1. Identification of the substance/mixture and of the company/undertaking

Product identifier

Trade name : 16g N_2O cartridge

Safety data sheet no. : D11.00.01

Chemical description of gas : Nitrous Oxide
CAS-No.: 10024-97-2
EC no.: 233-032-0
Index no.: --

Chemical formula : N_2O

UN number : UN 2037

Registration number : N_2O is listed in Annex IV/V of regulation no. EC 1907/2006 (REACH). Exempted from registration.

Usage : Principal use is in conjunction with appliances designed for cryosurgical applications.

Company : H&O Equipments nv/sa
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2. HAZARDS IDENTIFICATION

Classification of the substance or mixture

Classification according to EC 1272/2008 (CLP, GHS)

- Physical hazards : Press. Gas (Liquefied gas) – Contains gas under pressure; may explode if heated.
  Ox. Gases 1 – May cause or intensify fire; oxidiser

Classification according to EC 67/548 and EC 1999/45 : Not classified as dangerous preparation/substance.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Substance/Preparation: Substance

Substance name	CAS no.	Concentration	OSHA PEL	ACGIH TLV-TWA (1999)
Nitrous Oxide	1024-97-2	>99%*	None currently established	50 ppm

*The symbol > means “greater than”; the symbol <, “less than”.

Does not contain any other components or impurities which could affect the classification of this product.

Gas supplied in accordance to iSi Spec. TLV 0193 / E942 (99% N2O) USP, EU.PH.

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 105°F (41°C). In case of massive exposure, remove contaminated clothing while showering with warm water. Call a physician.

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.

Swallowing : An unlikely route of exposure. This product is a gas normal temperature and pressure, but frostbite of the lips and mouth may result from contact with the liquid.

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 other immunological function, reducing resistance to infection and other immuno-dependent disease process.*

5. FIRE-FIGHTING MEASURES

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

Special fire fighting Procedure : **Warning! 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; shut off leak if without risk. 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 point 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. *Recommended storage temperature: -30 degrees C to +65 degrees C.*

Hazardous combustion product : None known.

6. ACCIDENTAL RELEASE MEASURES

Steps to be taken if material is released or spilled : **Warning! 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 of move cylinder to well-ventilated area.

Waste disposable method : 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

Handling : Protect cylinders from damage, refer to section 16.

Storage : Store and use with adequate ventilation, away from oil, grease, and other hydrocarbons. Separate nitrous oxide cylinders from flammable by at 20 ft (6.1 m) or use a barricade if noncombustible material. This barricade should be at least 5 ft (1.53m) 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.
Storage temperature limit: 50°C (122°F)

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Ventilation/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

Respiratory protection : Use an air-supplied respiratory 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. Respiratory protection must conform to OSHA rules as specified in 29 CFR 1910.134.

Skin protection : Wear clean work gloves free of any oil and grease when handling cylinders.

Eye protection : Select in accordance with OSHA 29 CFR 1910.133.

Other protective equipment : Metatarsal shoes for cylinder handling; protective clothing where needed. Select in accordance with OSHA 29 CFR 1910.132 and 1910.133. Regardless of protective equipment, never touch live electrical parts

9. PHYSICAL AND CHEMICAL CHARACTERISTICS

Molecular Weight	: 44.0128
Specific gravity (Air = 1) at 70°F 521.1°C and 1 atm	: 1.5297
Gas density at 70°F (21.1°C) and 1 atm	: 0.1146 lb/ft³ (1.947 kg/m³)
Vapor pressure at 70°F (21.1°C)	: 735 psig (5070 kPa)
Solubility in water, vol/vol at 68°F (20°C) and 1 atm	: 0.68
Percent volatiles by volume	: 100
Boiling point at 1 atm	: -127.4°F (-88.5°C)
Melting point at 1 atm	: -131.5°F (-90.8°C)
Appearance, odor and state	: Colorless gas with a slightly sweet odor and taste.

10. STABILITY AND REACTIVITY

Stable

Incompatibility (materials to avoid) **:** 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 coper or nickel oxides, this reaction occurs at lower temperatures.

Hazardous polymerization : will not occurs at lower temperatures.

Condition to avoid : None known.

11. TOXICOLOGICAL 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.

12. ECOLOGICAL INFORMATION

No adverse ecological effects expected. Nitrous oxide does not contain any Class I or Class II ozonedepleting chemicals. Nitrous oxide is not listed as a marine pollutant by DOT.

13. DISPOSABLE CONSIDERATIONS

Waste disposal method : Do not attempt to dispose of residual or unused quantities. Return cylinder to supplier.

14. TRANSPORT INFORMATION

UN No.: 2037
Title: RECEPTACLES, SMALL, CONTAINING GAS (GAS CARTRIDGES) without a release device

No dangerous goods by road and sea transport
21ml (16g) N2O filled chargers are not classified as dangerous goods, therefore it is not necessary to label, transport and storage them as dangerous goods.

Air Transport :

In accordance with the requirements set out in the current issue of the IATA, Dangerous Good Regulation.

This classification can be found in the UN Recommendations on the Transport of Dangerous Goods

(Model Regulations). UN No. 2037 RECEPTACLES, SMALL, CONTAINING GAS (GAS CARTRIDGES) without a release device, non-refillable, Special Provision SP 191 specifies: "Receptacles, small, containing gas are not fitted with a release device. Receptacles with a capacity not exceeding 50 ml containing only non-toxic constituents are not subject to these Provisions"

The gas N2O (Nitrous Oxide) is classified according to UN Regulation as a Division 2.2 gas (nonflammable, non-toxic gases).

Customs code is 28112930: “Receptacle small containing gas (gas cartridges < 21 ml) extra air freight without release devices UN2037, class 2.2. Gas special provision A98 applies. Good are not restricted.”

15. REGULATORY INFORMATION

Safety, health and environmental Regulations/legislation specific for the substance or the mixture : All national/local regulations apply

Seveso regulations 96/82/EC : Not covered.

16. OTHER INFORMATION

Warning : Medical grades of nitrous oxide are used as an anesthetic. Medical nitrous oxide is subject to strict federal regulation and is for use only under the control of a licensed physician or clinician, familiar with the product and its hazards. Care should be taken in transportation, handling, and storage of nitrous oxide to prevent unauthorized use.

Special precautions **:** High-pressure, oxidizing liquid and gas. Clean all gauges, valves, regulators, piping, and equipment as for oxygen service in accordance with CGA pamphlet G-4.1. Never substitute CO2 equipment for N2O equipment unless the CO2 equipment has been disassembled and cleaned for oxygen service. Use piping and equipment adequately designed to withstand pressures to be encountered. Keep

cylinders and their valves free of oil and grease. 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. Gas can cause rapid suffocation due to oxygen deficiency. Store and use with adequate ventilation. Close cylinder valve after each use; keep closed even when empty. Never work on a pressurized system. If there is a leak, close the cylinder valve. Blow the system down in a safe and environmentally sound manner in compliance with all federal, state and local laws; then repair the leak.
Never place a compressed gas cylinder where it may become part of an electrical circuit.

Recommended Equipment : In semiconductor process gas and other suitable applications, it is recommended the use of engineering controls such as gas cabinet enclosures, automatic gas panels (used to purge systems on cylinder changeout), excess-flow valves throughout the gas distribution system, double containment for the distribution system, and continuous gas monitors.

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.

Ghislenghien, Belgium

Omar GARZIAD
Quality assurance

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