

# Material Safety Data Sheet



Nonflammable Gas Mixture: Carbon Monoxide / Hydrogen Sulfide / Methane / Nitrogen / Oxygen

## Section 1. Chemical product and company identification

**Product name** : Nonflammable Gas Mixture: Carbon Monoxide / Hydrogen Sulfide / Methane / Nitrogen / Oxygen

**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 #** : 002527

**Date of Preparation/ Revision** : **10/7/2013.**

**In case of emergency** : 1-866-734-3438

## Section 2. Hazards identification

**Physical state** : Gas.

**Emergency overview** : WARNING!  
CONTENTS UNDER PRESSURE.  
Do not puncture or incinerate container.  
Contact with rapidly expanding gases can cause frostbite.

**Routes of entry** : Inhalation

**Potential acute health effects**

**Eyes** : Contact with rapidly expanding gas may cause burns or frostbite.

**Skin** : Contact with rapidly expanding gas may cause burns or frostbite.

**Inhalation** : Acts as a simple asphyxiant.

**Ingestion** : Ingestion is not a normal route of exposure for gases

**Medical conditions aggravated by over-exposure** : Acute or chronic respiratory conditions may be aggravated by overexposure to this gas.

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>
Nitrogen	7727-37-9	73.6 - 80.5	Oxygen Depletion [Asphyxiant]
Oxygen	7782-44-7	19.5 - 23.5	
Methane	74-82-8	0.0001 - 2.7	<b>ACGIH TLV (United States, 3/2012).</b> TWA: 1000 ppm 8 hours.
Carbon Monoxide	630-08-0	0.0001 - 0.1	<b>ACGIH TLV (United States, 3/2012).</b> TWA: 29 mg/m <sup>3</sup> 8 hours. TWA: 25 ppm 8 hours. <b>NIOSH REL (United States, 1/2013).</b> CEIL: 229 mg/m <sup>3</sup> CEIL: 200 ppm TWA: 40 mg/m <sup>3</sup> 10 hours. TWA: 35 ppm 10 hours. <b>OSHA PEL (United States, 6/2010).</b> TWA: 55 mg/m <sup>3</sup> 8 hours. TWA: 50 ppm 8 hours. <b>OSHA PEL 1989 (United States, 3/1989).</b> CEIL: 229 mg/m <sup>3</sup>

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Hydrogen Sulfide	7783-06-4	0.0001 - 0.1	CEIL: 200 ppm TWA: 40 mg/m <sup>3</sup> 8 hours. TWA: 35 ppm 8 hours. <b>ACGIH TLV (United States, 3/2012).</b> STEL: 5 ppm 15 minutes. TWA: 1 ppm 8 hours. <b>NIOSH REL (United States, 1/2013).</b> CEIL: 15 mg/m <sup>3</sup> 10 minutes. CEIL: 10 ppm 10 minutes. <b>OSHA PEL 1989 (United States, 3/1989).</b> STEL: 21 mg/m <sup>3</sup> 15 minutes. STEL: 15 ppm 15 minutes. TWA: 14 mg/m <sup>3</sup> 8 hours. TWA: 10 ppm 8 hours. <b>OSHA PEL Z2 (United States, 11/2006).</b> AMP: 50 ppm 10 minutes. CEIL: 20 ppm
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## Section 4. First aid measures

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

- Eye contact** : Check for and remove any contact lenses. Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. 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. Clean shoes thoroughly before reuse. Get medical attention immediately.
- Frostbite** : Try to warm up the frozen tissues and seek medical attention.
- Inhalation** : Move exposed person to fresh air. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention immediately.
- Ingestion** : As this product is a gas, refer to the inhalation section.

## Section 5. Fire-fighting measures

- Flammability of the product** : Non-flammable.
- Auto-ignition temperature** : Lowest known value: 539.85°C (1003.7°F) (methane).
- Flash point** : Lowest known value: Closed cup: -188.15°C (-306.7°F). (methane)
- Flammable limits** : Greatest known range: Lower: 5% Upper: 15% (methane)
- Products of combustion** : Decomposition products may include the following materials:  
carbon dioxide  
carbon monoxide  
nitrogen oxides
- Fire-fighting media and instructions** : Use an extinguishing agent suitable for the surrounding fire.
- Apply water from a safe distance to cool container and protect surrounding area. If involved in fire, shut off flow immediately if it can be done without risk.
- Contains gas under pressure. Contact with combustible material may cause fire. This material increases the risk of fire and may aid combustion. In a fire or if heated, a pressure increase will occur and the container may burst or explode.
- Special protective equipment for fire-fighters** : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

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## Section 6. Accidental release measures

- Personal precautions** : Immediately contact emergency personnel. Keep unnecessary personnel away. Use suitable protective equipment (section 8). Eliminate all ignition sources if safe to do so. Do not touch or walk through spilled material. Shut off gas supply if this can be done safely. Isolate area until gas has dispersed.
- Environmental precautions** : Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.
- Methods for cleaning up** : Immediately contact emergency personnel. Stop leak if without risk. Use spark-proof tools and explosion-proof equipment. Note: see Section 1 for emergency contact information and Section 13 for waste disposal.

## Section 7. Handling and storage

- Handling** : High pressure gas. Do not puncture or incinerate container. Use equipment rated for cylinder pressure. Close valve after each use and when empty. Store in tightly-closed container. Avoid contact with combustible materials. 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. Separate from acids, alkalis, reducing agents and combustibles. 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. 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. If contact is possible, the following protection should be worn, unless the assessment indicates a higher degree of protection: safety glasses with side-shields.
- 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 complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary. Considering the parameters specified by the glove manufacturer, check during use that the gloves are still retaining their protective properties. It should be noted that the time to breakthrough for any glove material may be different for different glove manufacturers. In the case of mixtures, consisting of several substances, the protection time of the gloves cannot be accurately estimated.
- Personal protection in case of a large spill** : Self-contained breathing apparatus (SCBA) should be used to avoid inhalation of the product.

### Product name

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nitrogen oxygen methane	Oxygen Depletion [Asphyxiant]
carbon monoxide	<b>ACGIH TLV (United States, 3/2012).</b> TWA: 1000 ppm 8 hours. <b>ACGIH TLV (United States, 3/2012).</b> TWA: 29 mg/m <sup>3</sup> 8 hours. TWA: 25 ppm 8 hours. <b>NIOSH REL (United States, 1/2013).</b> CEIL: 229 mg/m <sup>3</sup> CEIL: 200 ppm TWA: 40 mg/m <sup>3</sup> 10 hours. TWA: 35 ppm 10 hours. <b>OSHA PEL (United States, 6/2010).</b> TWA: 55 mg/m <sup>3</sup> 8 hours. TWA: 50 ppm 8 hours. <b>OSHA PEL 1989 (United States, 3/1989).</b> CEIL: 229 mg/m <sup>3</sup> CEIL: 200 ppm TWA: 40 mg/m <sup>3</sup> 8 hours. TWA: 35 ppm 8 hours.
hydrogen sulphide	<b>ACGIH TLV (United States, 3/2012).</b> STEL: 5 ppm 15 minutes. TWA: 1 ppm 8 hours. <b>NIOSH REL (United States, 1/2013).</b> CEIL: 15 mg/m <sup>3</sup> 10 minutes. CEIL: 10 ppm 10 minutes. <b>OSHA PEL 1989 (United States, 3/1989).</b> STEL: 21 mg/m <sup>3</sup> 15 minutes. STEL: 15 ppm 15 minutes. TWA: 14 mg/m <sup>3</sup> 8 hours. TWA: 10 ppm 8 hours. <b>OSHA PEL Z2 (United States, 11/2006).</b> AMP: 50 ppm 10 minutes. CEIL: 20 ppm

Consult local authorities for acceptable exposure limits.

## Section 9. Physical and chemical properties

<b>Melting/freezing point</b>	: -182.6°C (-296.7°F) This is based on data for the following ingredient: methane. Weighted average: -211.2°C (-348.2°F)
<b>Critical temperature</b>	: Lowest known value: -146.9°C (-232.4°F) (nitrogen).
<b>Vapor density</b>	: Highest known value: 1.105 (Air = 1) (oxygen). Weighted average: 0.99 (Air = 1)
<b>Gas Density (lb/ft<sup>3</sup>)</b>	: Weighted average: 0.07

## Section 10. Stability and reactivity

<b>Stability and reactivity</b>	: The product is stable.
<b>Incompatibility with various substances</b>	: Not considered to be reactive according to our database.
<b>Hazardous decomposition products</b>	: Under normal conditions of storage and use, hazardous decomposition products should not be produced.
<b>Hazardous polymerization</b>	: Under normal conditions of storage and use, hazardous polymerization will not occur.

## Section 11. Toxicological information

### Toxicity data

Product/ingredient name	Result	Species	Dose	Exposure
carbon monoxide	TDLo Intraperitoneal	Rat	35 mL/kg	-
	LC50 Inhalation	Rat	6600 ppm	30 minutes
	Gas.			
	LC50 Inhalation	Rat	3760 ppm	1 hours
hydrogen sulphide	Gas.			
	LC50 Inhalation	Rat	1807 ppm	4 hours
	Gas.			
	LD50 Intraperitoneal	Rat	2300 µg/kg	-
	LD50 Intravenous	Rat	270 µg/kg	-
	LC50 Inhalation	Rat	820 mg/m <sup>3</sup>	3 hours
	Vapor			
	LC50 Inhalation	Rat	700 mg/m <sup>3</sup>	4 hours
	Vapor			
	LC50 Inhalation	Rat	470 mg/m <sup>3</sup>	6 hours
	Vapor			
	LC50 Inhalation	Rat	712 ppm	1 hours
Gas.				
LC50 Inhalation	Mouse	634 ppm	1 hours	
Gas.				
LC50 Inhalation	Rat	444 ppm	4 hours	
Gas.				

**Other toxic effects on humans** : No specific information is available in our database regarding the other toxic effects of this material to humans.

### Specific effects

- 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

### Aquatic ecotoxicity

Product/ingredient name	Test	Result	Species	Exposure
hydrogen sulphide	-	Acute EC50 770 µg/l Fresh water	Crustaceans - Amphipod - Crangonyx richmondensis ssp. laurentianus - 10 mm	48 hours
	-	Acute EC50 540 µg/l Fresh water	Crustaceans - Amphipod - Crangonyx richmondensis ssp. laurentianus - 10 mm	48 hours
	-	Acute EC50 95 µg/l Fresh water	Crustaceans - Scud - Gammarus pseudolimnaeus - 11 mm	2 days
	-	Acute EC50 71 µg/l Fresh water	Crustaceans - Scud - Gammarus pseudolimnaeus - 11 mm	2 days
	-	Acute EC50 62 µg/l Fresh water	Crustaceans - Scud - Gammarus	2 days

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-	Acute LC50 4 µg/l Fresh water	pseudolimnaeus - 11 mm Fish - Lake whitefish - Coregonus clupeaformis - Yolk-sac fry	96 hours
-	Acute LC50 3.2 µg/l Fresh water	Fish - Asian redbtail catfish - Hemibagrus nemurus	96 hours
-	Acute LC50 3 µg/l Fresh water	Fish - Lake whitefish - Coregonus clupeaformis - Yolk-sac fry	96 hours
-	Acute LC50 2 µg/l Fresh water	Fish - Lake whitefish - Coregonus clupeaformis - Yolk-sac fry	96 hours
-	Acute LC50 <2 µg/l Fresh water	Fish - Yellow perch - Perca flavescens - Yolk-sac fry	96 hours

**Products of degradation** : Products of degradation: carbon oxides (CO, CO<sub>2</sub>) and water, nitrogen oxides (NO, NO<sub>2</sub> etc.).

**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
<b>DOT Classification</b>	UN1956	COMPRESSED GAS, N.O.S.	2.2	Not applicable (gas).		-
<b>TDG Classification</b>	UN1956	COMPRESSED GAS, N.O.S.	2.2	Not applicable (gas).		<b><u>Explosive Limit and Limited Quantity Index</u></b> 0.125  <b><u>Passenger Carrying Road or Rail Index</u></b> 75
<b>Mexico Classification</b>	UN1956	COMPRESSED GAS, N.O.S.	2.2	Not applicable (gas).		-

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“Refer to CFR 49 (or authority having jurisdiction) to determine the information required for shipment of the product.”

## Section 15. Regulatory information

### United States

**U.S. Federal regulations** : TSCA 8(a) CDR Exempt/Partial exemption: Not determined  
United States inventory (TSCA 8b): All components are listed or exempted.  
SARA 302/304: hydrogen sulphide  
SARA 311/312 Hazards identification: Fire hazard, Sudden release of pressure, Delayed (chronic) health hazard  
Clean Water Act (CWA) 311: No products were found.

**State regulations** : **Clean Air Act (CAA) 112 regulated flammable substances:** methane  
**Connecticut Carcinogen Reporting:** None of the components are listed.  
**Connecticut Hazardous Material Survey:** None of the components are listed.  
**Florida substances:** None of the components are listed.  
**Illinois Chemical Safety Act:** None of the components are listed.  
**Illinois Toxic Substances Disclosure to Employee Act:** None of the components are listed.  
**Louisiana Reporting:** None of the components are listed.  
**Louisiana Spill:** None of the components are listed.  
**Massachusetts Spill:** None of the components are listed.  
**Massachusetts Substances:** The following components are listed: NITROGEN; OXYGEN (LIQUID); METHANE  
**Michigan Critical Material:** None of the components are listed.  
**Minnesota Hazardous Substances:** None of the components are listed.  
**New Jersey Hazardous Substances:** The following components are listed: NITROGEN; OXYGEN; METHANE  
**New Jersey Spill:** None of the components are listed.  
**New Jersey Toxic Catastrophe Prevention Act:** None of the components are listed.  
**New York Acutely Hazardous Substances:** None of the components are listed.  
**New York Toxic Chemical Release Reporting:** None of the components are listed.  
**Pennsylvania RTK Hazardous Substances:** The following components are listed: NITROGEN; OXYGEN; METHANE  
**Rhode Island Hazardous Substances:** None of the components are listed.

**California Prop. 65** : **WARNING:** This product contains less than 1% of a chemical known to the State of California to cause birth defects or other reproductive harm.

<u>Ingredient name</u>	<u>Cancer</u>	<u>Reproductive</u>	<u>No significant risk level</u>	<u>Maximum acceptable dosage level</u>
Carbon Monoxide	No.	Yes.	No.	No.

### Canada

**WHMIS (Canada)** : Class A: Compressed gas.  
Class D-2A: Material causing other toxic effects (Very toxic).  
**CEPA Toxic substances:** The following components are listed: Methane  
**Canadian ARET:** None of the components are listed.  
**Canadian NPRI:** The following components are listed: Volatile organic compounds  
**Alberta Designated Substances:** None of the components are listed.  
**Ontario Designated Substances:** None of the components are listed.  
**Quebec Designated Substances:** None of the components are listed.

## Section 16. Other information

### United States

**Label requirements** : CONTENTS UNDER PRESSURE.

### Canada

**Label requirements** : Class A: Compressed gas.  
Class D-2A: Material causing other toxic effects (Very toxic).

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

Health	*	1
Flammability		0
Physical hazards		0

**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.