



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

1125 West Amity Road  
Boise, ID 83705  
(208) 336-1643

# Hydrogen Sulfide in Nitrogen 0.0001% to 5.0%

## MATERIAL SAFETY DATA SHEET

### Identification

Product Name: Hydrogen Sulfide in Nitrogen 0.0001% to 5.0%  
Chemical Name: Hydrogen Sulfide in Nitrogen  
Chemical Family: Gas Mixture  
CAS Number: N/A  
Common Names/Synonyms: Cal. Gas, Calibration Gas  
MSDS Identification Code/Number: 2100  
Prepared By: Quality Department

Revision Date: 02/10/05  
Last Review Date: 01/06/14

### Composition, Information on Ingredients

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

Ingredient	% Volume	PEL-OSHA <sup>1</sup>	TLV-ACGIH <sup>2</sup>	LD <sub>50</sub> or LC <sub>50</sub> Route/Species
Nitrogen Formula: N <sub>2</sub> CAS Number: 7727-37-9 RTECS #: QW9700000	95.0 to 99.9999	Simple Asphyxiant	Simple Asphyxiant	Not Applicable
Hydrogen Sulfide Formula: H <sub>2</sub> S CAS Number: 7783-06-4 RTECS#: MX1225000	0.0001 to 5.0	20 PPM Ceiling 50 PPM Peak (10 min. max. peak)	10 PPM TWA 15 PPM STEL	LC <sub>50</sub> : 712 ppm Inhalation/rat 1 Hour

<sup>1</sup> Refer to individual state or provincial regulations, as applicable, for limits which 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 2007 Threshold Limit Values for Chemical Substances and Physical Agents.

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

IDLH (Hydrogen Sulfide): 100 PPM

### Hazard Identification

#### Emergency Overview:

Colorless gas with characteristic "rotten egg" odor. Contains ≤ 5% hydrogen sulfide, a gas that is irritating to the eyes, mucous membranes and respiratory system. Hydrogen sulfide can cause respiratory paralysis, sudden collapse and death. Contents under pressure. Use and store below 125° F (52° C).

#### Route of Entry:

Skin Contact Yes	Skin Absorption No	Eye Contact Yes	Inhalation Yes	Ingestion No
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**Hazard Identification Continued**

**Health Effects:**

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

Carcinogenicity: NTP: No            IARC: No            OSHA: No

**Eye Effects:**

Exposure to 20 to 50 ppm hydrogen sulfide will cause eye irritation. Low to moderately high concentrations may cause painful conjunctivitis, photophobia, lacrimation and corneal opacity. Exposure to 50 – 100 ppm hydrogen sulfide has resulted in temporary damage to the corneal epithelium in dogs, cats, rabbits, and guinea pigs. Contact with rapidly expanding gas near the point of release may cause frostbite.

**Skin Effects:**

Contact with hydrogen sulfide in this product may cause severe pain, itching and erythema. 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 of this product is unlikely but can cause irritation of the mucous membranes and gastrointestinal tract.

**Inhalation Effects:**

Nitrogen acts as a simple asphyxiant displacing the oxygen content in the air necessary for life. The following effects of asphyxiation are representative and it is possible that none of these symptoms may occur: loss of balance or dizziness; tightness in the frontal area of the forehead; tingling of the tongue, fingertips or toes; weakened speech leading to the inability to utter sounds; rapid reduction in the ability to perform movements; reduced consciousness of surroundings; loss of tactile sensations; and heightened mental activity.

Hydrogen sulfide toxic effects depend on the amount inhaled and duration of exposure. Lethal concentrations of hydrogen sulfide cause respiratory paralysis and breathing stops. Life threatening pulmonary edema is common following prolonged exposure to concentrations between 250 and 600 ppm. Edema has been reported following prolonged exposure at concentrations as low as 50 ppm.

Sense of smell becomes rapidly fatigued and cannot be used as warning of exposure. Symptoms may include irritation, difficulty breathing, conjunctivitis, nervousness, cough, nausea and headache.

**Medical Conditions Aggravated by Exposure:**

May aggravate pre-existing eye, skin, respiratory and central nervous system (CNS) disorder.

**Potential Environmental Effects:**

The 96 hour TLm in the bluegill sunfish was 0.0448 mg/L in a flow-through bioassay (21 – 22<sup>o</sup> C). The LC<sub>50</sub> for inhalation in the fly is 1500 mg/m<sup>3</sup>/7 minutes.

**NFPA Hazard Codes**

Health:            1  
Flammability:    0  
Reactivity:        0

**HMIS Hazard Codes**

Health:            1  
Flammability:    0  
Physical Hazard: 3

**Ratings System**

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

## First Aid Measures

**Eyes:**

PERSONS WITH POTENTIAL EXPOSURE TO HYDROGEN SULFIDE 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 or frostbite is suspected, seek immediate medical attention.

**Skin:**

Remove contaminated clothing and flush affected area with large quantities of water. If irritation persists or for frostbite seek immediate 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 TO THIS PRODUCT. RESCUE PERSONNEL SHOULD BE EQUIPPED WITH SELF-CONTAINED BREATHING APPARATUS. Rescue personnel should recognize the hazards of overexposure due to olfactory fatigue. Immediately remove to fresh air. If breathing is difficult, administer oxygen. If breathing has stopped, give artificial respiration. Keep victim warm and calm. Further treatment should be symptomatic and supportive. Seek immediate medical attention.

**Note to physician:** Acute hydrogen sulfide poisoning can be treated by induction of methemoglobinemia through parenteral injection of methemoglobin generating agents (i.e.: sodium nitrite). This acts as an antidote by restoring the normal activity of the sulfide inhibited enzyme.

## Fire Fighting Measures

Conditions of Flammability: Nonflammable*		
Flash point: Not Applicable	Method: Not Available	Autoignition Temperature: None
LEL(%): Not Available	UEL (%) Not Available	
Hazardous combustion products: Sulfur dioxide, irritants, toxic gases		
Sensitivity to mechanical shock: No data		
Sensitivity to static discharge: No data		

\* Concentrations of H<sub>2</sub>S ≤ 6.7% in nitrogen are non-flammable (CGA P-23).

**Fire and Explosion Hazards:**

The majority of this product constitutes a nonflammable, inert gas. Cylinder may vent rapidly or rupture violently from pressure when exposed to a fire situation

**Extinguishing Media:**

Use media suitable for surrounding combustible or flammable materials.

**Fire Fighting Instructions:**

If possible, stop the flow of gas supply if it can be done without risk. Continue to cool surrounding containers until well after flames are extinguished. Firefighters should wear a full-facepiece, 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. Hydrogen sulfide is soluble – use water spray to knock down vapors and protect personnel. Dike run-off waters for later disposal. Personnel entering area should wear appropriate protective equipment including respiratory protection suitable for unknown concentrations. Stop the flow of gas or remove cylinder to outdoor location if this can be done without risk. Ventilate enclosed areas. Personnel should not re-enter hazard area until hydrogen sulfide has sufficiently dispersed and adequate oxygen re-established. If a leak is in user's equipment, be certain

## Accidental Release Measures Continued

to purge piping with inert gas prior to attempting repairs. If leak is in container or valve, contact the appropriate emergency telephone number listed in Section 1 or call your closest Norco/NorLab location.

## Handling and Storage

### Electrical Classification:

Nonhazardous.

Use only in well-ventilated areas. Valve protection caps must remain in place unless the 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 regulator when connecting cylinder to lower pressure (< 3000 psig) 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°F (52°C). Cylinders should be stored upright and firmly secured to prevent falling or being knocked over. Full and empty cylinders should be segregated. Use a "first in-first out" inventory system to prevent full cylinders from being stored for excessive periods of time.

Do not rely on olfactory sense to detect the presence of hydrogen sulfide. Analytical devices and instrumentation are readily available for this purpose. Perform frequent analytical tests to be certain the TWA is not exceeded. Many metals corrode rapidly with wet hydrogen sulfide. Anhydrous hydrogen sulfide can be handled in carbon steel, aluminum, Inconel®, Stellite® and 304 and 316 stainless steels. Avoid hard steels, which are highly stressed since they may be susceptible to hydrogen embrittlement from hydrogen sulfide.

Hydrogen sulfide may cause lines and fittings to corrode or become brittle. Pipes and valves containing hydrogen sulfide should be inspected and adequately maintained to prevent leaks.

Never carry a compressed gas cylinder 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.

For additional recommendations, consult Compressed Gas Association's Pamphlet P-1.

## Exposure Controls, Personal Protection

### Engineering Controls:

Use a laboratory hood with forced ventilation for handling small quantities. Use local exhaust and enclosed processes to prevent accumulation above the exposure limit and to maintain oxygen levels above 19.5%. Exhaust gas should be vented to a gas treatment system.

### Eye/Face Protection:

Safety goggles or glasses or full face respirator.

### Skin Protection:

Protective gloves of neoprene, butyl rubber, PVC or polyethylene should be worn.

### Respiratory Protection:

For emergency release and conditions with exposures above the applicable exposure limits use a positive pressure NIOSH approved air-supplying respirator system (SCBA or airline/escape bottle) using a full face mask and a minimum of Grade D air.

### Other/General Protection:

Safety shoes, safety shower and an emergency eyewash station should be available. Personnel with potential exposure to hydrogen sulfide should work in pairs, wear a gas mask with an all purpose canister or light three minute unit with a self contained air supply for instantaneous use and carry wet lead acetate paper on wrists or belt for detection of dangerous concentrations of hydrogen sulfide. (Turns black in the presence of minute amounts of hydrogen sulfide).

## Physical and Chemical Properties

Parameter	Value	Units
Physical state (gas, liquid, solid)	: Gas	
Vapor pressure	: Not Available	
Vapor density (Air = 1)	: Not Available	
Evaporation Point	: Not Available	
Boiling point	: Not Available	°F
	: Not Available	°C
Freezing point	: Not Available	°F
	: Not Available	°C
pH	: Not Applicable	
Specific gravity	: 1.105	
Oil/water partition coefficient	: Not Available	
Solubility (H <sub>2</sub> O)	: Slightly soluble	
Odor threshold	: 0.13 ppm (for hydrogen sulfide)	
Odor and appearance	: Colorless gas. Characteristic “rotten egg” odor	

## Stability and Reactivity

**Stability:**

Stable under normal conditions.

**Conditions to Avoid:**

Avoid heat, flames, ignition sources and oxidizing agents.

**Incompatible Materials:**

Pure hydrogen sulfide is dangerously reactive with fuming or strong nitric acid and strong oxidizers; may ignite on contact with a variety of metal oxides (i.e.: copper oxide, nickel oxide, silver (I & II) oxide, sodium peroxide); ignites in contact with fluorine and chlorine monoxide; and forms explosive reactions with oxygen difluoride, nitrogen trifluoride and many halogenic compounds.

**Hazardous Decomposition Products:**

Oxides of sulfur.

**Hazardous Polymerization:**

Will not occur.

## Toxicological Information

**Inhalation:**

Inhalation of 1000-3000 ppm (dogs) was lethal. Respiration ceased after several breaths at 3000 ppm and death occurred within 15-20 minutes at concentrations of 1000 ppm.

**Skin and Eye:**

Concentrations of 50-500 ppm cause eye and respiratory irritation. Ocular toxicity has been reported at hydrogen sulfide concentrations ranging from 5-30 ppm.

**Other:**

Hydrogen sulfide is not considered a cumulative poison; however, headaches, fatigue, dizziness, irritability and loss of libido have been reported following chronic exposure. It is unclear whether low level exposures, repeated unmeasured acute exposures or pre-existing neurological disease are responsible for the above symptoms.

## Ecological Information

**Environmental Fate:**

Hydrogen sulfide does not absorb solar radiation and therefore does not undergo photolysis or photochemical reaction with oxygen. Primary chemical transformation of hydrogen sulfide in the atmosphere is oxidation via oxygen containing radicals. The persistence of hydrogen sulfide in the atmosphere is dependent on season, latitude, and atmospheric conditions, ranging from 1 to 40 days with decreased temperatures and decreased levels of hydroxide in northern regions increasing residence time.

### Ecological Information Continued

In soil and water, hydrogen sulfide is oxidized to elemental sulfur by microorganisms via oxidation-reduction reactions, which form part of the global sulfur cycle.

**Ecotoxicity:**

Product does not contain Class I or Class II ozone depleting substances. Data indicates that hydrogen sulfide is toxic to a variety of life forms including both domestic and wild animals, fish, birds, insects and plants.

### 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.

### Transport Information

Parameter	United States DOT	Canada TDG
<b>Proper Shipping name:</b>	Compressed gases, n.o.s., (Hydrogen Sulfide, Nitrogen)	Compressed gases, 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 Notification and Information:**

**SARA Title III – Hazard Classes:**

Acute Health hazard  
Sudden Release of Pressure Hazard

**Sara Title III – Section 313 Supplier Notification:**

This product contains hydrogen sulfide (CAS No. 7783-06-4), subject to the reporting requirements of section 313 of the Emergency Planning and Community Right-To-Know Act (EPCRA) of 1986 and of 40 CFR 372.

Hydrogen sulfide is listed as an Extremely Hazardous Substance (EHS) subject to state and local reporting under Section 304 of SARA Title III (EPCRA) with a reportable quantity (RQ) of 100 pounds.

The presence of hydrogen sulfide in quantities in excess of the Threshold Planning Quantity (TQP) of 500 pounds requires certain emergency planning activities to be conducted.

Hydrogen sulfide is listed under the accident prevention provisions of section 112(r) of the Clean Air Act (CAA) with a threshold quantity (TQ) of 10,000 pounds.

**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 shall 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:**

Although reasonable care has been taken in the preparation of this document, we extend no warranties and make no representations as to the accuracy or completeness of the information contained herein, and assume no responsibility regarding the suitability of this information for the user's intended purposes or for the consequences of its use. Each individual should make a determination as to the suitability of the information for their particular purpose(s).



Emergency Contact: Chemtrec (800) 424-9300  
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## N-Pentane 0.0001% to 4.39% in Nitrogen

### MATERIAL SAFETY DATA SHEET

#### Identification

Product Name: N-Pentane 0.0001% to 4.39 % in Nitrogen  
Chemical Name: N-Pentane in Nitrogen  
Chemical Family: Gas Mixture  
CAS Number: N/A  
Common Names/Synonyms: N/A  
MSDS Identification Code/Number: NLB2820  
Prepared by: Quality Dept.

Revision Date: 02/21/08  
Last Review Date: 08/18/11

#### Composition, Information on Ingredients, Exposure Limits

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

Ingredient	% Volume	PEL-OSHA <sup>1</sup>	TLV-ACGIH <sup>2</sup>	LD <sub>50</sub> or LC <sub>50</sub> Route/Species
N-Pentane Formula: C <sub>5</sub> H <sub>12</sub> CAS: 109-66-0 RTECS#: RZ9450000	0.0001% to 4.39%	1000 PPM	600 PPM TWA	LC <sub>50</sub> 12.3% inhalation rat (4 Hr)
Nitrogen Formula: N <sub>2</sub> CAS: 7727-37-9 RTECS#: QW9700000	Balance	None Established	Simple Asphyxiant	Not Applicable

<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 2007 Threshold Limit Values for Chemical Substances and Physical Agents

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

IDLH: 1500 PPM (10% LEL) N-Pentane

#### Hazards Identification

##### Emergency Overview:

Simple Asphyxiant-This product does not contain oxygen and may cause asphyxia if released in a confined area. Colorless, non-flammable gas with a mild gasoline type odor. High concentrations may have a narcotic effect. Repeated or prolonged skin contact may cause irritation or dermatitis. Use only with adequate ventilation. Contents under pressure. Use and store below 125°F (52°C).

##### Route of Entry:

Skin Contact	Skin Absorption	Eye Contact	Inhalation	Ingestion
Yes	No	Yes	Yes	No

##### Health Effects:

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

**Hazards Identification Continued**

Carcinogenicity: NTP: No IARC: No OSHA: No

**Eye Effects:**

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

**Skin Effects:**

N-Pentane is a primary skin irritant and fat solvent. Prolonged or repeated contact may tend to dry and defat skin causing irritation and dermatitis. 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:**

None known. Ingestion is unlikely as product is a gas at room temperature.

**Inhalation Effects:**

High concentrations of vapors may have a narcotic effect. Symptoms may include dizziness, headache and nausea.

**Medical Conditions Aggravated by Exposure:**

None known.

**NFPA Hazard Codes**

Health: 1  
Flammability: 0  
Instability: 0

**HMIS Hazard Codes**

Health: 1  
Flammability: 0  
Physical Hazards:3

**Ratings System**

0: No Hazard  
1: Slight Hazard  
2: Moderate Hazard  
3: Serious Hazard  
4: Severe Hazard

Ratings were assigned in accordance with Compressed Gas Association (CGA) guidelines as published in CGA Pamphlet P-19 2009 *CGA Recommended Hazard Ratings for Compressed Gases, 3<sup>rd</sup> Edition*.

**First Aid Measures**

**Eyes:**

Flush eyes with water for 15 minutes. If irritation persists or frostbite occurs, seek medical attention.

**Skin:**

Rinse skin thoroughly with water. For skin, immerse skin in lukewarm water. DO NOT USE HOT WATER. For frostbite or persistent irritation, seek medical attention.

**Ingestion:**

None required. Product is a gas at normal temperatures and conditions.

**Inhalation:**

PROMPT MEDICAL ATTENTION IS MANDATORY IN ALL CASES OF OVEREXPOSURE. RESCUE PERSONNEL SHOULD BE EQUIPPED WITH SELF-CONTAINED BREATHING APPARATUS. Victims should be assisted to an uncontaminated area and inhale fresh air. Quick removal from the contaminated area is most important. Unconscious persons should be moved to an uncontaminated area, and if breathing has stopped, administer artificial resuscitation and supplemental oxygen. Further treatment should be symptomatic and supportive.

**Fire Fighting Measures**

Conditions of Flammability: Not flammable		
Flash Point: Not Available	Method: Not Available	Autoignition Temperature: Not Available
LEL % None	UEL % None	
Hazardous Combustion Products: Small amounts of carbon monoxide, carbon dioxide.		
Sensitivity to mechanical shock: None		
Sensitivity to static discharge: None		

## Fire Fighting Measures Continued

### Fire and Explosion Hazards:

Nonflammable. Contains N-Pentane in concentrations below the LEL in nitrogen of 4.4%. Cylinders may rupture violently from pressure when involved in a fire situation.

### Extinguishing Media:

None required. Use as appropriate for surrounding materials.

### Fire Fighting Instructions:

If possible, stop the flow of gas supply. Use water spray to cool adjacent cylinders and areas. Fire fighters should wear a full-facepiece NIOSH/MSHA approved self-contained breathing apparatus (SCBA) operated in positive pressure mode and full turnout gear.

## Accidental Release Measures

Evacuate all personnel from affected area. Use appropriate protective equipment. If leak is in user's equipment, be certain to purge piping with inert gas prior to attempting repairs. If leak is in container or valve, contact the appropriate emergency telephone number listed in section 1 or call your closest Norco/NorLab location.

## Handling and Storage

Gas mixture is non-corrosive and may be used with any common structural material.

Use only in well-ventilated areas. Valve protection caps must remain in place unless the 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 regulator when connecting cylinder to lower pressure (<3000 PSIG) 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 backflow 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°F (52°C). Cylinders should be stored upright and firmly secured to prevent falling or being knocked over. Full and empty cylinders should be segregated. Use a "first in – first out" inventory system to prevent full cylinders from being stored for excessive periods of time. Post "NO SMOKING OR OPEN FLAMES" sign in the storage or use area.

For additional recommendations, consult Compressed Gas Association Pamphlets 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:

Local exhaust used in combination with general ventilation as necessary to maintain air contaminants at or below acceptable exposure guidelines.

### Eye/Face Protection:

Safety goggles or glasses as appropriate for the job.

### Skin Protection:

Protective gloves of nitrile rubber or polyvinyl alcohol.

### Respiratory Protection:

Positive pressure air line with full-face mask and escape bottle or self-contained breathing apparatus should be available for emergency use.

### Other/General Protection:

Safety shoes.

<b>Physical and Chemical Properties</b>
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Parameter	Value	Units
Physical state (gas, liquid, solid)	: Gas	
Vapor pressure	: Above critical temp.	
Vapor density (Air = 1)	: ~ 1	(as air)
Evaporation point	: Not Available	
Boiling point	: Not Available	
Freezing point	: Not Available	
pH	: Not Applicable	
Specific gravity	: Not Available	
Oil/water partition coefficient	: Not Available	
Solubility (H <sub>2</sub> O)	: Slight	(as N-Pentane)
Odor threshold	: 300 – 500 PPM	(as N-Pentane)
Odor and appearance	: Colorless gas with a slight gasoline type odor.	

<b>Stability and Reactivity</b>
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**Stability:**

Stable

**Incompatible Materials:**

None

**Hazardous Polymerization:**

Does not occur.

<b>Toxicological Information</b>
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**Inhalation:**

Ten minute exposures to N-Pentane concentrations of 5,000 PPM (0.5%) produced slight dizziness within a few minutes in humans.

**Skin and Eye:**

N-Pentane is a mucous membrane irritant in animals. Ten-minute exposure in humans to 5,000 PPM (0.5%) N-pentane did not produce noticeable eye, nose or respiratory tract irritation. Undiluted N-Pentane applied to human skin for 1 hour and 5 hours cause immediate irritation (hyperemia, erythema, pigmentation and swelling) with blisters after 5 hours. Mild symptoms continued for up to 96 hours after exposure, but no permanent scarring was observed.

**Chronic:**

Exposures to N-Pentane alone in animals have not caused neurologic damage. It is possible that N-Pentane in solvent mixtures may potentiate hexacarbon neuropathy in humans.

<b>Ecological Information</b>
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Product does not contain any Class I or Class II ozone depleting substances. Not toxic. Will not bioconcentrate.

<b>Disposal Considerations</b>
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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 Norco or NorLab for proper disposal. Non-refillable containers should be vented in a well-ventilated area then disposed of in accordance with local regulations, or returned to NorLab.

**Transport Information**

Parameter	United States DOT	Canada TDG
<b>Proper Shipping Name:</b>	Compressed Gas, N.O.S., (N-Pentane, 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:**

N-Pentane is listed under the accident prevention provisions of section 112(r) of the Clean Air Act (CAA) with a threshold quantity (TQ) of 10,000 pounds.

**SARA Title III-Section 313 Supplier Notification**

This product does not contain ingredients subject to the reporting requirements of Section 313 of the Emergency Planning and Community Right-to-Know Act (EPCRA) of 1986 and of 40 CFR Part 372.

**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**

ACGIH	American Conference of Governmental Industrial Hygienists
DOT	Department of Transportation
IARC	International Agency for Research on Cancer
NTP	National Toxicology Program
OSHA	Occupational Safety and Health Administration
PEL	Permissible Exposure Limit
SARA	Superfund Amendments and Reauthorization Act
STEL	Short Term Exposure Limit
TDG	Transportation of Dangerous Goods
TLV	Threshold Limit Value

Compressed gas cylinders shall 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:**

Although reasonable care has been taken in the preparation of this document, we extend no warranties and make no representations as to the accuracy or completeness of the information contained herein, and assume no responsibility regarding the suitability of this information for the user's intended purposes or for the consequences of its use. Each individual should make a determination as to the suitability of the information for their particular purpose(s).



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# Oxygen 5.0% to 23.5% in Nitrogen

## MATERIAL SAFETY DATA SHEET

### Identification

Product Name: Oxygen 5.0% to 23.5% in Nitrogen  
Chemical Name: Oxygen in Nitrogen  
Chemical Family: Gas Mixture  
CAS Number: N/A  
Common Names/Synonyms: N/A  
MSDS Identification Code/Number: 2250  
Prepared By: Quality Dept.

Revision Date: 11/02/06  
Last Review Date: 04/10/13

### Composition, Information on Ingredients, Exposure Limits

#### 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
Oxygen Formula: O <sub>2</sub> CAS: 7782-44-7 RTECS#: RS2060000	5.0 to 23.5	Not Available	Not Available	Not Available
Nitrogen Formula: N <sub>2</sub> CAS: 7727-37-9 RTECS#: QW9700000	76.5 to 95	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 July1, 1993)

<sup>3</sup> As stated in the ACGIH 2007 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:

Odorless, colorless nonflammable gas. Mixtures with less than 19.5% oxygen act as a simple asphyxiant. Effects may include headaches, dizziness and loss of consciousness. Non-toxic. Contents under pressure. Use and store below 125<sup>o</sup>F (52<sup>o</sup>C).

#### Route of Entry:

Skin Contact	Skin Absorption	Eye Contact	Inhalation	Ingestion
No	No	No	Yes	No

#### Health Effects:

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

**Hazards Identification Continued**

Carcinogenicity: NTP: No IARC: No OSHA: No

**Eye Effects:**

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

**Skin Effects:**

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:**

None known. Ingestion is unlikely as product is a gas at room temperature.

**Inhalation Effects:**

**Note:** Not to be used as breathing air!

Mixtures which contain < 19.5% oxygen may act as simple asphyxiants. Effects of oxygen deficiency resulting from simple asphyxiants may include: rapid breathing, diminished mental alertness, impaired muscular coordination, faulty judgment, depression of all sensations, emotional instability, and fatigue. As asphyxiation progresses, nausea, vomiting, prostration, and loss of consciousness may result, eventually leading to convulsions, coma and death.

Oxygen deficiency during pregnancy has produced developmental abnormalities in humans and experimental animals.

**Medical Conditions Aggravated by Exposure:**

None known.

**NFPA Hazard Codes**

Health: 0  
Flammability: 0  
Instability: 0

**HMIS Hazard Codes**

Health: 0  
Flammability: 0  
Physical Hazard: 3

**Ratings System**

0: No Hazard  
1: Slight Hazard  
2: Moderate Hazard  
3: Serious Hazard  
4: Severe Hazard

Note: Ratings were assigned in accordance with Compressed Gas Association (CGA) guidelines as published in CGA Pamphlet P-19-2009, *CGA Recommended Hazard Ratings for Compressed Gases, 3<sup>rd</sup> Edition*.

**First Aid Measures**

**Eyes:**

None required for gas. If frostbite is suspected, flush eyes with cool water for 15 minutes and obtain immediate medical attention.

**Skin:**

None required for gas. For frostbite, immerse skin in lukewarm water. DO NOT USE HOT WATER. Obtain medical attention.

**Ingestion:**

None required.

**Inhalation:**

PROMPT MEDICAL ATTENTION IS MANDATORY IN ALL CASES OF OVEREXPOSURE. RESCUE PERSONNEL SHOULD BE EQUIPPED WITH SELF-CONTAINED BREATHING APPARATUS.

Victims should be assisted to an uncontaminated area and inhale fresh air. Quick removal from the contaminated area is most important. Unconscious persons should be moved to an uncontaminated area and, if breathing has stopped, administer artificial resuscitation and supplemental oxygen. Further treatment should be symptomatic and supportive.

### Fire Fighting Measures

Conditions of Flammability: Not flammable		
Flash Point: None	Method: Not Applicable	Autoignition Temperature: None
LEL % None		UEL % None
Hazardous Combustion Products: None		
Sensitivity to mechanical shock: None		
Sensitivity to static discharge: None		

**Fire and Explosion Hazards:**

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

**Extinguishing Media:**

None required. Use as appropriate for surrounding materials.

**Fire Fighting Instructions:**

If possible, stop the flow of gas supply. Use water spray to cool adjacent cylinders and areas. Fire fighters 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

Evacuate all personnel from affected area. Use appropriate protective equipment. If leak is in user's equipment, be certain to purge piping with inert gas prior to attempting repairs. If leak is in container or 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.

Do not use as breathing air.

Gas mixture is non-corrosive and may be used with all materials of construction. Moisture causes metal oxides which are formed with air to be hydrated so that they include volume and lose their protective role (rust formation). Concentrations of SO<sub>2</sub>, Cl<sub>2</sub>, salt, etc. in the moisture enhances the rusting of metals in air.

Use only in well-ventilated areas. Valve protection caps must remain in place unless the 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 regulator when connecting cylinder to lower pressure (<3000 PSIG) 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 backflow 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°F (52°C). Cylinders should be stored upright and firmly secured to prevent falling or being knocked over. Full and empty cylinders should be segregated. Use a "first in – first out" inventory system to prevent full cylinders from 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 local exhaust to prevent accumulation of high concentrations and maintain atmospheric oxygen at or above 19.5%.

**Eye/Face Protection:**

Safety goggles or glasses as appropriate for the job.

<b>Exposure Controls, Personal Protection Continued</b>
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**Skin Protection:**

Protective gloves of material appropriate for the job.

**Respiratory Protection:**

Positive pressure air line with full-face mask and escape bottle or self-contained breathing apparatus should be available for emergency use.

**Other/General Protection:**

Safety shoes.

<b>Physical and Chemical Properties</b>
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Parameter	Value	Units
Physical state (gas, liquid, solid)	: Gas	
Vapor pressure	: Not Available	
Vapor density (Air = 1)	: 0.97	
Evaporation point	: Not Available	
Boiling point	: -320.4	°F
	: -195.8	°C
Freezing point	: -345.9	°F
	: -209.9	°C
pH	: Not Applicable	
Specific gravity	: 1	
Oil/water partition coefficient	: Not Available	
Solubility (H <sub>2</sub> O)	: Slightly Soluble	
Odor threshold	: Not Applicable	
Odor and appearance	: Colorless, odorless gas	

<b>Stability and Reactivity</b>
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**Stability:**

Stable

**Incompatible Materials:**

None

**Hazardous Decomposition Products:**

None

**Hazardous Polymerization:**

Does not occur.

<b>Toxicological Information</b>
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**Inhalation:**

These mixtures of oxygen and nitrogen are not intended for breathing use since the oxygen concentration in the mixture may be below that which supports life. Oxygen levels should be maintained at greater than 19.5% at normal atmospheric pressure which is equivalent to a partial pressure of 135 mm Hg.

High concentrations of Nitrogen and low concentrations of oxygen in these gas mixtures may exclude adequate supply of oxygen to the lungs which causes dizziness, deeper breathing due to air hunger, possible nausea and eventual unconsciousness.

### Toxicological Information Continued

Mixtures with less than 19.5% oxygen are relatively inactive biologically and essentially nontoxic. The major hazard is the exclusion of an adequate supply of oxygen to the lungs.

Oxygen deficiency during pregnancy has produced developmental abnormalities in humans and experimental animals.

No data given in the Registry of Toxic Effects of Chemical Substances (RTECS or Sax, Dangerous Properties of Industrial Materials, 7<sup>th</sup> ed.

**Reproductive:**

Oxygen deficiency during pregnancy has produced developmental abnormalities in humans and experimental animals.

### Ecological Information

Product does not contain Class I or Class II ozone depleting substances. Not toxic. Will not bioconcentrate.

### 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 Norco or NorLab for proper disposal. Non-refillable containers should be vented in a well-ventilated area then disposed of in accordance with local regulations, or returned to NorLab.

### Transport Information

Parameter	United States DOT	Canada TDG
Proper Shipping Name:	Compressed gas, N.O.S., (Oxygen, Nitrogen)	Compressed gases, N.O. S.,
Hazard Class:	2.2	2.2
Identification Number:	UN 1956	UN 1956
Shipping Label:	Nonflammable Gas	Nonflammable Gas

### Regulatory Information

**SARA Title III Notifications and Information:**

**SARA Title III- Section 313 Supplier Notification**

This product does not contain any ingredients which are regulated on the U.S. EPA List of Toxic Chemicals (40 CFR 372), and is therefore no subject to release reporting under Section 313 of EPCRA/SARA Title III.

**SARA Title III – Hazard Classes:**

Sudden Release of Pressure Hazard

Acute Health Hazard

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

### Other Information

Compressed gas cylinders shall 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:**

Although reasonable care has been taken in the preparation of this document, we extend no warranties and make no representations as to the accuracy or completeness of the information contained herein, and assume no responsibility regarding the suitability of this information for the user's intended purposes or for the consequences of its use. Each individual should make a determination as to the suitability of the information for their particular purpose(s).