1
Flammability = 0
Physical hazards = 3

Key to abbreviations

ACGIH	: American Conference of Governmental Industrial Hygienists
BCF	: Bioconcentration Factor
CAS	: Chemical Abstract Services
CERCLA	: Comprehensive Environmental Response, Compensation, and Liability Act
CFR	: United States Code of Federal Regulations
DOT	: Department of Transportation
GHS	: Globally Harmonized System of Classification and Labeling of Chemicals
IATA	: International Air Transport Association
IMDG	: International Maritime Dangerous Goods
Log P _{ow}	: Logarithm of the octanol/water partition coefficient
NIOSH	: National Institute for Occupational Safety and Health
OSHA	: Occupational Safety and Health Administration
STEL	: Short-term Exposure Limit
SARA	: Superfund Amendments and Reauthorization Act
TLV	: Threshold Limit Value
TSCA	: Toxic Substances Control Act
TWA	: Time Weighted Average

Notice to reader:

To the best of our knowledge, the information contained herein is accurate. However, neither the above-named supplier, nor any of its subsidiaries, assumes any liability whatsoever for the accuracy or completeness of the information contained herein.

Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee they are the only hazards that exist.