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MSDS V1.1	Nitrous Oxide	DG003G



Label 2.2: Non flammable, non toxic gas.



Label 5.1: Oxidizing substance



NFPA RATING



O: Oxidizing

1 IDENTIFICATION OF THE SUBSTANCE / PREPARATION AND OF THE COMPANY / UNDERTAKING

Trade Name	: Nitrous Oxide
Chemical Formula	: N ₂ O
MSDS No	: DG003G
Company Identification	: Aldakheel Industrial Gases and Plant (DIGAS)
Emergency Phone Number	: 04-8455-101

2 COMPOSITION / INFORMATION ON INGREDIENTS

COMPONENT	CAS NUMBER	CONCENTRATION
Nitrous Oxide	10024-97-2	>99%*


*The symbol > means "greater than"

3 HAZARDS IDENTIFICATION

Emergency Overview	: Warning! High-pressure, oxidizing liquid and gas. Vigorously accelerates combustion. Can cause rapid suffocation. Can cause anesthetic effects. May cause nervous system and blood cell damage. Reproductive hazard. May cause frostbite. May cause dizziness and drowsiness.
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 asphyxiation 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.
Potential Environmental Effects	: None known.

Aldakheel Industrial Gases Plant

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4 FIRST AID MEASURES

Inhalation	: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, qualified personnel may give oxygen. Call a physician.
Skin Contact	: For exposure to liquid, immediately warm frostbite area with warm water not to exceed 41°C (105°F). In case of massive exposure, remove contaminated clothing while showering with warm water. Call a physician.
Swallowing	: An unlikely route of exposure. This product is a gas at normal temperature and pressure.
Eye Contact	: For exposure to liquid, immediately flush eyes thoroughly 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 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


Flammable class	: Non flammable.
Extinguishing media Suitable extinguishing media	: All known extinguishants can be used.
Hazardous combustion products	: If involved in a fire the following toxic and/or corrosive fumes may be produced by thermal decomposition Nitric oxide/nitrogen dioxide.
Specific physical and chemical hazards	: Oxidizing agent; vigorously accelerates 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. No part of cylinder should be subjected to a temperature higher than 52°C (125°F). Nitrous oxide cylinders are equipped with a pressure relief device. (Exceptions may exist).
Protective equipment and precautions for firefighters	: Firefighters should wear self contained breathing apparatus and full fire-fighting turnout gear.

6 ACCIDENTAL RELEASE MEASURES

Warning!	: High-pressure, oxidizing liquid and gas.
Personal precautions	: Evacuate area. Ensure adequate air ventilation. Eliminate ignition sources. Wearself-contained breathing apparatus when entering area unless atmosphere is proved to be safe.
Environmental precautions	: Try to stop release. Prevent from entering sewers, basements and workpits, or a any place where its accumulation can be dangerous.
Clean up methods	: Ventilate area.

7 HANDLING AND STORAGE

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, screw driver, pry bar) into cap openings; doing so may damage the valve and cause a leak. Use an adjustable strap wrench to remove air-tight or rusted caps. Open valve slowly. If valve is hard to open, discontinue use and contact DIGAS. Never apply flame or localized heat directly to any part of the cylinder. High temperatures may damage the cylinder and could cause the pressure relief device to fail prematurely, venting the cylinder contents.
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7 HANDLING AND STORAGE (Continued)

Precautions to be taken in storage & use : Store and use with adequate ventilation, away from oil, grease, and other hydrocarbons. Separate Nitrous Oxide cylinders from flammables by at least 20 ft (6.1 m) or use a barricade of noncombustible material. This barricade should be at least 5 ft (1.53 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. Store only where temperature will not exceed 52°C (125°F). Store full and empty cylinders separately. Use a first-in, first-out inventory system to prevent storing full cylinders for long periods.

8 EXPOSURE CONTROLS / PERSONAL PROTECTION

Engineering controls

Local exhaust : Use a local exhaust system, if necessary, to control the concentration of nitrous -oxide in the worker's breathing zone.

Mechanical (General) : Not recommended as a primary ventilation system to control worker's exposure.

Special : None.

Other : None.


Personal protective equipment

Skin Protection : Wear clean work gloves free of any oil and grease when handling cylinders. Metatarsal shoes for cylinder handling; protective clothing where needed.

Respiratory Protection : Use an air-supplied respirator or a full-face, positive-pressure, self contained breathing apparatus.

9 PHYSICAL AND CHEMICAL PROPERTIES

Appearance	: Colorless gas.
Odor	: Slightly sweet.
Odor Thresold	: Not available.
Physical State	: Gas at normal temperature and pressure.
pH	: Not applicable.
Melting Point at 1 atom	: -90.82°C (-131.48°F)
Boiling Point at 1 atom	: -88.48°C (-127.26°F)
Flash Point (test method)	: Not applicable.
Evaporation Rate (Butyl Acetate = 1)	: High.
Flammability	: Nonflammable.
Flammable Limits In Air , % by volume	: Lower Not applicable. Upper Not applicable.
Vapor Pressure at 21.1°C(70°F) and 1 atom	: 759.7 psia (5238 kPa abs)
Liquid Density at 25°C (77°F)	: 46.3 lb/ft3 (0.742 g/cm3)
Gas Density at 21.1°C (77°F) and 1 atm	: 0.1146 lb/ft3 (1.947 kg/cm3)
Specific Gravity (Air = 1) at 21.1°C(70°F) and 1 atm	: 1.5297
Solubility In Water , vol/vol at 20°C (68°F) and 1 atm	: 0.68

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9 PHYSICAL AND CHEMICAL PROPERTIES (Continued)

Partition Coefficient: n- octanol/water	: Not available.
Autoignition Temperature	: Not applicable.
Decomposition Temperature	: 650°C (1202°F).
Percent Volatiles By Volume	: 100
Molecular Weight	: 44.0128
Molecular Formula	: N ₂ O

10 STABILITY AND REACTIVITY

Chemical Stability	: <input type="checkbox"/> Unstable <input checked="" type="checkbox"/> Stable
Conditions to Avoid	: Contact with incompatible materials, heating to decomposition.
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 650°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.
Possible Of Hazardous Reactions	: <input checked="" type="checkbox"/> May Occur <input type="checkbox"/> Will Not Occur Nitrous oxide may decompose explosively at high temperatures.

11 TOXICOLOGICAL INFORMATION

Acute Dose Effect Study Results	: Not available. : 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 increased 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.
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12 ECOLOGICAL INFORMATION


Ecotoxicity	: No Known effects.
Other Adverse Effects	: Nitrous oxide does not contain any Class I or Class II ozone depleting chemicals.

13 DISPOSAL CONSIDERATION

Waste Disposal Method	: Do not attempt to dispose of residual or unused quantities. Return cylinder to DIGAS.
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14 TRANSPORT INFORMATION

Transport Information	: Avoid transport on vehicles where the load space is not separated from the driver's compartment. : Ensure vehicle driver is aware of the potential hazards of the load and knows what to do in the event of an accident or an emergency.
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14 TRANSPORT INFORMATION (Continued)

Transport Information : Before transporting product containers:

- Ensure that containers are firmly secured.
- Ensure cylinder valve is closed and not leaking.
- Ensure valve outlet cap nut or plug (where provided) is correctly fitted.
- Ensure valve protection device (where provided) is correctly fitted.
- Ensure there is adequate ventilation.
- Compliance with applicable regulations.

15 OTHER INFORMATION

Asphyxiant in high concentrations.
Ensure all national/local regulations. are observed.
The hazard of asphyxiation is often overlooked and must be stressed during operator training.
Contact with liquid may cause cold burns/frostbite.

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 SYSTEMS:

NFPA Ratings:		HMIS Ratings:	
Health	=1	Health	=1
Flammability	=0	Flammability	=0
Instability	=0	Physical Hazard	=3
Special	= Ox		

STANDARD VALVE CONNECTIONS:

THREADED : CGA-326
PIN-INDEX YOKE : CGA-910 (Medical Use)

Use the proper CGA connections. **DO NOT USE ADAPTERS.**

This Material Safety Data Sheet has been established for the best knowledge of DIGAS.

Details given in this document are believed to be correct at the best of DIGAS knowledge. Whilst proper care has been taken in the preparation of this document, no liability for injury or damage resulting from its use can be accepted.

End of Documents