Material Safety Data Sheet

1. PRODUCT AND COMPANY IDENTIFICATION

Product name : Nitrous oxide
Chemical formula : N2O
Synonyms : Nitrous oxide
Product Use Description : General Industrial

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Synonyms :	Nitrous oxide
Product Use Description :	General Industrial
Company :	Cryotech Vietnam JSC Lu xa, Thanh tri Ward, Hoang Mai District, Hanoi City, Vietnam
Telephone :	+84 - 43 – 6434788/6434789
Fax :	+84 – 43 - 6434752

2. COMPOSITION/INFORMATION ON INGREDIENTS

Components	CAS Number	Concentration (Volume)
Nitrous oxide	10024-97-2	100 %

Concentration is nominal

3. HAZARDS IDENTIFICATION

Emergency Overview

Vigorously accelerates combustion.
Keep oil, grease, and combustibles away.
May react violently with combustible materials.
Compressed liquefied gas.
Direct contact with liquid can cause frostbite.

Potential Health Effects

Inhalation :	In high concentrations may cause asphyxiation. Symptoms may include loss of mobility/consciousness.Victim may not be aware of asphyxiation. Asphyxiation may bring about unconsciousness without warning and so rapidly that victim may be unable to protect themselves
Eye contact :	Contact with liquid may cause cold burns/frost bite. No adverse effect
Skin contact :	Contact with liquid may cause cold burns/frost bite
Ingestion :	Ingestion is not considered a potential route of exposure.

Exposure Guidelines

Primary Routes of Entry : Inhalation

Target Organs : None known

Aggravated Medical Condition

None known

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4. FIRST AID MEASURES

General advice :	Remove victim to uncontaminated area wearing self contained breathing apparatus. Keep victim warm and rested. Call a doctor. Apply artificial respiration if breathing stopped.
Eye contact :	Seek medical advice.
Skin contact :	Wash with water and soap as a precaution.
Ingestion :	Ingestion is not considered a potential route of exposure
Inhalation :	Move to fresh air. If breathing has stopped or is labored, give assisted respirations. Supplemental oxygen may be indicated. If the heart has stopped, trained personnel should begin cardiopulmonary resuscitation immediately. In case of shortness of breath, give oxygen. Consult a doctor

5. FIRE- FIGHTING MEASURES

Suitable extinguishing media :	All known extinguishing media can be used.
Specific hazards :	Upon exposure to intense heat or flame, cylinder will vent rapidly and or rupture violently. Oxidant. Strongly supports combustion. May react violently with combustible materials. Some materials which are noncombustible in air may burn in the presence of an oxidizer. Gas is heavier than air and may collect in low areas or travel along the ground where there may be an ignition source present. Move away from container and cool with water from a protected position. If possible, stop flow of product. Keep adjacent cylinders cool by spraying with large amounts of water until the fire burns itself out. Most cylinders are designed to vent contents when exposed to elevated temperatures.
Special protective equipment for fire-fighters :	Wear self contained breathing apparatus for fire fighting if necessary.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions :	Evacuate personnel to safe areas. Wear self-contained breathing apparatus when entering area unless atmosphere is proved to be safe. Ventilate the area.
Environmental precautions :	Do not discharge into any place where its accumulation could be dangerous. Prevent further leakage or spillage if safe to do so.
Methods for cleaning up :	Ventilate the area.
Additional advice :	If possible, stop flow of product. Increase ventilation to the release area and monitor concentrations. If leak is from cylinder or cylinder valve, call the Air Products emergency telephone number. If the leak is in the user's system, close the cylinder valve, safely vent the pressure, and purge with an inert gas before attempting repairs.

7. HANDLING AND STORAGE

Handling

Only experienced and properly instructed persons should handle compressed gases. Protect cylinders from
physical damage; do not drag, roll, slide or drop. Do not allow storage area temperature to exceed 50°C
(122°F). Before using the product, determine its identity by reading the label. Know and understand the

properties and hazards of the product before use. When doubt exists as to the correct handling procedure for a particular gas, contact the supplier. Do not remove or deface labels provided by the supplier for the identification of the cylinder contents. When moving cylinders, even for short distances, use a cart (trolley, hand truck, etc.) designed to transport cylinders. Leave valve protection caps in place until the container has been secured against either a wall or bench or placed in a container stand and is ready for use. Use an adjustable strap wrench to remove over-tight or rusted caps. Before connecting the container, check the complete gas system for suitability, particularly for pressure rating and materials. Before connecting the container for use, ensure that back feed from the system into the container is prevented. Ensure the complete gas system is compatible for pressure rating and materials of construction. Ensure the complete gas system has been checked for leaks before use. Employ suitable pressure regulating devices on all containers when the gas is being emitted to systems with lower pressure rating than that of the container. Never insert an object (e.g. wrench, screwdriver, pry bar, etc.) into valve cap openings. Doing so may damage valve, causing a leak to occur. If user experiences any difficulty operating cylinder valve discontinue use and contact supplier. Close container valve after each use and when empty, even if still connected to equipment. Never attempt to repair or modify container valves or safety relief devices. Damaged valves should be reported immediately to the supplier. Do not use containers as rollers or supports or for any other purpose than to contain the gas as supplied. Never strike an arc on a compressed gas cylinder or make a cylinder a part of an electrical circuit. Do not smoke while handling product or cylinders. Never re-compress a gas or a gas mixture without first consulting the supplier. Never attempt to transfer gases from one cylinder/container to another. Always use backflow protective device in piping. When returning cylinder install valve outlet cap or plug leak tight. Never permit oil, grease, or other readily combustible substances to come into contact with valves or containers containing oxygen or other oxidants. Do not use rapidly opening valves (e.g. ball valves). Open valve slowly to avoid pressure shock. Never pressurize the entire system at once. Use only with equipment cleaned for oxygen service and rated for cylinder pressure. Never use direct flame or electrical heating devices to raise the pressure of a container. Containers should not be subjected to temperatures above 50°C (122°F). Prolonged periods of cold temperature below -30°C (-20°F) should be avoided.

Storage

Containers should be stored in a purpose build compound which should be well ventilated, preferably in the open air. Full containers should be stored so that oldest stock is used first. Stored containers should be periodically checked for general condition and leakage. Observe all regulations and local requirements regarding storage of containers. Protect containers stored in the open against rusting and extremes of weather. Containers should not be stored in conditions likely to encourage corrosion. Containers should be stored in the vertical position and properly secured to prevent toppling. The container valves should be tightly closed and where appropriate valve outlets should be capped or plugged. Container valve guards or caps should be in place. Keep containers tightly closed in a cool, well-ventilated place. Store containers in location free from fire risk and away from sources of heat and ignition. Full and empty cylinders should be segregated. Do not allow storage temperature to exceed 50°C (122°F). Display "No Smoking or Open Flames" signs in the storage areas. Return empty containers in a timely manner. Flammable storage areas should be separated from oxygen and other oxidizers by a minimum distance of 20 ft. (6.1 m.) or by a barrier of non-combustible material at least 5 ft. (1.5 m.) high, having a fire resistance rating of at least 1/2 hour.

Technical measures/Precautions

Containers should be segregated in the storage area according to the various categories (e.g. flammable, toxic, etc.) and in accordance with local regulations

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Personal protective equipment

Respiratory protection :	Keep self contained breathing apparatus readily available for emergency use. Users of breathing apparatus must be trained.
Hand protection :	Sturdy work gloves are recommended for handling cylinders. Gloves must be clean and free of oil and grease. The breakthrough time of the selected glove(s) must be greater than the intended use period.
Eye protection :	Safety glasses recommended when handling cylinders.

	Polycarbonate full faceshield over safety glasses when connecting, disconnecting or opening cylinders.
Skin and body protection :	Safety shoes are recommended when handling cylinders
Special instructions for protection and hygiene:	Ensure adequate ventilation, especially in confined areas. Gloves must be clean and free of oil and grease.

9. PHYSICAL AND CHEMICAL PROPERTIES

Form :	Liquefied gas.
Color :	Colorless gas
Odor :	Sweet. Poor warning properties at high concentrations
Molecular Weight :	44 g/mol
Relative vapor density :	1.5 (air = 1)
Relative density :	1.2 (water = 1)
Vapor pressure :	736.77 psia (50.80 bar) at 20 °C
Density :	0.112 lb/ft3 (0.0018 g/cm3) at 70 °F (21 °C)
	Note: (as vapor)
Specific Volume :	8.74 ft3/lb (0.5456 m3/kg) at 70 °F (21 °C)
Boiling point/range :	-127 °F (-88.5 °C)
Critical temperature :	98 °F (36.4 °C)
Melting point/range :	-131 °F (-90.81 °C)
Autoignition temperature :	Not applicable.
Water solubility	0.0022 g/l

10. STABILITY AND REACTIVITY

Stability :	Stable under normal conditions.
Conditions to avoid :	Direct sources of heat. At temperatures over 575°C (1067 °F) and at atmospheric pressure, nitrous oxide decomposes into nitrogen and oxygen. Pressurized nitrous oxide can also decompose at temperatures equal or greater than 300°C (572 °F). In the presence of catalysts (e.g. halogen products, mercury, nickel, platinum) the decomposition rate will increase and decomposition can occur at lower temperatures. The decomposition of nitrous oxide is irreversible and exothermic and will lead to a substancial pressure increase.
Materials to avoid :	Flammable materials. Organic materials. Avoid oil, grease and all other combustible materials.

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11. TOXICOLOGICAL INFORMATION

Acute Health Hazard

Ingestion :	No data is available on the product itself.
Inhalation :	No data is available on the product itself.

Skin. :	No data is available on the product itself.

Chronic Health Hazard:

Exposure to Nitrous Oxide has produced embryofetal toxicity in animals as evidenced by reduced fetal weight, delayed ossification, and increased incidence of visceral and skeletal variations. In humans, repeated high-level exposure (>3000 hours within the prior 10 years) to Nitrous Oxide (N2O) has caused adverse liver and kidney effects and neurological damage with such symptoms as numbness or tingling of the extremities, weakness, and depression. In monkeys, exposure to 50% N2O for 2 months caused incoordination, progressive ataxia and spinal cord demyelination with spongy degeneration. Nitrous oxide inactivates vitamin B12 (an essential cofactor of certain enzymes) that adversely affects folate metabolism, DNA synthesis and blood formation (RBC, WBC, and platelets). Nitrous Oxide exposure may be associated with increased incidence of fetal miscarriage in humans.

12. ECOLOGICAL INFORMATION

Ecotoxicity effects

Aquatic toxicity :	No data is available on the product itself.
Toxicity to other organisms :	No data available.

Persistence and degradability

Mobility :	No data available.
Bioaccumulation :	No data is available on the product itself.

Further information

This product has no known eco-toxicological effects.

13. DISPOSAL CONSIDERATIONS

Waste from residues / unused products :	Return unused product in orginal cylinder to supplier. Contact supplier if guidance is required.
Contaminated packaging :	Return cylinder to supplier.

14. TRANSPORT INFORMATION

CFR

Proper shipping name :	Nitrous oxide
Class :	2.2 (5.1)
UN/ID No. :	UN1070

IATA

Proper shipping name :	Nitrous oxide
Class :	2.2 (5.1)
UN/ID No. :	UN1070

IMDG

Proper shipping name :	NITROUS OXIDE
Class :	2.2 (5.1)
UN/ID No. :	UN1070

CTC

Proper shipping name :	NITROUS OXIDE
Class :	2.2 (5.1)
UN/ID No. :	UN1070

Further 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.

15. OTHER INFORMATION

NFPA Rating

Health :	2
Fire :	0
Instability :	0

HMIS Rating

Health :	1
Flammability :	0
Physical hazard :	3