

Material Safety Data Sheet



Nitric Oxide

Section 1. Chemical product and company identification

Product Name : Nitric Oxide
Supplier : AIRGAS INC., on behalf of its subsidiaries
259 North Radnor-Chester Road
Suite 100
Radnor, PA 19087-5283
1-610-687-5253
Product use : Synthetic/Analytical chemistry.
MSDS# : 001039
Date of Preparation/Revision : **11/1/2006.**
In case of emergency : 1-866-734-3438

Section 2. Hazards identification

Physical state : Gas. (COLORLESS COMPRESSED GAS WITH A SHARP UNPLEASANT ODOR.)
Emergency overview : Danger!
MAY BE FATAL IF INHALED.
OXIDIZER.
CONTENTS UNDER PRESSURE.
CAUSES SEVERE EYE IRRITATION.
CAUSES SKIN IRRITATION.
CAUSES DAMAGE TO THE FOLLOWING ORGANS: BLOOD, LUNGS, MUCOUS MEMBRANES, RESPIRATORY TRACT, SKIN, EYES, CENTRAL NERVOUS SYSTEM, EYE, LENS OR CORNEA, NOSE, SINUSES, THROAT.
Contact with combustible material may cause fire.
Avoid contact with skin and clothing. Do not breathe gas. Do not puncture or incinerate container. Store in tightly closed container. Avoid contact with combustible materials. Use only with adequate ventilation. Wash thoroughly after handling.
Contact with rapidly expanding gases can cause frostbite.
Routes of entry : Inhalation,Dermal,Eyes
Potential acute health effects
Eyes : Severely irritating to the eyes.
Skin : Irritating to skin.
Inhalation : Very toxic by inhalation.
Ingestion : Ingestion is not a normal route of exposure for gases
Potential chronic health effects : **CARCINOGENIC EFFECTS** Not available.
MUTAGENIC EFFECTS Not available.
TERATOGENIC EFFECTS: Not available.
Medical conditions aggravated by overexposure : Repeated exposure to a highly toxic material may produce general deterioration of health by an accumulation in one or many human organs.
See toxicological Information (section 11)

Section 3. Composition, Information on Ingredients

<u>Name</u>	<u>CAS number</u>	<u>% Volume</u>	<u>Exposure limits</u>
Nitric Oxide	10102-43-9	100	ACGIH TLV (United States, 9/2004). Notes: Identifies substances identified in the BEI documentation for Methemoglobin inducers (for which methemoglobin is the principle toxicity) and organophosphorous cholinesterase inhibitors are part of this notation. TWA: 31 mg/m ³ 8 hour(s). Form: All forms

TWA: 25 ppm 8 hour(s). Form: All forms
NIOSH REL (United States, 6/2001).
TWA: 30 mg/m³ 10 hour(s). Form: All forms
TWA: 25 ppm 10 hour(s). Form: All forms
OSHA PEL (United States, 6/1993).
TWA: 30 mg/m³ 8 hour(s). Form: All forms
TWA: 25 ppm 8 hour(s). Form: All forms

Section 4. First aid measures

No action shall be taken involving any personal risk or without suitable training. If fumes are still suspected to be present, the rescuer should wear an appropriate mask or a self-contained breathing apparatus. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation.

- Eye contact** : In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention immediately.
- Skin contact** : In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention immediately.
- Frostbite** : Try to warm up the frozen tissues and seek medical attention.
- Inhalation** : If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention immediately.
- Ingestion** : Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Get medical attention if symptoms appear.

Section 5. Fire fighting measures

Flammability of the product : Non-flammable.

Fire fighting media and instructions : Use an extinguishing agent suitable for surrounding fires.

If involved in fire, shut off flow immediately if it can be done without risk. Apply water from a safe distance to cool container and protect surrounding area.

This material increases the risk of fire and may aid combustion. Contact with combustible material may cause fire.

Special protective equipment for fire-fighters : Fire fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full facepiece operated in positive pressure mode.

Section 6. Accidental release measures

Personal precautions : Immediately contact emergency personnel. Eliminate all ignition sources. Keep unnecessary personnel away. Use suitable protective equipment (Section 8). Do not touch or walk through spilled material.

Environmental precautions : Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.

Section 7. Handling and storage

Handling : Avoid contact with eyes, skin and clothing. Keep container closed. Use only with adequate ventilation. Store in tightly closed container. Avoid contact with combustible materials. Do not puncture or incinerate container. Wash thoroughly after handling. High pressure gas. Use equipment rated for cylinder pressure. Close valve after each use and when empty. Protect cylinders from physical damage; do not drag, roll, slide, or drop. Use a suitable hand truck for cylinder movement.

Storage : Keep container tightly closed. Keep container in a cool, well-ventilated area. 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).

Section 8. Exposure Controls, Personal Protection

- Engineering controls** : Use only with adequate ventilation. If user operations generate dust, fumes, vapor or mist, use process enclosures, local exhaust ventilation, or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits.
- Personal protection**
- Eyes** : Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists or dusts.
- Skin** : Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.
- Respiratory** : Use a properly fitted, air-purifying or air-fed respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.
The applicable standards are (US) 29 CFR 1910.134 and (Canada) Z94.4-93
- Hands** : Chemical-resistant, impervious gloves or gauntlets complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary.
- Personal protection in case of a large spill** : Full chemical resistant suit and self-contained breathing apparatus only by trained and authorized persons.
- Consult local authorities for acceptable exposure limits.**

Section 9. Physical and chemical properties

- Molecular weight** : 30.01 g/mole
- Molecular formula** : NO
- Boiling/condensation point** : -151.66°C (-241°F)
- Melting/freezing point** : -163.88°C (-263°F)
- Critical temperature** : -93.1°C (-135.6°F)
- Vapor density** : 1.04 (Air = 1)
- Specific Volume (ft³/lb)** : 12.987
- Gas Density (lb/ft³)** : 0.077

Section 10. Stability and reactivity

- Stability and reactivity** : The product is stable.
- Incompatibility with various substances** : Extremely reactive or incompatible with reducing agents, combustible materials. Highly reactive with alkalis, moisture.

Section 11. Toxicological information

Toxicity data

<u>Ingredient name</u>	<u>Test</u>	<u>Result</u>	<u>Route</u>	<u>Species</u>
Nitric Oxide	LC50	115 ppm (1 hour (s))	Inhalation	Rat
	LC50	1068 mg/m ³ (4 hour(s))	Inhalation	Rat

- IDLH** : 100 ppm
- Chronic effects on humans** : Causes damage to the following organs: blood, lungs, mucous membranes, upper respiratory tract, skin, eyes, central nervous system (CNS), eye, lens or cornea, nose/sinuses, throat.
- Other toxic effects on humans** : No specific information is available in our database regarding the other toxic effects of this material for humans.

Specific effects

Nitric Oxide

- Carcinogenic effects** : No known significant effects or critical hazards.
Mutagenic effects : No known significant effects or critical hazards.
Reproduction toxicity : No known significant effects or critical hazards.







Section 12. Ecological information




- Products of degradation** : These products are nitrogen oxides (NO, NO₂...).
- Toxicity of the products of biodegradation** : The products of degradation are less toxic than the product itself.
- Environmental fate** : Not available.
- Environmental hazards** : No known significant effects or critical hazards.
- Toxicity to the environment** : Not available.

Section 13. Disposal considerations

Product removed from the cylinder must be disposed of in accordance with appropriate Federal, State, local regulation. Return cylinders with residual product to Airgas, Inc. Do not dispose of locally.

Section 14. Transport information

Regulatory information	UN number	Proper shipping name	Class	Packing group	Label	Additional information
DOT Classification	UN1660	NITRIC OXIDE, COMPRESSED	2.3	Not applicable (gas).	  	<p>Reportable quantity 10 lbs. (4.536 kg)</p> <p>Limited quantity Yes.</p> <p>Packaging instruction Passenger Aircraft Quantity limitation: Forbidden.</p> <p>Cargo Aircraft Quantity limitation: Forbidden.</p> <p>Special provisions 1, B37, B46, B50, B60, B77</p>
TDG Classification	UN1660	NITRIC OXIDE, COMPRESSED	2.3	Not applicable (gas).	  	<p>Explosive Limit and Limited Quantity Index 0</p> <p>ERAP Index 0</p> <p>Passenger Carrying Ship</p>

Nitric Oxide						
						Index Forbidden Passenger Carrying Road or Rail Index Forbidden Special provisions 38
Mexico Classification	UN1660	NITRIC OXIDE, COMPRESSED	2.3	Not applicable (gas).	  	-

Section 15. Regulatory information

United States

- U.S. Federal regulations** : TSCA 8(b) inventory: nitric oxide
 SARA 302/304/311/312 extremely hazardous substances: nitric oxide
 SARA 302/304 emergency planning and notification: nitric oxide
 SARA 302/304/311/312 hazardous chemicals: nitric oxide
 SARA 311/312 MSDS distribution - chemical inventory - hazard identification: nitric oxide: Sudden Release of Pressure, Immediate (Acute) Health Hazard
 Clean Water Act (CWA) 307: No products were found.
 Clean Water Act (CWA) 311: No products were found.
 Clean air act (CAA) 112 accidental release prevention: nitric oxide
 Clean air act (CAA) 112 regulated flammable substances: No products were found.
 Clean air act (CAA) 112 regulated toxic substances: nitric oxide
- State regulations** : Pennsylvania RTK: nitric oxide: (environmental hazard, generic environmental hazard)
 Massachusetts RTK: nitric oxide
 New Jersey: nitric oxide

Canada

- WHMIS (Canada)** : Class A: Compressed gas.
 Class C: Oxidizing material.
 Class D-1A: Material causing immediate and serious toxic effects (VERY TOXIC).
 Class E: Corrosive gas.
 CEPA DSL: nitric oxide

Section 16. Other information

United States

- Label Requirements** : MAY BE FATAL IF INHALED.
 OXIDIZER.
 CONTENTS UNDER PRESSURE.
 CAUSES SEVERE EYE IRRITATION.
 CAUSES SKIN IRRITATION.
 CAUSES DAMAGE TO THE FOLLOWING ORGANS: BLOOD, LUNGS, MUCOUS MEMBRANES, RESPIRATORY TRACT, SKIN, EYES, CENTRAL NERVOUS SYSTEM, EYE, LENS OR CORNEA, NOSE, SINUSES, THROAT.
 CONTACT WITH OTHER MATERIAL MAY CAUSE FIRE.

Nitric Oxide

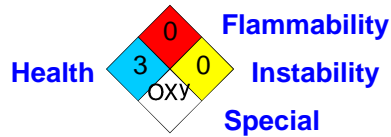
Canada

Label Requirements : Class A: Compressed gas.
Class C: Oxidizing material.
Class D-1A: Material causing immediate and serious toxic effects (VERY TOXIC).
Class E: Corrosive gas.

Hazardous Material Information System (U.S.A.)

Health	*	3
Fire hazard		0
Reactivity		0
Personal protection		C

National Fire Protection Association (U.S.A.)



Notice to reader

To the best of our knowledge, the information contained herein is accurate. However, neither the above named supplier nor any of its subsidiaries assumes any liability whatsoever for the accuracy or completeness of the information contained herein.

Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.