



Emergency Contact: Chemtrec (800) 424-9300  
Or Norco (208) 336-1643

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## Nitrogen Dioxide 0.0002% to 0.005% in Nitrogen

### MATERIAL SAFETY DATA SHEET

#### Identification

Product Name: Nitrogen Dioxide 0.0002% to 0.005% (2 to 500 PPM) in Nitrogen  
CAS Number: N/A  
Chemical Family: Gas Mixture  
Chemical Formula: NO<sub>2</sub> in N<sub>2</sub>  
Synonyms: Calibration Gas Mixture, Cal Gas, NO<sub>x</sub> Gas Mix  
MSDS Identification Code/Number: 2240  
Prepared By: Quality Dept.

Revision Date: 03/05/02  
Last Review Date: 02/16/07

#### Composition, Information on Ingredients

##### Exposure Limits<sup>1</sup>:

INGREDIENT	% VOLUME	PEL-OSHA <sup>2</sup>	TLV-ACGIH <sup>3</sup>	LD <sub>50</sub> or LC <sub>50</sub> Route/Species
Nitrogen Dioxide Formula: NO <sub>2</sub> CAS: 10102-44-0 RTECS#: QW9800000	0.0002% to 0.005%	5 ppm Ceiling	3 ppm TWA 5ppm STEL	LC50: 115 ppm Inhalation/rat 1 Hr.
Nitrogen Formula: N <sub>2</sub> CAS: 7727-37-9 RTECS#: QW9700000	99.005% to 99.9999%	None Established	Simple Asphyxiant	Not Available

<sup>1</sup> Refer to individual state or provincial regulations, as applicable, for limits that may be more stringent than those listed here.

<sup>2</sup> As stated in 29 CFR 1910, Subpart Z (revised July 1, 1993).

<sup>3</sup> As stated in the ACGIH 2006 Threshold Limit Values for Chemical Substances and Physical Agents.

OSHA Regulatory Status: This material is classified as hazardous under OSHA regulations.

#### Hazards Identification

##### Emergency Overview:

This product is a colorless gas with a slight acrid odor. At higher concentrations nitrogen dioxide has a reddish brown color. Nitrogen dioxide is extremely toxic by inhalation, and symptoms of over-exposure may not become apparent for up to 72 hours. Over-exposures to this gas may result in severe irritation and burns of eyes, skin, mucous membranes, and any other exposed tissue. If high concentrations of nitrogen dioxide (>100 ppm) are inhaled, delayed pulmonary damage and breathing difficulty may occur. Nitrogen acts as a simple asphyxiant by displacing oxygen necessary to support life. Contents under pressure. Use and store below 125° F, (52° C).

<b>Hazards Identification Cont.</b>
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**Route of Entry:**

Skin Contact Yes	Skin Absorption No	Eye Contact Yes	Inhalation Yes	Ingestion No
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**Health Effects:**

Exposure Limits Yes	Irritant Yes	Sensitization No
Teratogen Yes	Reproductive Hazard Yes	Mutagen Yes
Synergistic Effects None reported		

**Carcinogenicity:**      NTP: No      IARC: No      OSHA: No

**Eye Effects:**

May cause irritation. Contact with rapidly expanding gas near the point of release may cause frostbite.

**Skin Effects:**

May irritate the skin upon contact. Contact with rapidly expanding gas near the point of release may cause frostbite with redness, skin color change to gray or white, and blistering.

**Ingestion Effects:**

Ingestion is unlikely. Gas at room temperature.

**Inhalation Effects:**

Inhalation of nitrogen dioxide in low concentrations produces an irritating effect on the mucous membranes of the eyes, nose, throat, and lungs. Acute exposure through inhalation may result in dryness and irritation of the nose and throat, choking, coughing, and bronchospasm. Severe overexposure may cause death through systemic, delayed pulmonary edema. Exposure to high concentrations may also cause unconsciousness, and under some circumstances, death. Medical care after overexposure is essential as symptoms will rapidly worsen, possibly leading to death.

Nitrogen acts as a simple asphyxiant. Accumulation of high concentrations can displace oxygen content in the air necessary to support life.

**Medical Conditions Aggravated by Exposure:**

Pre-existing respiratory, dental, skin and eye conditions may be aggravated by overexposure to this gas mixture.

**NFPA Hazard Codes**

Health:            3  
Flammability:    0  
Reactivity:        0

**HMIS Hazard Codes**

Health:            3  
Flammability:    0  
Physical Hazard: 3

**Ratings System**

0 = No Hazard  
1 = Slight hazard  
2 = Moderate Hazard  
3 = Serious Hazard  
4 = Severe Hazard

Hazard Ratings were assigned in accordance with Compressed Gas Association (CGA) guidelines as published in CGA Pamphlet P-19\_2004, *CGA Recommended Hazard ratings for Compressed Gases, 2<sup>nd</sup> Edition*.

<b>First Aid Measures</b>
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**Eye:**

PERSONS WITH POTENTIAL EXPOSURE TO NITROGEN DIOXIDE SHOULD NOT WEAR CONTACT LENSES. Flush eyes with large amounts of water for at least 15 minutes, holding eyelids open to ensure adequate rinsing. If irritation persists, seek immediate medical attention.

### First Aid Measures Continued

**Skin:**

Remove contaminated clothing and flush affected area with large quantities of water. If irritation persists or symptoms occur, seek medical attention.

**Ingestion:**

Not anticipated; product is a gas.

**Inhalation:**

PROMPT REMOVAL FROM THE CONTAMINATED AREA AND IMMEDIATE MEDICAL ATTENTION IS MANDATORY IN ALL CASES OF OVEREXPOSURE. RESCUE PERSONNEL SHOULD BE EQUIPPED WITH SELF-CONTAINED BREATHING APPARATUS.

Delayed onset of life-threatening symptoms is likely to occur. **Victim(s) must be taken for medical attention.**

Victims should be carried (not assisted) to an uncontaminated area and inhale fresh air supplemented with oxygen. Quick removal from the contaminated area is most important. Keep patient warm, quiet and under competent medical observation until the danger of delayed pulmonary edema has passed (at least 72 hours). Any physical exertion during this period should be discouraged as it may increase the severity of the pulmonary edema or chemical pneumonitis. Bed rest is indicated. Unconscious persons should be moved to an uncontaminated area, given artificial resuscitation and supplemental oxygen. Once respiration has been restored, they should be treated as above.

### Fire Fighting Measures

Conditions of Flammability: Not flammable		
Flash point: None	Method: Not Applicable	Autoignition Temperature: None
LEL (%): Not Applicable	UEL (%): Not Applicable	
Hazardous combustion products: Nitrogen compounds		
Sensitivity to mechanical shock: None		
Sensitivity to static discharge: None		

**Fire and Explosion Hazards:**

Nonflammable. Cylinders may rupture violently from pressure when involved in a fire situation.

**Extinguishing Media:**

Use media suitable for surrounding combustible or flammable materials. Nitrogen dioxide can slowly react with water to form a corrosive solution of nitric acid. Nitric acid is corrosive to skin and metal.

**Fire Fighting Instructions:**

Stop the flow of gas if it can be done without risk. Use water spray to cool surrounding containers. Continue to cool surrounding containers until well after flames are extinguished. Firefighters should wear a full-face piece, NIOSH/MSHA-approved self-contained breathing apparatus (SCBA) operated in positive pressure mode and full turnout gear.

### Accidental Release Measures

Isolate hazard area, evacuate personnel and deny entry to unauthorized/unprotected individuals. Extinguish all ignition sources and ventilate closed spaces and low areas. Personnel entering area should wear appropriate protective equipment, including respiratory protection suitable for unknown concentrations. Personnel should not re-enter an area until nitrogen dioxide has sufficiently dispersed and adequate oxygen re-established. If a leak is in user's equipment, be certain to purge piping with an inert gas prior to attempting repairs. If leak is in container valve, contact the appropriate emergency telephone number listed in Section 1 or call your closest Norco/NorLab location.

## Handling and Storage

### Electrical classification:

Non-hazardous

Use only in well-ventilated areas. Valve protection caps must remain in place on refillable cylinders unless cylinder is secured with valve outlet piped to use point. Do not drag, slide or roll cylinders. Use a suitable hand truck for cylinder movement. Use a pressure reducing regulator when connecting cylinder to lower pressure piping or systems. Do not heat cylinder by any means to increase the discharge rate of product from the cylinder. Use a check valve or trap in the discharge line to prevent hazardous back flow into the cylinder.

Protect cylinders from physical damage. Store in cool, dry, well-ventilated area of non-combustible construction away from heavy traffic areas and emergency exits. Do not allow the temperature where cylinders are stored to exceed 125<sup>o</sup> F. Cylinders should be stored upright and firmly secured to prevent falling or being knocked over. Use a "first in-first out" inventory system to prevent full cylinders being stored for excessive periods of time.

For additional recommendations, consult Compressed gas Association Pamphlet P-1.

Never carry a compressed gas cylinder or a container of a gas in cryogenic liquid form in an enclosed space such as a car trunk, van or station wagon. A leak can result in a fire, explosion, asphyxiation or a toxic exposure.

## Exposure Controls, Personal Protection

### Engineering Controls:

Use a laboratory hood with forced ventilation for handling small quantities. Use local exhaust to prevent accumulation above the exposure limit.

### Eye/Face Protection:

Chemical safety goggles with full faceshield.

### Skin Protection:

Protective gloves as appropriate for the job (rubber or Teflon for pure nitrogen dioxide).

### Respiratory Protection:

A NIOSH/MSHA-approved full-facepiece SCBA operated in positive mode and/or any supplied air respirator with a full-facepiece and operated in a positive pressure mode in combination with an auxiliary self contained breathing apparatus operated in positive pressure mode should be used for high or unknown concentrations. Respirators should be stored in an area not likely to be contaminated.

### Other/General Protection:

Safety shoes, safety showers and an emergency eyewash station should be available.

### Physical and Chemical Properties

PARAMETER	VALUE	UNITS
Physical state (gas, liquid, solid)	: Gas	
Vapor pressure	: Not applicable	
Vapor density (Air = 1)	: 0.906	
Evaporation point	: Not applicable	
Boiling point	: -320.4	°F
	: -195.8	°C
Freezing point	: -345.9	°F
	: -209.9	°C
pH	: Not applicable	
Specific gravity	: Not available	
Oil/water partition coefficient	: Not available	
Solubility (H <sub>2</sub> O) vol/vol @0° C (32°F) and 1 atm.	: 0.023	
Odor threshold	: 0.1 to 0.4 ppm for nitrogen dioxide	
Odor and appearance	: Colorless to red-brown non-flammable gas with an acidic odor.	

### Stability and Reactivity

**Stability:**

Stable under normal conditions.

**Incompatible Materials:**

Nitrogen dioxide is not compatible with strong bases, strong oxidizers, alkali metals, alkali earth metals and powdered metals.

**Hazardous Decomposition Products:**

None

**Hazardous Polymerization:**

Will not occur.

### Toxicological Information

Nitrogen dioxide is highly toxic and hazardous because of its ability to cause delayed chemical pneumonitis and pulmonary edema. Chronic or repeated exposure may cause permanent decrements in pulmonary function (silo filler's disease). The absence of marked acute irritation of nitrogen dioxide limits its warning properties.

LC<sub>50</sub> (Rat), Inhalation of 115 PPM for 1 hour.

Experimental data indicate this compound may produce teratogenic, reproductive or mutagenic effects.

### Ecological Information

**Environmental Fate:**

This gas mixture will be dissipated rapidly in well-ventilated areas. Complex reactions of nitrogen dioxide occur in the atmosphere which contribute to air pollution.

Nitrogen dioxide hydrolyzes to nitric acid when in contact with water.

### Disposal Considerations

Do not attempt to dispose of waste or unused quantities in returnable cylinders. Return in the shipping container, *properly labeled, with any valve outlet plugs or caps secure and valve protection cap in place* to NorLab for proper disposal. Non-refillable containers should be vented in a well-ventilated area then disposed of in compliance with local regulations, or returned to NorLab.

### Transportation Information

Parameter	United States DOT	Canada TDG
<b>Proper Shipping Name:</b>	Compressed gas, n.o.s., (nitrogen dioxide, nitrogen)	Compressed gas, n.o.s.
<b>Hazard Class:</b>	2.2	2.2
<b>Identification Number:</b>	UN 1956	UN 1956
<b>Shipping Label:</b>	Non Flammable Gas	Non Flammable Gas

### Regulatory Information

**SARA Title III Notifications and Information:**

**Releases of**

Releases of nitrogen dioxide in quantities equal to or greater than the reportable quantity (RQ) of 10 pounds are subject to reporting to the National Response Center under CERCLA, Section 304 SARA Title III.

Nitrogen dioxide is listed under Section 302 as an extremely hazardous Substance (EHS). The presence of nitrogen dioxide in quantities in excess of the threshold planning quantity (TPQ) of 100 pounds requires certain emergency planning activities to be conducted.

**SARA Title III – Hazard Classes:**

Acute Health Hazard  
Sudden Release of Pressure Hazard

**California Proposition 65:** This product does not contain ingredient(s) known to the State of California to cause cancer or reproductive toxicity.

### Other Information

Compressed gas cylinders must not be refilled without the express written permission of the owner. Shipment of a compressed gas cylinder which has not been filled by the owner or with his/her (written) consent is a violation of transportation regulations.

**Disclaimer of expressed and implied warranties:**

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