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Revision Date: 01-Jul-2024

Version 2

1. IDENTIFICATION

Product identifier**Product Name** Nitrous Oxide**Other means of identification****SDS #** EF-045**Synonyms** Dinitrogen monoxide, nitrogen (I) oxide, factitious air, hyponitrous acid anhydride, laughing gas.**UN/ID No** UN1070**Recommended use of the chemical and restrictions on use****Recommended Use** Synthetic/Analytical chemistry.**Details of the supplier of the safety data sheet****Supplier Address**EFC Gases & Advanced Materials
3266 Bergey Road
Hatfield, PA 19440
Email: efcsafety@efcgases.com**Emergency telephone number****Company Phone Number** 215-443-9600
Emergency Telephone INFOTRAC 1-352-323-3500 (International)
1-800-535-5053 (North America)

2. HAZARDS IDENTIFICATION

Appearance Colorless gas **Physical state** Compressed liquefied gas **Odor** Slightly sweet**Classification**

Specific target organ toxicity (single exposure)	Category 3
Oxidizing gases	Category 1
Gases under pressure	Liquefied gas

Signal Word**Danger****Hazard statements**May cause frostbite
May displace oxygen and cause rapid suffocation
May cause drowsiness or dizziness
May cause or intensify fire; oxidizer
Contains gas under pressure; may explode if heated



Precautionary Statements - Prevention

Wear cold insulating gloves/face shield/eye protection
 Avoid breathing dust/fume/gas/mist/vapors/spray
 Use only outdoors or in a well-ventilated area
 Keep/Store away from clothing/ combustible materials
 Keep reduction valves/valves and fittings free from oil and grease

Precautionary Statements - Response

IF exposed or concerned: Call a POISON CENTER or doctor
 Thaw frosted parts with lukewarm water. Do not rub affected area
 Get immediate medical advice/attention
 In case of fire: Stop leak if safe to do so

Precautionary Statements - Storage

Store in a well-ventilated place. Keep cool
 Store locked up
 Protect from sunlight

Precautionary Statements - Disposal

Dispose of in accordance with federal, state and local regulations

3. COMPOSITION/INFORMATION ON INGREDIENTS

Synonyms Dinitrogen monoxide, nitrogen (I) oxide, factitious air, hyponitrous acid anhydride, laughing gas.

Chemical name	CAS No	Weight-%
Nitrogen Oxide	10024-97-2	>99

If Chemical Name/CAS No is "proprietary" and/or Weight-% is listed as a range, the specific chemical identity and/or percentage of composition has been withheld as a trade secret.

4. FIRST AID MEASURES

Description of first aid measures

General Advice	In case of accident or if you feel unwell, seek medical advice immediately (show the label or SDS where possible).
Eye Contact	Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Immediate medical attention is required.
Skin Contact	For exposure to liquid, immediately warm frostbite area with warm water not to exceed 105°F (41°C). In case of massive exposure, remove contaminated clothing while showering with warm water. Obtain medical attention.
Inhalation	Remove to fresh air. If breathing is difficult, give oxygen. If not breathing, give artificial respiration. Call a POISON CENTER or doctor/physician.

Ingestion Not an expected route of exposure.

Self-Protection of the First Aider First aider: Pay attention to self-protection.

Most important symptoms and effects, both acute and delayed

Symptoms 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. (See section 11 for further information.).

Indication of any immediate medical attention and special treatment needed

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 immuno-dependent disease processes.

5. FIRE-FIGHTING MEASURES

Suitable Extinguishing Media

Nitrous oxide cannot catch fire. Use media appropriate for surrounding fire.

Unsuitable Extinguishing Media Not determined.

Specific Hazards Arising from the Chemical

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 spray 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. 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 lights, 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. Store between -5 degrees C to +50 degrees C.

Hazardous combustion products Toxic fumes.

Protective equipment and precautions for firefighters

As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures

Personal Precautions	High-pressure, oxidizing liquid and gas. Immediately evacuate all personnel from danger area. Use self-contained breathing apparatus where needed. Nitrous oxide is an asphyxiant. Lack of oxygen can kill. Vapors can spread from spill. Contact with flammable materials may cause fire or explosion. (See section 5.) Test for sufficient oxygen, especially in confined areas, before allowing reentry. Use self-contained breathing apparatus where needed. Shut off leak if without risk. Ventilate area of leak or move cylinder to a well-ventilated area.
For Emergency Responders	Use personal protection recommended in Section 8. Follow all fire fighting procedures in Section 5.

Environmental precautions

Environmental precautions	See Section 12 for additional Ecological Information.
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Methods and material for containment and cleaning up

Methods for Containment	Prevent further leakage or spillage if safe to do so.
Methods for Clean-Up	Prevent waste from contaminating the surrounding environment. Keep personnel away. 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 supplier for assistance.

7. HANDLING AND STORAGE

Precautions for safe handling

Advice on Safe Handling	Handle in accordance with good industrial hygiene and safety practice. Avoid breathing dust/fume/gas/mist/vapors/spray. Use only outdoors or in a well-ventilated area. Wear appropriate personal protective equipment. MIXTURES: When you mix two or more gases or liquefied gases, you can 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 evaluate the end product. Remember, gases and liquids have properties that can cause serious injury or death.
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Conditions for safe storage, including any incompatibilities

Storage Conditions	Store in accordance with local regulations. Store in a segregated and approved area. Store away from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10). 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 52 °C (125 °F).
Incompatible Materials	Flammable materials, hydrocarbons such as oils and grease, asphalt, ethers, alcohols, acids, and aldehydes. Alkali metals, boron, tungsten carbide, and powdered aluminum.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Exposure Guidelines

Chemical name	ACGIH TLV	OSHA PEL	NIOSH IDLH
Nitrogen Oxide 10024-97-2	TWA: 50 ppm	-	TWA: 25 ppm over the time exposed to waste anesthetic gas TWA: 46 mg/m ³ over the time exposed to waste anesthetic gas

Appropriate engineering controls

Engineering Controls Apply technical measures to comply with the occupational exposure limits. Use a local exhaust system, if necessary, to control the concentration of nitrous oxide in the worker's breathing zone.

Individual protection measures, such as personal protective equipment

Eye/Face Protection Refer to 29 CFR 1910.133 for eye and face protection regulations.

Skin and Body Protection Wear clean work gloves free of any oil and grease when handling cylinders. Refer to 29 CFR 1910.138 for appropriate skin and body protection.

Respiratory Protection Use an air-supplied respirator in a continuous-flow mode for concentrations up to 10 times the applicable permissible exposure limit. A self-contained breathing apparatus in a positive-pressure demand mode is required for higher concentrations. Refer to 29 CFR 1910.134 for respiratory protection requirements.

General Hygiene Considerations Handle in accordance with good industrial hygiene and safety practice.

9. PHYSICAL AND CHEMICAL PROPERTIES

Information on basic physical and chemical properties

Physical state	Compressed liquefied gas	Odor	Slightly sweet
Appearance	Colorless gas	Odor Threshold	Not determined
Color	Colorless		
<u>Property</u>	<u>Values</u>	<u>Remarks • Method</u>	
pH	No data available		
Melting point / freezing point	-90.8 °C / -131.4 °F		
Initial boiling point and boiling range	-88.5 °C / -127.3 °F		
Flash point	No data available		
Evaporation Rate	Not determined		
Flammability (Solid, Gas)	Not determined		
Flammability Limit in Air			
Upper flammability or explosive limits	No data available		
Lower flammability or explosive limits	No data available		
Vapor Pressure	745 (psig)		
Vapor Density	1.53	(Air=1)	
Relative Density	Not determined		
Water Solubility	1.2 g/l		
Solubility in other solvents	Not determined		
Partition Coefficient	0.36		
Autoignition temperature	No data available		
Decomposition temperature	Not determined		

Kinematic viscosity	Not determined
Dynamic Viscosity	Not determined
Explosive Properties	Not determined
Oxidizing Properties	May intensify fire; oxidizer

Other information

Molecular weight	44.01 g/mole
VOC Content	Molecular formula: N ₂ O
Liquid Density	Specific volume: 8.6957 ft ³ /lb
Bulk density	Gas density: 0.115 lb/ft ³

10. STABILITY AND REACTIVITY**Reactivity**

Not reactive under normal conditions.

Chemical stability

Stable under recommended storage conditions.

Possibility of hazardous reactions

None under normal processing.

Hazardous Polymerization Hazardous polymerization does not occur.

Conditions to Avoid

Incompatible Materials.

Incompatible materials

Flammable materials, hydrocarbons such as oils and grease, asphalt, ethers, alcohols, acids, and aldehydes. Alkali metals, boron, tungsten carbide, and powdered aluminum.

Hazardous decomposition products

Excess heat. Nitrous oxide decomposes explosively at 1202°F (650°C) 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.

11. TOXICOLOGICAL INFORMATION**Information on likely routes of exposure**

Product Information	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 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.
Eye Contact	Avoid contact with eyes.
Skin Contact	Contact with liquid or refrigerated gas can cause cold burns and frostbite.
Inhalation	Acts as a simple asphyxiant.
Ingestion	Not an expected route of exposure.

Component Information

Not available

Symptoms related to the physical, chemical and toxicological characteristics

Symptoms Please see section 4 of this SDS for symptoms.

Delayed and immediate effects as well as chronic effects from short and long-term exposure

Carcinogenicity Group 3 IARC components are "not classifiable as human carcinogens".

Chemical name	ACGIH	IARC	NTP	OSHA
Nitrogen Oxide 10024-97-2		Group 3		

Numerical measures of toxicity

The following values are calculated based on chapter 3.1 of the GHS document Not determined

12. ECOLOGICAL INFORMATION

Ecotoxicity

No adverse ecological effects expected. Nitrous oxide does not contain any Class I or Class II ozone depleting chemicals.

Persistence/Degradability

Not determined.

Bioaccumulation

There is no data for this product.

Mobility

Chemical name	Partition coefficient
Nitrogen Oxide 10024-97-2	0.4

Other adverse effects

Not determined

13. DISPOSAL CONSIDERATIONS

Waste Treatment Methods

Disposal of Wastes Release residual or unused quantities using inhaler. Discard cylinder. Never touch used cylinder or turn upside down in your hand. Discard directly into garbage for inhaler.

Contaminated Packaging Disposal should be in accordance with applicable regional, national and local laws and regulations.

14. TRANSPORT INFORMATION

Note Please see current shipping paper for most up to date shipping information, including exemptions and special circumstances.

DOT
UN/ID No UN1070
Proper Shipping Name Nitrous Oxide
Transport hazard class(es) 2.2
Subsidiary Hazard Class 5.1

IATA
UN number or ID number UN1070
Proper Shipping Name Nitrous oxide
Transport hazard class(es) 2.2
Subsidiary hazard class 5.1

IMDG
UN number or ID number UN1070
Proper Shipping Name Nitrous Oxide
Transport hazard class(es) 2.2
Subsidiary Hazard Class 5.1

15. REGULATORY INFORMATION

International Inventories

Chemical name	TSCA	TSCA Inventory Status	DSL/NDSL	EINECS/ELINCS	ENCS	IECSC	KECL	PICCS	AICS
Nitrogen Oxide	X	ACTIVE	X	X	X	X	X	X	X

Legend:

- TSCA - United States Toxic Substances Control Act Section 8(b) Inventory
- DSL/NDSL - Canadian Domestic Substances List/Non-Domestic Substances List
- EINECS/ELINCS - European Inventory of Existing Chemical Substances/European List of Notified Chemical Substances
- ENCS - Japan Existing and New Chemical Substances
- IECSC - China Inventory of Existing Chemical Substances
- KECL - Korean Existing and Evaluated Chemical Substances
- PICCS - Philippines Inventory of Chemicals and Chemical Substances
- AICS - Australian Inventory of Chemical Substances

US Federal Regulations

CERCLA

This material, as supplied, does not contain any substances regulated as hazardous substances under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302) or the Superfund Amendments and Reauthorization Act (SARA) (40 CFR 355).

SARA 311/312 Hazard Categories

This material, as supplied, is subject to the following Hazard Categories of SARA 311/312 (40 CFR 370)

Acute health hazard Yes
Chronic Health Hazard Yes
Fire hazard Yes
Sudden Release of Pressure Hazard Yes
Reactive Hazard No

SARA 313

Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA). This product does not contain any chemicals which are subject to the reporting requirements of the Act and Title 40 of the Code of Federal Regulations, Part 372

US State Regulations

California Proposition 65

This product contains the following Proposition 65 chemicals.

Chemical name	California Proposition 65
Nitrogen Oxide - 10024-97-2	Developmental Female Reproductive

U.S. State Right-to-Know Regulations

Chemical name	New Jersey	Massachusetts	Pennsylvania
Nitrogen Oxide 10024-97-2	X	X	X

16. OTHER INFORMATION

<u>NFPA</u>	Health hazards	Flammability	Instability	Special hazards
	2	0	0	OX
<u>HMIS</u>	Health hazards	Flammability	Physical hazards	Personal Protection
	2	0	0	See Section 8

Issue Date: 05-Apr-2023
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 Revision Note: Regulatory review

Disclaimer

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.

End of Safety Data Sheet