NorLAB
A DIVISION OF NORCO, INC.

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

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Boise, ID 83705
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Methane 0.0001% to 50% in Nitrogen

MATERIAL SAFETY DATA SHEET

Identification

Product Name: Methane 0.0001% to 50% in Nitrogen
Chemical Name: CH_4 in N_2
Chemical Family: Gas Mixture
CAS Number: N/A
Common Names/Synonyms: N/A
MSDS Identification Code/Number: 2130
Prepared by: Quality Dept.

Revision Date: 06/08/99
Last Review Date: 03/04/13

Composition, Information on Ingredients

Exposure Limits[1]

Ingredient	% Volume	PEL-OSHA [1]	TLV-ACGIH [2]	LD_{50} or LC_{50} Route/Species
Nitrogen Formula: N2 CAS Number: 7727-37-9 RTECS #: QW9700000	50.0 to 99.9999	Simple Asphyxiant	Simple Asphyxiant	Not Applicable
Methane Formula: CH_4 CAS Number; 74-82-8 RTECS#: PA1490000	0.0001 to 50.0	Simple Asphyxiant	1000 PPM	Not Available

[1] Refer to individual state or provincial regulations, as applicable, for limits which may be more stringent than those listed here.
[2] As stated in 29 CFR 1910, Subpart Z (revised July 1, 1993
[3] 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.

Hazard Identification

Emergency Overview:

Odorless colorless gas. Methane concentrations > 14.3% in Nitrogen are flammable and may cause fire or explosion. Keep flammable mixtures away from heat, sparks, and flames. Simple asphyxiant – This product does not contain o0xygen and may cause asphyxia if released in a confined area. Maintain oxygen levels above 19.5%. Contents under pressure. Use and store below 125^0 F (52^0 C).

Route of Entry:

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

Health Effects:

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

Hazard 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.

Inhalation Effects:
Methane and nitrogen are simple asphyxiants. Oxygen levels should be maintained at greater than 18 molar percent at normal atmospheric pressure which is equivalent to a partial pressure of 135 mm Hg. Exposure to high concentrations of this gas mixture may exclude an adequate supply of oxygen.

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.

NFPA Hazard Codes		**HMIS Hazard Codes**		**Ratings System**
Health:	0	Health:	0	0 = No Hazard
Flammability:	4 (as Methane)	Flammability:	4 (as methane)	1 = Slight Hazard
Instability:	0	Physical Hazard:	3	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, 2nd 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 TO THIS PRODUCT. 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. If breathing has stopped, administer artificial resuscitation and supplemental oxygen. Further treatment should be symptomatic and supportive. Keep victim warm and quiet.

Fire Fighting Measures

Fire and Explosion Hazards:
Methane is slightly lighter than air. Gas may accumulate in areas with inadequate ventilation, possibly forming an explosive atmosphere. Methane concentrations > 14.3% in nitrogen are flammable (CGA P-23, 1995). Use adequate ventilation to prevent gas buildup. Cylinders may vent rapidly or rupture violently if involved in a fire situation.

Fire Fighting Measures Continued

Conditions of Flammability: Flammable gas (for methane concentrations > 14.3% in nitrogen)		
Flash point: Not Available	Method: Not Available	Autoignition Temperature: Not Available
LEL(%): 5 (CH_4)	UEL(%) 15 (CH_4)	
Hazardous combustion products: Carbon Dioxide, Carbon Monoxide		
Sensitivity to mechanical shock: None		
Sensitivity to static discharge: Not Available		

Extinguishing Media:
Carbon dioxide, dry chemical or water spray.

Fire Fighting Instructions:
Use water spray to cool adjacent areas. Fire fighters should wear respiratory protection (SCBA) and full turnout or Bunker gear. Continue to cool fire-exposed cylinders until well after flames are extinguished.

For flammable mixtures:
If possible, stop the flow of gas supply. Inerting the atmosphere to reduce oxygen levels may extinguish flame, allowing capping of leaking container. Do not attempt this unless specifically trained. Reduce the rate of flow and inject an inert gas, if possible, before completely stopping the flow to prevent flashback. Do not extinguish the fire until the supply is shut off as otherwise and explosive re-ignition may occur. If the fire is extinguished and the flow of gas continues, use increased ventilation to prevent build-up of explosive atmosphere. Use non-sparking tools to close container valves.

Use water spray to cool adjacent cylinders and areas. Be cautions of a Boiling Liquid Evaporating Vapor Explosion BLEVE, if flame is impinging on surrounding containers. Direct 500 GPM water stream onto containers above liquid level with remote monitors. Limit the number of personnel in proximity of fire and evacuate surrounding areas in all directions.

Accidental Release Measures

For mixtures containing > 14.3% methane, immediately extinguish all ignition sources. No smoking, flames, flares or sparks in hazard area. 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

Earth ground and bond all lines and equipment associated with flammable gas mixtures. All equipment should be non-sparking or explosion proof. Post "NO SMOKING OR OPEN FLAMES" signs in the storage or use area. Outside or detached storage preferred.

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 back flow into the cylinder.

Protect cylinders from physical damage. Store in a 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 $125^{O}F$ ($52^{O}C$). Cylinders should be stored upright and firmly secured to prevent falling or being knocked over. Full and empty cylinders should be segregated.

Handling and Storage Continued

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" signs in the storage or use area.

For additional recommendations, consult Compressed Gas Association's Pamphlet P-1, P-14 and Safety Bulletin SB-2.

Exposure Controls, Personal Protection

Engineering Controls:
Local exhaust to prevent accumulation of flammable concentrations and maintain air oxygen levels at or above 19.5%. Mechanical in accordance with electrical codes.

Eye/Face Protection:
Safety goggles or glasses.

Skin Protection:
Protective gloves made of any suitable material.

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

Other/General Protection:
Safety shoes

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	
	: Not Available	
Freezing point	: Not Available	
	: Not Available	
pH	: Not Applicable	
Specific gravity	: Not Available	
Oil/water partition coefficient	: Not Available	
Solubility (H_2O)	: Negligible	
Odor threshold	: Not Applicable	
Odor and appearance	: Odorless, colorless gas	

Stability and Reactivity

Stability:
Stable.

Incompatible Materials:
Oxidizers.

Hazardous Polymerization:
Will not occur.

Toxicological Information

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, 7th ed.

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 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
Proper Shipping name: > 14.3% Methane	Compressed gas, flammable, N.O. S., (Methane, Nitrogen)	Compressed gas, flammable, N. O. S.,
Hazard Class:	2.1	2.1
Identification Number:	UN 1954	UN 1954
Shipping Label:	Flammable Gas	Flammable Gas

Parameter	United States DOT	Canada TDG
Proper Shipping name: < 14.3% Methane	Compressed gas, N.O.S., (Methane, Nitrogen)	Compressed gas, 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 Notification and Information:

Methane 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 – Hazard Classes:
Acute Health hazard
Fire Hazard
Sudden Release of Pressure Hazard

California Proposition 65: This product does not contain ingredient(s) know 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).

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Emergency Contact: Chemtrec (800) 424-9300
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1125 West Amity Road
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Carbon Monoxide in Nitrogen 0.0001% to 20.0%

MATERIAL SAFETY DATA SHEET

Identification

Product Name: Carbon Monoxide in Nitrogen 0.0001% to 20.0%
Chemical Name: Carbon Monoxide in Nitrogen
Chemical Family: Gas Mixture
CAS Number: N/A
Common Names/Synonyms: N/A
MSDS Identification Code/Number: 2070
Prepared by: Quality Dept.

Revision Date: 05-01-03
Last Review Date: 03/04/13

Composition, Information on Ingredients

Exposure Limits[1]

Ingredient	% Volume	PEL-OSHA [2]	TLV-ACGIH [3]	LD_{50} or LC_{50} Route/Species
Nitrogen Formula: N_2 CAS Number: 7727-37-9 RTECS #: QW9700000	80.0 to 99.9999	None Established	Simple Asphyxiant	Not Available
Carbon Monoxide Formula: CO CAS Number: 630-08-0 RTECS#: FG3500000	0.0001 to 20.0	50 PPM TWA 25 PPM Canada	25 PPM TWA	LC 50 3760 PPM RAT Time Adj.

[1] Refer to individual state or provincial regulations, as applicable, for limits which may be more stringent than those listed here.
[2] As stated in 29 CFR 1910, Subpart Z (revised July 1, 1993)
[3] As stated in the ACGIH 2007 Threshold Limit Values for Chemical Substances and Physical Agents

Hazard Identification

Emergency Overview:
Non-flammable, colorless, odorless gas. Nitrogen acts as a simple asphyxiant, displacing atmospheric oxygen and may cause asphyxiation if released in a confined area. Carbon monoxide acts as a chemical asphyxiant, binding to the blood hemoglobin, greatly reducing the red blood cell's ability to transport oxygen to body tissues. Effects may include headaches, dizziness, convulsions, loss of consciousness and death. Contents under pressure. Use and store below 125^0 F (52^0 C).

Route of Entry:

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

Health Effects:

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

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.

Inhalation Effects:
Depending on the concentration of the carbon monoxide present, this product may act as a simple asphyxiant or a chemical asphyxiant.

Inhaled carbon monoxide binds with blood hemoglobin to form carboxyhemoglobin. Carboxyhemoglobin can not take part in normal oxygen transport, greatly reducing the blood's ability to transport oxygen. Depending on levels and duration of exposure, symptoms may include headache, dizziness, heart palpitations, weakness, confusion, nausea, and even convulsions, eventual unconsciousness and death.

Some experimental evidence indicates teratogenic and reproductive effects.

Medical Conditions Aggravated by Exposure:
Recovery from carbon monoxide may be adversely affected by obesity, alcoholism, and chronic heart disease.

NFPA Hazard Codes		**HMIS Hazard Codes**		**Ratings System**
Health:	1	Health:	1	0 = No Hazard
Flammability:	0	Flammability:	0	1 = Slight Hazard
Instability:	0	Physical Hazard:	3	2 = Moderate Hazard
				3 = Serious Hazard
				4 = Severe Hazard

Hazard Data from: *CGA P-19-2004, CGA Recommended Hazard Ratings for Compressed Gases, Second edition*

First Aid Measures

Eyes:
Never introduce ointment or oil into the eyes without medical advice! Remove victim from the source of contamination. Flush eyes with water for 15 minutes. If pain is present, refer the victim to an ophthalmologist for treatment and follow up. If the victim cannot tolerate light, protect the eyes with a light bandage. If frostbite is suspected, flush 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 TO THIS PRODUCT. RESCUE PERSONNEL SHOULD BE EQUIPPED WITH SELF-CONTAINED BREATHING APPARATUS. Conscious persons should be assisted to an uncontaminated area and be treated with supplemental oxygen. Quick removal from the contaminated area is most important. Unconscious persons should be moved to an uncontaminated area and be given artificial respiration and oxygen at the same time. Administration of 100% oxygen by tight fitting face mask reduces the biological half-life of CO.

First Aid Measures Continued

FOR SEVERELY POISNED PATIENTS, HYPERBARIC OXYGEN THERAPY SHOULD BE CONSIDERED. The administering of the oxygen at an elevated pressure (up to 2 to 2.5 atmospheres) has shown to be beneficial as has treatment in a hyperbaric chamber. The physician should be informed that the patient has inhaled toxic quantities of carbon monoxide.

Fire Fighting Measures

Conditions of Flammability: Nonflammable		
Flash point: Not Available	Method: Not Available	Autoignition Temperature: Not Available
LEL(%): 12.5 (CO)	UEL(%) 74.0 (CO)	
Hazardous combustion products: None		
Sensitivity to mechanical shock: None		
Sensitivity to static discharge: Not Available		

Fire and Explosion Hazards:
Non-flammable. Concentrations of carbon monoxide less than or equal to 20% in nitrogen are considered non-flammable (CGA P-23, 1995).

Extinguishing Media:
None required. Use media appropriate for surrounding materials.

Fire Fighting Instructions:
Firefighters should wear respiratory protection (SCBA) and full turnout or Bunker gear. If possible, stop the flow of gas supply. Use water spray to cool adjacent cylinders and areas.

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

Carbon monoxide can be handled in all commonly used metals up to approximately 500 psig (3450 kPa). Above that pressure it forms toxic and corrosive carbonyl compounds with some metals. Carbon steels, aluminum alloys, copper and copper alloys, low carbon stainless steels and nickel-based alloys such as Hastelloy A, B & C are recommended for higher pressure applications.

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 a 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^{O}F (52^{O}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's Pamphlet P-1.

Exposure Controls, Personal Protection

Engineering Controls:
Hood with forced ventilation. Use local exhaust to prevent accumulation above the exposure limit. Use mechanical ventilation in accordance with electrical codes.

Exposure Controls, Personal Protection Continued

Eye/Face Protection:
Safety goggles or glasses as appropriate for the job.

Skin Protection:
Protective gloves made of any suitable material.

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

Other/General Protection:
Safety shoes.

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	
	: Not Available	
Freezing point	: Not Available	
	: Not Available	
pH	: Not Available	
Specific gravity	: Not Available	
Oil/water partition coefficient	: Not Available	
Solubility (H_2O)	: Very slight	
Odor threshold	: Not Applicable	
Odor and appearance	: Odorless, colorless gas	

Stability and Reactivity

Stability:
Stable.

Incompatible Materials:
None known.

Hazardous Decomposition Products:
Carbon dioxide.

Hazardous Polymerization:
Will not occur.

Toxicological Information

Inhalation:
LC50: 3670 ppm inhalation/rat (Time Adj.).

Reproductive:
Inhalation of 150 ppm carbon monoxide for 24 hours by pregnant rats produced cardiovascular and behavioral defects in offspring. Toxic effects to fertility were observed in female rats exposed to 1 mg/m^3 for 24 hours. Similar effects observed in other mammalian species.

Toxicological Information Continued

Mutagenic:
Genetic changes observed in mammalian cell assay systems at exposures of 1500 to 2500 ppm for 10 minutes.

Other:
Degenerative changes were observed in the brain of rats chronically exposed to 30 mg/m^3 carbon monoxide.

Ecological Information

Product does not contain Class I or Class II ozone depleting substances. Not expected to 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 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
Proper Shipping name:	Compressed gases, n.o.s., (Carbon Monoxide, Nitrogen)	Compressed gases, n.o.s.,
Hazard Class:	2.2	2.2
Identification Number:	UN 1956	UN 1956
Shipping Label:	Non-flammable Gas	Non-flammable Gas

Regulatory Information

SARA Title III Notification and Information:

SARA Title III – Section 313 Supplier Notification:
This product does not contain toxic chemicals subject to the reporting requirements of section 313 of the Emergency Planning and Community Right-To-Know Act (EPCRA) of 1986 and CFR 372.

SARA Title III – Hazard Classes:
Acute Health hazard
Fire Hazard
Sudden Release of Pressure Hazard

California Proposition 65: This product contains carbon monoxide, which the State of California has listed as having developmental 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).