

Material Safety Data Sheet



Nonflammable Gas Mixture: Carbon Monoxide / Nitrogen / Sulfur Dioxide

Section 1. Chemical product and company identification

Product name	: Nonflammable Gas Mixture: Carbon Monoxide / Nitrogen / Sulfur Dioxide
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 #	: 002391
Date of Preparation/Revision	: 5/11/2009.
In case of emergency	: 1-866-734-3438

Section 2. Hazards identification

Physical state	: Gas.
Emergency overview	: DANGER! CAUSES SEVERE RESPIRATORY TRACT, EYE AND SKIN BURNS. HARMFUL IF INHALED. CONTAINS MATERIAL THAT MAY CAUSE TARGET ORGAN DAMAGE, BASED ON ANIMAL DATA. CONTENTS UNDER PRESSURE. Do not puncture or incinerate container. Do not breathe gas. Do not get on skin or clothing. Contains material that may cause target organ damage, based on animal data. Use only with adequate ventilation. Keep container closed. Do not get in eyes, on skin or on clothing. Avoid breathing gas. Wash thoroughly after handling. Contact with rapidly expanding gases can cause frostbite.
Target organs	: Contains material which may cause damage to the following organs: blood, lungs, cardiovascular system, upper respiratory tract, skin, eyes, central nervous system (CNS).
Routes of entry	: Inhalation Dermal Eyes
Potential acute health effects	
Eyes	: Severely corrosive to the eyes. Causes severe burns. Contact with rapidly expanding gas may cause burns or frostbite.
Skin	: Corrosive to the skin.
Inhalation	: Toxic by inhalation. Severely corrosive to the respiratory system.
Ingestion	: Ingestion is not a normal route of exposure for gases
Potential chronic health effects	: CARCINOGENIC EFFECTS: Classified A4 (Not classifiable for humans or animals.) by ACGIH, 3 (Not classifiable for humans.) by IARC [Sulfur dioxide]. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available.
Medical conditions aggravated by over-exposure	: Pre-existing disorders involving any target organs mentioned in this MSDS as being at risk may be aggravated by over-exposure to this product.

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	94 - 99	Oxygen Depletion [Asphyxiant]
Carbon Monoxide	630-08-0	0.0025 - 5	<p>ACGIH TLV (United States, 1/2008). TWA: 29 mg/m³ 8 hour(s). TWA: 25 ppm 8 hour(s).</p> <p>NIOSH REL (United States, 6/2008). CEIL: 229 mg/m³ CEIL: 200 ppm TWA: 40 mg/m³ 10 hour(s). TWA: 35 ppm 10 hour(s).</p> <p>OSHA PEL (United States, 11/2006). TWA: 55 mg/m³ 8 hour(s). TWA: 50 ppm 8 hour(s).</p> <p>OSHA PEL 1989 (United States, 3/1989). CEIL: 229 mg/m³ CEIL: 200 ppm TWA: 40 mg/m³ 8 hour(s). TWA: 35 ppm 8 hour(s).</p>
Sulfur Dioxide	7446-09-5	0.0002 - 1	<p>ACGIH TLV (United States, 1/2008). STEL: 13 mg/m³ 15 minute(s). STEL: 5 ppm 15 minute(s). TWA: 5.2 mg/m³ 8 hour(s). TWA: 2 ppm 8 hour(s).</p> <p>NIOSH REL (United States, 6/2008). STEL: 13 mg/m³ 15 minute(s). STEL: 5 ppm 15 minute(s). TWA: 5 mg/m³ 10 hour(s). TWA: 2 ppm 10 hour(s).</p> <p>OSHA PEL (United States, 11/2006). TWA: 13 mg/m³ 8 hour(s). TWA: 5 ppm 8 hour(s).</p> <p>OSHA PEL 1989 (United States, 3/1989). STEL: 10 mg/m³ 15 minute(s). STEL: 5 ppm 15 minute(s). TWA: 5 mg/m³ 8 hour(s). TWA: 2 ppm 8 hour(s).</p>

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: 608.89°C (1128°F) (Carbon monoxide).
- Flammable limits** : Greatest known range: Lower: 12.5% Upper: 74.2% (Carbon monoxide)
- Products of combustion** : Decomposition products may include the following materials:
carbon dioxide
carbon monoxide
nitrogen oxides
sulfur 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. 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.

Section 6. Accidental release measures

- Personal precautions** : Immediately contact emergency personnel. Keep unnecessary personnel away. Use suitable protective equipment (section 8). 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. Note: see section 1 for emergency contact information and section 13 for waste disposal.

Section 7. Handling and storage

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

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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.

Personal protection in case of a large spill : Self-contained breathing apparatus (SCBA) should be used to avoid inhalation of the product. Full chemical-resistant suit and self-contained breathing apparatus should be worn only by trained and authorized persons.

Product name

Nitrogen
Carbon monoxide

Oxygen Depletion [Asphyxiant]
ACGIH TLV (United States, 1/2008).

TWA: 29 mg/m³ 8 hour(s).

TWA: 25 ppm 8 hour(s).

NIOSH REL (United States, 6/2008).

CEIL: 229 mg/m³

CEIL: 200 ppm

TWA: 40 mg/m³ 10 hour(s).

TWA: 35 ppm 10 hour(s).

OSHA PEL (United States, 11/2006).

TWA: 55 mg/m³ 8 hour(s).

TWA: 50 ppm 8 hour(s).

OSHA PEL 1989 (United States, 3/1989).

CEIL: 229 mg/m³

CEIL: 200 ppm

TWA: 40 mg/m³ 8 hour(s).

TWA: 35 ppm 8 hour(s).

Sulfur dioxide

ACGIH TLV (United States, 1/2008).

STEL: 13 mg/m³ 15 minute(s).

STEL: 5 ppm 15 minute(s).

TWA: 5.2 mg/m³ 8 hour(s).

TWA: 2 ppm 8 hour(s).

NIOSH REL (United States, 6/2008).

STEL: 13 mg/m³ 15 minute(s).

STEL: 5 ppm 15 minute(s).

TWA: 5 mg/m³ 10 hour(s).

TWA: 2 ppm 10 hour(s).

OSHA PEL (United States, 11/2006).

TWA: 13 mg/m³ 8 hour(s).

TWA: 5 ppm 8 hour(s).

OSHA PEL 1989 (United States, 3/1989).

STEL: 10 mg/m³ 15 minute(s).

STEL: 5 ppm 15 minute(s).

TWA: 5 mg/m³ 8 hour(s).

TWA: 2 ppm 8 hour(s).

Consult local authorities for acceptable exposure limits.

Section 9. Physical and chemical properties

Melting/freezing point : -75.6°C (-104.1°F) This is based on data for the following ingredient: Sulfur dioxide.
Weighted average: -208.19°C (-342.7°F)

Critical temperature : Lowest known value: -146.9°C (-232.4°F) (Nitrogen).

Vapor density : Highest known value: 2.2 (Air = 1) (Sulfur dioxide). Weighted average: 0.98 (Air = 1)

Gas Density (lb/ft³) : Weighted average: 0.02

Section 10. Stability and reactivity

- Stability and reactivity** : The product is stable.
- Incompatibility with various substances** : Reactive with alkalis, moisture.
- Hazardous decomposition products** : Under normal conditions of storage and use, hazardous decomposition products should not be produced.
- Hazardous polymerization** : 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 Vapor	Rat	13500 mg/m ³	15 minutes	
	LC50 Inhalation Vapor	Rat	1900 mg/m ³	4 hours	
	LC50 Inhalation Gas.	Rat	3760 ppm	1 hours	
	LC50 Inhalation Gas.	Mouse	2444 ppm	4 hours	
	LC50 Inhalation Gas.	Rat	6600 ppm	30 minutes	
	LC50 Inhalation Gas.	Rat	1807 ppm	4 hours	
	Sulfur dioxide	LC50 Inhalation Gas.	Mouse	3000 ppm	0.5 hours
		LC50 Inhalation Gas.	Rat	2520 ppm	1 hours
LC50 Inhalation Gas.		Rat	2520 ppm	1 hours	

Chronic effects on humans : **CARCINOGENIC EFFECTS:** Classified A4 (Not classifiable for humans or animals.) by ACGIH, 3 (Not classifiable for humans.) by IARC [Sulfur dioxide]. Contains material which may cause damage to the following organs: blood, lungs, cardiovascular system, upper respiratory tract, skin, eyes, central nervous system (CNS).

Other toxic effects on humans : Hazardous by the following route of exposure: of skin contact (irritant), of eye contact (irritant), of inhalation (lung irritant).

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

Not available.




- Products of degradation** : Products of degradation: carbon oxides (CO, CO₂), nitrogen oxides (NO, NO₂ etc.), sulfur oxides (SO₂, SO₃ etc.).
- Environmental fate** : Not available.
- Environmental hazards** : No known significant effects or critical hazards.
- Toxicity to the environment** : Not available.

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Section 13. Disposal considerations

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

Section 14. Transport information

Regulatory information	UN number	Proper shipping name	Class	Packing group	Label	Additional information
DOT Classification	UN1956	COMPRESSED GAS, N.O.S.	2.2	Not applicable (gas).		-
TDG Classification	UN1956	COMPRESSED GAS, N.O.S.	2.2	Not applicable (gas).		Explosive Limit and Limited Quantity Index 0.125 Passenger Carrying Road or Rail Index 75
Mexico Classification	UN1956	COMPRESSED GAS, N.O.S.	2.2	Not applicable (gas).		-

“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** :
- United States inventory (TSCA 8b):** All components are listed or exempted.
 - SARA 302/304/311/312 extremely hazardous substances:** Sulfur dioxide
 - SARA 302/304 emergency planning and notification:** Sulfur dioxide
 - SARA 302/304/311/312 hazardous chemicals:** Nitrogen; Sulfur dioxide; Carbon monoxide
 - SARA 311/312 MSDS distribution - chemical inventory - hazard identification:**
Nitrogen: Sudden release of pressure; Sulfur dioxide: Sudden release of pressure, Immediate (acute) health hazard, Delayed (chronic) health hazard; Carbon monoxide: Fire hazard, Sudden release of pressure, Immediate (acute) health hazard, Delayed (chronic) health hazard
 - Clean Water Act (CWA) 307:** No products were found.
 - Clean Water Act (CWA) 311:** No products were found.
 - Clean Air Act (CAA) 112 accidental release prevention:** Sulfur dioxide
 - Clean Air Act (CAA) 112 regulated flammable substances:** No products were found.
 - Clean Air Act (CAA) 112 regulated toxic substances:** Sulfur dioxide
- State regulations** :
- 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.

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Massachusetts Substances: The following components are listed: NITROGEN; CARBON MONOXIDE; SULFUR DIOXIDE
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 (COMPRESSED OR LIQUIFIED); CARBON MONOXIDE; SULFUR DIOXIDE
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: The following components are listed: Sulfur dioxide
New York Toxic Chemical Release Reporting: None of the components are listed.
Pennsylvania RTK Hazardous Substances: The following components are listed: NITROGEN; CARBON MONOXIDE; SULFUR DIOXIDE
Rhode Island Hazardous Substances: None of the components are listed.

California Prop. 65

: **WARNING:** This product contains a chemical known to the State of California to cause birth defects or other reproductive harm.

Ingredient name

Cancer

Reproductive

No significant risk level

Maximum acceptable dosage level

Carbon Monoxide

No.

Yes.

No.

No.

Canada

WHMIS (Canada)

: Class A: Compressed gas.
Class D-1A: Material causing immediate and serious toxic effects (Very toxic).
Class D-2A: Material causing other toxic effects (Very toxic).
Class E: Corrosive material

CEPA Toxic substances: The following components are listed: Sulphur dioxide

Canadian ARET: None of the components are listed.

Canadian NPRI: The following components are listed: Carbon monoxide; Sulphur dioxide

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

: CAUSES SEVERE RESPIRATORY TRACT, EYE AND SKIN BURNS.
HARMFUL IF INHALED.
CONTAINS MATERIAL THAT MAY CAUSE TARGET ORGAN DAMAGE, BASED ON ANIMAL DATA.
CONTENTS UNDER PRESSURE.

Canada

Label requirements

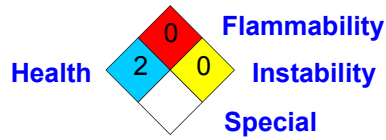
: Class A: Compressed gas.
Class D-1A: Material causing immediate and serious toxic effects (Very toxic).
Class D-2A: Material causing other toxic effects (Very toxic).
Class E: Corrosive material

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

Health	*	2
Flammability		0
Physical hazards		0

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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.