

# MATERIAL SAFETY DATA SHEET

## SECTION 1. PRODUCT IDENTIFICATION

**PRODUCT NAME:** Nitrous Oxide  
**CHEMICAL NAME:** Nitrous Oxide **FORMULA:** N<sub>2</sub>O  
**MANUFACTURER:** Air Products and Chemicals, Inc.  
7201 Hamilton Boulevard  
Allentown, PA 18195-1501  
**PRODUCT INFORMATION:** (800) 752-1597  
**MSDS NUMBER:** 1077 **REVISION:** 9  
**REVISION DATE:** November 1997

## SECTION 2. COMPOSITION / INFORMATION ON INGREDIENTS

Nitrous Oxide is sold as a pure product >99%.

**CAS NUMBER:** 10024-97-2

### EXPOSURE LIMITS:

**OSHA:** PEL = None

**ACGIH:** TWA/TLV = 50 ppm

**NIOSH:** IDLH = see below

Comments: NIOSH has recommended a TWA (8 hr workday) of 25 ppm during anesthetic administration, and 50 ppm in dental offices.

## SECTION 3. HAZARD IDENTIFICATION

### EMERGENCY OVERVIEW

Nitrous Oxide is a nontoxic, colorless, nonflammable liquefied compressed gas packaged in cylinders under its own vapor pressure. This product can cause rapid suffocation when concentrations are sufficient to reduce oxygen levels below 19.5%. Self Contained Breathing Apparatus (SCBA) may be required. It is also an oxidizer and will support and vigorously accelerate combustion. The misuse of nitrous oxide can cause death by reducing the amount of oxygen necessary to support life. Nitrous Oxide abuse can impair an individual's ability to make and implement life sustaining decisions.

### EMERGENCY TELEPHONE NUMBERS

(800) 523-9374 Continental U.S., Canada, and Puerto Rico  
(610) 481-7711 other locations

### ACUTE POTENTIAL HEALTH EFFECTS:

#### ROUTES OF EXPOSURE:

**EYE CONTACT:** Contact with vaporizing liquid can cause freezing of tissue.

**INHALATION:** Simple asphyxiant.

**SKIN CONTACT:** Contact with vaporizing liquid can cause freezing of tissue and frostbite.

## POTENTIAL HEALTH EFFECTS OF REPEATED EXPOSURE:

**ROUTE OF ENTRY:** Inhalation

**TARGET ORGANS:** None

**SYMPTOMS:** Exposure to an oxygen deficient atmosphere (less than 19.5%) may cause dizziness, drowsiness, nausea, vomiting, excess salivation, diminished mental alertness, loss of consciousness and death. Exposure to atmospheres containing 8-10% or less oxygen will bring about unconsciousness without warning and so quickly that the individuals cannot help themselves. Nitrous oxide has been associated with several effects from long term exposure. The most strongly substantiated effect is neuropathy (degenerative changes to the nervous system). Complaints include numbness, tingling of hands and legs, loss of feeling in fingers, poor balance, and muscular weakness. Epidemiological studies also suggest fetotoxic effects and higher incidents of spontaneous abortion in exposed personnel. Although no cause and effect relationship has been firmly established, exposure to the gas should be minimized.

**MEDICAL CONDITIONS AGGRAVATED BY OVEREXPOSURE:** Pregnant women should avoid exposure to nitrous oxide.

**CARCINOGENICITY:** Nitrous oxide is not listed as a carcinogen or potential carcinogen by NTP, IARC, or OSHA.

## SECTION 4. FIRST AID MEASURES

**EYE CONTACT:** Contact with liquid or cold vapor can cause freezing of tissue. Gently flush eyes with lukewarm water. Obtain medical attention immediately.

**INHALATION:** Remove person to fresh air. If not breathing, administer artificial respiration. If breathing is difficult, administer oxygen. Obtain prompt medical attention.

**SKIN CONTACT:** Contact with liquid or cold vapor can cause frostbite. Immediately warm affected area with lukewarm less than 105 °F water.

**NOTES TO PHYSICIAN:** None.

## SECTION 5. FIRE FIGHTING MEASURES

**FLASH POINT:**

Not applicable

**AUTOIGNITION:**

Not applicable

**FLAMMABLE RANGE:**

Not applicable

**EXTINGUISHING MEDIA:** Product is nonflammable, but will support combustion. Use extinguishing media appropriate for surrounding fire.

**SPECIAL FIRE FIGHTING INSTRUCTIONS:** Evacuate all personnel from area. If possible, remove cylinders from fire area or cool with water. SCBA may be required by rescue workers.

**UNUSUAL FIRE AND EXPLOSION HAZARDS:** Oxidizing agent; vigorously accelerates combustion. Some materials which are noncombustible in air will burn in the presence of an oxidizing agent. This product may form explosive compounds when exposed to combustible materials, oils, grease, or other hydrocarbon materials.

Upon exposure to intense heat or flame, cylinder will vent rapidly and/or rupture violently. Most cylinders are designed to vent contents when exposed to elevated temperatures. Pressure in a cylinder can build up due to heat and it may rupture if pressure relief devices should fail to function.

**HAZARDOUS COMBUSTION PRODUCTS:** None known.

## SECTION 6. ACCIDENTAL RELEASE MEASURES

**STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED:** Evacuate immediate area. If spill is small, ventilate area or remove cylinder to an outdoor location. If spill is large, evacuate all personnel from affected area. Increase ventilation to release area and monitor oxygen level. Regardless of spill size, shut off source of leak if possible. Isolate any leaking cylinder. If leaking from container, pressure relief device or its valve, contact your supplier. If leak is in user's system, close cylinder valve, safely vent pressure and purge with inert gas before attempting repairs.

## SECTION 7. HANDLING AND STORAGE

**STORAGE:** Store cylinders in a well-ventilated, secure area, protected from the weather. Cylinders should be stored upright with valve outlet seals and valve protection caps in place. Do not allow storage temperature to exceed 125 °F (52 °C). Storage should be away from heavily traveled areas and emergency exits. Avoid areas where salt or other corrosive materials are present. Full and empty cylinders should be segregated. Avoid excessive inventory and storage time. Use a first-in first-out inventory system to prevent full containers from being stored for long periods of time. Visually inspect stored cylinders on a routine basis, at least weekly, for any indication of leakage or other problems.

Caution: Because of its "laughing gas" anesthetic effects, nitrous oxide is often subject to theft and misuse. Cylinders should be stored and used in controlled areas. Users of this product must be aware of the hazards caused by the accumulation of high concentrations, especially in confined spaces. Compliance with OSHA regulations, especially 29CFR1910.1469 (confined space entry) is essential.

**HANDLING:** Do not drag, roll, slide or drop cylinder. Use a suitable hand truck designed for cylinder movement. Never attempt to lift a cylinder by its cap. Secure cylinders at all times while in use. Use a pressure reducing regulator or separate control valve to safely discharge gas from cylinder. Use a check valve to prevent reverse flow into cylinder. Use piping and equipment adequately designed to withstand pressures to be encountered. Never apply flame or localized heat directly to any part of the cylinder. Once cylinder has been connected to process, open cylinder valve slowly and carefully. If user experiences any difficulty operating cylinder valve, discontinue use and contact supplier. Never insert an object (e.g., wrench, screwdriver, etc.) into valve cap openings. Doing so may damage valve causing a leak to occur. Use an adjustable strap-wrench to remove over-tight or rusted caps.

**SPECIAL PRECAUTIONS:** Always store and handle compressed gas cylinders in accordance with Compressed Gas Association, Inc. (telephone 703-412-0900) pamphlet CGA P-1, *Safe Handling of Compressed Gases in Containers*. Local regulations may require specific equipment for storage or use.

## SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

### ENGINEERING CONTROLS:

**VENTILATION:** Provide good ventilation and/or local exhaust to prevent accumulation of high concentrations of gas. Oxygen levels in work area should be monitored to ensure they do not fall below 19.5%.

### RESPIRATORY PROTECTION:

**Emergency Use:** Use SCBA or positive pressure air line with mask and escape pack in areas where oxygen concentration is less than 19.5%. Air purifying respirators will not provide protection.

**EYE PROTECTION:** Safety glasses.

**SKIN PROTECTION:** Leather work gloves when handling cylinders.

**OTHER PROTECTIVE EQUIPMENT:** Safety shoes when handling cylinders.

## SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

**APPEARANCE, ODOR AND STATE:** Colorless gas with slightly sweet odor and taste.

**MOLECULAR WEIGHT:** 44.013

**BOILING POINT (At 1 atm):** -127.4 °F

**SPECIFIC GRAVITY (also called vapor density) (Air =1):** 1.53

**FREEZING POINT / MELTING POINT ( At 1 atm):** -131.5 °F

**VAPOR PRESSURE (At 70 °F (21.1 °C)):** 745 PSIG

**GAS DENSITY (At 70 °F (21.1 °C) and 1 atm):** 0.1146 lb/ft<sup>3</sup>

## SECTION 10. STABILITY AND REACTIVITY

**CHEMICAL STABILITY:** Stable

**CONDITIONS TO AVOID:** High temperature or open flame. Cylinders should not be exposed to temperatures in excess of 125 °F (52 °C). Decomposes at elevated temperature (1200 °F) to nitrogen and oxygen. Reaction will occur at lower temperatures in the presence of catalytic surfaces such as silver, platinum, cobalt, copper oxides or nickel oxides.

**INCOMPATIBILITY (Materials to Avoid):** Flammable and pyrophoric materials, hydrocarbons such as oils and grease ethers and alcohol.

**REACTIVITY:**

- A) **HAZARDOUS DECOMPOSITION PRODUCTS:** Nitrogen and oxygen.
- B) **HAZARDOUS POLYMERIZATION:** Will not occur.

## SECTION 11. TOXICOLOGICAL INFORMATION

**LC<sub>50</sub> (Inhalation):** Not available

**LD<sub>50</sub> (Oral):** Not available

**LD<sub>50</sub> (Dermal):** Not available

**CARCINOGENICITY:** No data

**SKIN CORROSIVITY:** Not corrosive

**ADDITIONAL NOTES TO PHYSICIAN:** In humans, repeated high-level exposure(>3000 hours within the prior 10 years) to N<sub>2</sub>O 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% N<sub>2</sub>O 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) which adversely affects folate metabolism, DNA synthesis, and blood formation (RBC, WBC, and platelets).

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. Exposure may be associated with increased incidence of fetal miscarriage in humans.

## SECTION 12. ECOLOGICAL INFORMATION

**AQUATIC TOXICITY:** Not available

**MOBILITY:** Not available

**PERSISTENCE AND BIODEGRADABILITY:** Not available

**POTENTIAL TO BIOACCUMULATE:** Not available

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

### SECTION 13. DISPOSAL CONSIDERATIONS

**UNUSED PRODUCT / EMPTY CONTAINER:** Return container and unused product to supplier. Do not attempt to dispose of residual or unused quantities. Ensure cylinder valve is properly closed, valve outlet seal has been reinstalled, and valve protection cap is secured before shipping cylinder.

**DISPOSAL INFORMATION:** For emergency disposal, secure the cylinder and slowly discharge gas to the atmosphere in a well ventilated area or outdoors.

### SECTION 14. TRANSPORT INFORMATION

**DOT SHIPPING NAME:** Nitrous oxide

**HAZARD CLASS:** 2.2

**IDENTIFICATION NUMBER:** UN1070

**SHIPPING LABEL(s):** Nonflammable Gas (primary), Oxidizer

**PLACARD (When required):** Nonflammable Gas

**SPECIAL SHIPPING INFORMATION:** Cylinders should be transported in a secure upright position in a well-ventilated truck. Never transport in passenger compartment of a vehicle. Ensure cylinder valve is properly closed, valve outlet cap has been reinstalled, and valve protection cap is secured before shipping cylinder.

**CAUTION:** Compressed gas cylinders shall not be refilled except by qualified producers of compressed gases. The filling and shipping of a compressed gas cylinder without the written consent of the cylinder's owner is in violation of federal law (49 CFR 173.301).

**NAERG #:** 122

### SECTION 15. REGULATORY INFORMATION

#### U.S. FEDERAL REGULATIONS:

#### EPA - ENVIRONMENTAL PROTECTION AGENCY

**CERCLA:** Comprehensive Environmental Response, Compensation, and Liability Act of 1980  
(40 CFR Parts 117 and 302)

Reportable Quantity (RQ): None

#### SARA TITLE III: Superfund Amendment and Reauthorization Act

**SECTIONS 302/304:** Emergency Planning and Notification (40 CFR Part 355)

Extremely Hazardous Substances: Nitrous oxide is not listed.

Threshold Planning Quantity (TPQ): None

Reportable Quantity (RQ): None

**SECTIONS 311/312:** Hazardous Chemical Reporting (40 CFR Part 370)

IMMEDIATE HEALTH: Yes PRESSURE: Yes

DELAYED HEALTH: Yes REACTIVITY: No

FIRE: Yes

**SECTION 313:** Toxic Chemical Release Reporting (40 CFR Part 372)

This product does not require reporting under Section 313.

#### CLEAN AIR ACT:

**SECTION 112 (r):** Risk Management Programs for Chemical Accidental Release  
(40 CFR PART 68)

This product is not listed as a regulated substance.

Threshold Planning Quantity (TPQ): None

**TSCA: Toxic Substance Control Act**

This product is listed on the TSCA inventory.

**OSHA - OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION:**

**29 CFR Part 1910.119:** Process Safety Management of Highly Hazardous Chemicals

This product is not listed in Appendix A as a highly hazardous chemical.

Threshold Planning Quantity (TPQ): None

**STATE REGULATIONS:**

**CALIFORNIA:**

Proposition 65: This product is not a listed substance which the State of California requires warning under this statute.

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| <b>SECTION 16. OTHER INFORMATION</b> |
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**NFPA RATINGS:**

HEALTH: 2  
FLAMMABILITY: 0  
REACTIVITY: 0  
SPECIAL: OX(oxidizer)

**HMIS RATINGS:**

HEALTH: 2  
FLAMMABILITY: 0  
REACTIVITY: 0

This Material Safety Data Sheet was reformatted in September 1998.