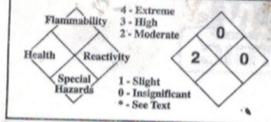




Date: 2/20/07



## SECTION IV - HEALTH HAZARD DATA

**Threshold Limit Value:** The ACGIH recommended general limit for Welding Fume NOS - (Not Otherwise Specified) is 5 mg/m<sup>3</sup>. ACGIH-1999 preface states that the TLV-TWA should be used as guides in the control of health hazards and should not be used as fin between safe and dangerous concentrations. See Section V for specific fume constituents which may modify this TLV. Threshold Lir Values are figures published by the American Conference of Government Industrial Hygienists. Units are milligrams per cubic meter c.

**Effects of Overexposure:** Electric arc welding may create one or more of the following health hazards:  
Fumes and Gases can be dangerous to your health. Common entry is by inhalation. Other possible routes are skin contact and ingestion.

Short-term (acute) overexposure to welding fumes may result in discomfort such as metal fume fever, dizziness, nausea, or dryness or irritation of nose, throat, or eyes. May aggravate pre-existing respiratory problems (e.g. asthma, emphysema).

Long-term (chronic) overexposure to welding fumes can lead to siderosis (iron deposits in lung) and may affect pulmonary function. Manganese overexposure can affect the central nervous system, resulting in impaired speech and movement. Bronchitis and some lung fibrosis have been reported. **WARNING:** This product, when used for welding or cutting, produces fumes or gases which contain chemicals known to the State of California to cause birth defects and, in some cases, cancer. (California Health & Safety Code Section 25249.5 et seq.)

Arc Rays can injure eyes and burn skin. Skin cancer has been reported.

Electric Shock can kill. If welding must be performed in damp locations or with wet clothing, on metal structures or when in cramped positions such as sitting, kneeling or lying, or if there is a high risk of unavoidable or accidental contact with workpiece, use the following equipment: Semiautomatic DC Welder, DC Manual (Stick) Welder, or AC Welder with Reduced Voltage Control.

**Emergency and First Aid Procedures:** Call for medical aid. Employ first aid techniques recommended by the American Red Cross. IF BREATHING IS DIFFICULT give oxygen. IF NOT BREATHING employ CPR (Cardiopulmonary Resuscitation) techniques. IN CASE OF ELECTRICAL SHOCK, turn off power and follow recommended treatment. In all cases call a physician.

## SECTION V - REACTIVITY DATA

**Hazardous Decomposition Products:** Welding fumes and gases cannot be classified simply. The composition and quantity of both are dependent upon the metal being welded, the process, procedure and electrodes used.

Other conditions which also influence the composition and quantity of the fumes and gases to which workers may be exposed include: coatings on the metal being welded (such as paint, plating, or galvanizing), the number of welders and the volume of the worker area, the quality and amount of ventilation, the position of the welder's head with respect to the fume plume, as well as the presence of contaminants in the atmosphere (such as chlorinated hydrocarbon vapors from cleaning and degreasing activities.)

When the electrode is consumed, the fume and gas decomposition products generated are different in percent and form from the ingredients listed in Section II. Decomposition products of normal operation include those originating from the volatilization, reaction, or oxidation of the materials shown in Section II, plus those from the base metal and coating, etc., as noted above.

Reasonably expected fume constituents of this product would include: Primarily iron oxide and fluorides; secondarily complex oxides of aluminum, calcium, magnesium, manganese, potassium, silicon, sodium, titanium and zirconium when used with recommended Lincolnweld fluxes. Primarily iron oxide; secondarily complex oxides of copper, manganese and silicon when used with gas shielding.

Maximum fume exposure guideline for this product (based on manganese content) is 1.5 milligrams per cubic meter.

Gaseous reaction products may include carbon monoxide and carbon dioxide. Ozone and nitrogen oxides may be formed by the radiation from the arc.

Determine the composition and quantity of fumes and gases to which workers are exposed by taking an air sample from inside the welder's helmet if worn or in the worker's breathing zone. Improve ventilation if exposures are not below limits. See ANSI/AWS F1.1, F1.2, F1.3 and F1.5, available from the American Welding Society, 550 N.W. LeJeune Road, Miami, FL 33126.

## SECTION VI AND VII CONTROL MEASURES AND PRECAUTIONS FOR SAFE HANDLING AND USE

Read and understand the manufacturer's instruction and the precautionary label on the product. Request Lincoln Safety Publication E205. See American National Standard Z49.1, "Safety in Welding, Cutting and Allied Processes" published by the American Welding Society, 550 N.W. LeJeune Road, Miami, FL, 33126 (both available for free download at <http://www.lincolnelectric.com/community/safety/>) and OSHA Publication 2206 (29CFR1910), U.S. Government Printing Office, Superintendent of Documents, P.O. Box 371954, Pittsburgh, PA 15250-7954 for more details on many of the following:

**Ventilation:** Use enough ventilation, local exhaust at the arc, or both to keep the fumes and gases from the worker's breathing zone and the general area. Train the welder to keep his head out of the fumes. Keep exposure as low as possible.

**Respiratory Protection:** Use respirable fume respirator or air supplied respirator when welding in confined space or general work area when local exhaust or ventilation does not keep exposure below TLV.

**Eye Protection:** Wear helmet or use face shield with filter lens shade number 12\* or darker. Shield others by providing screens and flash goggles.  
(\* No specific recommendation for submerged arc.

**Protective Clothing:** Wear hand, head, and body protection which help to prevent injury from radiation, sparks and electrical shock. See Z49.1. At a minimum this includes welder's gloves and a protective face shield, and may include arm protectors, aprons, hats, shoulder protection, as well as dark substantial clothing. Train the welder not to permit electrically live parts or electrodes to contact skin ... or clothing or gloves if they are wet. Insulate from work and ground.

**Disposal Information:** Discard any product, residue, disposable container, or liner as ordinary waste in an environmentally acceptable manner according to Federal, State and Local Regulations unless otherwise noted. No applicable ecological information available.

MATERIAL SAFETY DATA SHEET  
May be used to comply with  
OSHA's Hazard Communication  
Standard, 29CFR 1910.2100.

U.S. DEPARTMENT OF LABOR  
Occupational Safety and  
Health Administration  
(Non-Mandatory Form)

027-WATER BASED ANTI-SPATTER (AEROSOL) (RADNOR PART# 64000110)

RADNOR  
259 NORTH RADNOR-CHESTER RD. SUITE -100  
RADNOR, PA. 19087-5283

EMERGENCY NUMBER 866-734-3438  
INFORMATION 866-734-3438  
DATE PREPARED: JANUARY 1, 2008

SECTION II-HAZARDOUS INGREDIENTS/IDENTITY INFORMATION

Hazardous components OSHA PEL ACGIH TLV % (optional)

None N/A N/A

The ingredients in this product are not listed in 29 CFR 1910  
Subpart 2 nor do they appear in "Threshold Limit Values for  
Chemical Substances in the work environment adopted by ACGIH for  
1985-86."

SECTION III-PHYSICAL/CHEMICAL CHARACTERISTICS

Boiling Point: 212F Specific Gravity (H2O=1)-1.0  
Vapor Pressure: 114 Melting Point: N/A  
Vapor Density: 4.0 (AIR=1) Evaporation Rate: Slower than  
(BUTYL=1) butyl acetate.

Solubility in Water: Completely miscible.  
Appearance and Odor: Straw colored with slight odor.

SECTION IV-FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used) NONE (TCC)  
Flammable Limits %BY VOLUME  
LEL N/A  
UEL N/A

Extinguishing Media: Carbon dioxide, dry chemical or foam.  
Special Firefighting Procedures: Pressure-demand, self-contained  
protection should be provided.  
Storage containers exposed to  
fire should be kept cool with  
water.

Unusual Fire and Explosion Hazards: At high temperatures, over-  
pressurization of containers  
can result. Cans may burst.



SECTION VII-PRECAUTIONS FOR SAFE HANDLING AND USE

Steps to Be Taken in Case Material Is Released or Spilled:  
NONE.

Waste Disposal Method: N/A  
Material is non-toxic  
and biodegradable.

Precautions to Be Taken in Handling and Storing: Keep from freezing. Store at temperatures of 4-35C (40-95F) in order to preserve stability.

Other Precautions: N/A

SECTION VIII-CONTROL MEASURES

Respiratory Protection (Specify type) None required.

Ventilation: Local Exhaust-Adequate Special-N/A  
Mechanical- N/A Other-N/A

Protective Gloves- Rubber or plastic. Eye Protection-Yes

Other Protective Clothing or Equipment-None

Work/Hygienic Practices: Eyewash fountains and safety showers should be easily accessible.

NEW JERSEY RIGHT TO KNOW INFORMATION

WATER CAS# 7732-18-5  
LECITHIN CAS#8002-43-5  
POLYSORBATE 80 CAS#9005-65-6  
NITROGEN CAS#7727-37-9

# Material Safety Data Sheet

# Airgas

Acetylene

## Section 1. Chemical product and company identification

**Product name** : Acetylene  
**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.  
**Synonym** : Ethyne; Ethine; Narcylen; C<sub>2</sub>H<sub>2</sub>; Acetylen; UN 1001; Vinylene  
**MSDS #** : 001001  
**Date of Preparation/Revision** : **4/8/2008.**  
**In case of emergency** : 1-866-734-3438

## Section 2. Hazards identification

**Physical state** : Gas.  
**Emergency overview** : **WARNING!**  
FLAMMABLE GAS.  
MAY CAUSE FLASH FIRE.  
MAY CAUSE TARGET ORGAN DAMAGE, BASED ON ANIMAL DATA.  
CONTENTS UNDER PRESSURE.  
Keep away from heat, sparks and flame. Do not puncture or incinerate container. May cause target organ damage, based on animal data. Use only with adequate ventilation. Keep container closed.  
Contact with rapidly expanding gases can cause frostbite.  
**Target organs** : May cause damage to the following organs: upper respiratory tract, central nervous system (CNS).  
**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  
**Potential chronic health effects** : **CARCINOGENIC EFFECTS:** Not available.  
**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>   |
|-------------|-------------------|-----------------|--|
| Acetylene   | 74-86-2           | 100             | <b>NIOSH REL (United States, 12/2001).</b><br>CEIL: 2662 mg/m <sup>3</sup> |

## 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. To avoid the risk of static discharges and gas ignition, soak contaminated clothing thoroughly with water before removing it. 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** : Flammable.
- Auto-ignition temperature** : 304.85°C (580.7°F)
- Flash point** : Closed cup: -18.15°C (-0.7°F).
- Flammable limits** : Lower: 2.5% Upper: 82%
- Products of combustion** : Decomposition products may include the following materials:  
carbon dioxide  
carbon monoxide
- Fire hazards in the presence of various substances** : Extremely flammable in the presence of the following materials or conditions: open flames, sparks and static discharge, heat and oxidizing materials.
- Fire-fighting media and instructions** : In case of fire, use water spray (fog), foam or dry chemical.
- In case of fire, allow gas to burn if flow cannot be shut off immediately. 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. Flammable gas. In a fire or if heated, a pressure increase will occur and the container may burst, with the risk of a subsequent explosion.
- 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. 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** : Use only with adequate ventilation. Use explosion-proof electrical (ventilating, lighting and material handling) equipment. High pressure gas. Do not puncture or incinerate container. Use equipment rated for cylinder pressure. Close valve after each use and when empty. Keep container closed. Keep away from heat, sparks and flame. To avoid fire, eliminate ignition sources. Protect cylinders from physical damage; do not drag, roll, slide, or drop. Use a suitable hand truck for cylinder movement.
- Storage** : Keep container in a cool, well-ventilated area. Keep container tightly closed and sealed until ready for use. Avoid all possible sources of ignition (spark or flame). Segregate from oxidizing materials. 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. The engineering controls also need to keep gas, vapor or dust concentrations below any lower explosive limits. Use explosion-proof ventilation equipment.
- 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, gases 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
- 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.

### Product name

acetylene

NIOSH REL (United States, 12/2001).  
CEIL: 2662 mg/m<sup>3</sup>

Consult local authorities for acceptable exposure limits.

## Section 9. Physical and chemical properties

- Molecular weight** : 26.04 g/mole
- Molecular formula** : C<sub>2</sub>H<sub>2</sub>
- Melting/freezing point** : Sublimation temperature: -81.8°C (-115.2°F)
- Critical temperature** : 35.3°C (95.5°F)
- Vapor pressure** : 635 (psig)
- Vapor density** : 0.9 (Air = 1)
- Specific Volume (ft<sup>3</sup>/lb)** : 14.7058
- Gas Density (lb/ft<sup>3</sup>)** : 0.068

## Section 10. Stability and reactivity

- Stability and reactivity** : The product may undergo hazardous decomposition, condensation or polymerization, react violently with water to emit toxic gases or become self-reactive under conditions of shock or increase in temperature or pressure.
- Incompatibility with various substances** : Extremely reactive or incompatible with oxidizing agents
- 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

- Chronic effects on humans** : May cause damage to the following organs: upper respiratory tract, central nervous system (CNS).
- 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

Not available.

- Products of degradation** : Products of degradation: carbon oxides (CO, CO<sub>2</sub>) and water.
- 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  |
|------------------------|-----------|----------------------|-------|-----------------------|---|---|
| DOT Classification     | UN1001    | ACETYLENE, DISSOLVED | 2.1   | Not applicable (gas). |  | <p><b>Limited quantity</b><br/>Yes.</p> <p><b>Packaging instruction</b><br/><b>Passenger aircraft</b><br/>Quantity limitation:<br/>Forbidden.</p> <p><b>Cargo aircraft</b><br/>Quantity limitation: 15 kg</p> |
|                        |           |                      |       |                       |   |   |

| Acetylene             |        |                      |     |                       |   |  |
|-----------------------|--------|----------------------|-----|-----------------------|---|--|
| TDG Classification    | UN1001 | ACETYLENE, DISSOLVED | 2.1 | Not applicable (gas). |  | <u>Explosive Limit and Limited Quantity Index</u><br>0<br><br><u>Passenger Carrying Ship Index</u><br>75<br><br><u>Passenger Carrying Road or Rail Index</u><br>Forbidden<br><br><u>Special provisions</u><br>38, 42 |
| Mexico Classification | UN1001 | ACETYLENE, DISSOLVED | 2.1 | Not applicable (gas). |  | -  |

## Section 15. Regulatory information

### United States

#### U.S. Federal regulations

- : **United States inventory (TSCA 8b):** This material is listed or exempted.
- SARA 302/304/311/312 extremely hazardous substances:** No products were found.
- SARA 302/304 emergency planning and notification:** No products were found.
- SARA 302/304/311/312 hazardous chemicals:** acetylene
- SARA 311/312 MSDS distribution - chemical inventory - hazard identification:** acetylene: Fire hazard, reactive, Sudden release of pressure, Immediate (acute) 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:** acetylene
- Clean Air Act (CAA) 112 regulated flammable substances:** acetylene
- Clean Air Act (CAA) 112 regulated toxic substances:** No products were found.

#### State regulations

- : **Connecticut Carcinogen Reporting:** This material is not listed.
- Connecticut Hazardous Material Survey:** This material is not listed.
- Florida substances:** This material is not listed.
- Illinois Chemical Safety Act:** This material is not listed.
- Illinois Toxic Substances Disclosure to Employee Act:** This material is not listed.
- Louisiana Reporting:** This material is not listed.
- Louisiana Spill:** This material is not listed.
- Massachusetts Spill:** This material is not listed.
- Massachusetts Substances:** This material is listed.
- Michigan Critical Material:** This material is not listed.
- Minnesota Hazardous Substances:** This material is not listed.
- New Jersey Hazardous Substances:** This material is listed.
- New Jersey Spill:** This material is not listed.
- New Jersey Toxic Catastrophe Prevention Act:** This material is not listed.
- New York Acutely Hazardous Substances:** This material is not listed.
- New York Toxic Chemical Release Reporting:** This material is not listed.
- Pennsylvania RTK Hazardous Substances:** This material is listed.
- Rhode Island Hazardous Substances:** This material is not listed.

# Acetylene

## Canada

WHMIS (Canada)

: Class A: Compressed gas.  
Class B-1: Flammable gas.  
Class F: Dangerously reactive material.

**CEPA Toxic substances:** This material is not listed.

**Canadian ARET:** This material is not listed.

**Canadian NPRI:** This material is listed.

**Alberta Designated Substances:** This material is not listed.

**Ontario Designated Substances:** This material is not listed.

**Quebec Designated Substances:** This material is not listed.

## Section 16. Other information

United States

Label requirements

: FLAMMABLE GAS.  
MAY CAUSE FLASH FIRE.  
MAY CAUSE TARGET ORGAN DAMAGE, BASED ON ANIMAL DATA.  
CONTENTS UNDER PRESSURE.

Canada

Label requirements

: Class A: Compressed gas.  
Class B-1: Flammable gas.  
Class F: Dangerously reactive material.

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

|                  |   |   |
|------------------|---|---|
| Health           | * | 1 |
| Flammability     |   | 4 |
| Physical hazards |   | 3 |
|                  |   |   |

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.

# Material Safety Data Sheet

# Airgas

Argon

## Section 1. Chemical product and company identification

Product name : Argon  
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.  
Synonym : argon, compressed; Cryogenic Liquid Argon, Liquid Argon  
MSDS # : 001004  
Date of Preparation/Revision : 2/13/2009.  
In case of emergency : 1-866-734-3438

## Section 2. Hazards identification

Physical state : Gas. [COLORLESS, ODORLESS INERT GAS OR LIQUID]

Emergency overview : WARNING!

GAS:  
CONTENTS UNDER PRESURE.  
Do not puncture or incinerate container.  
Can cause rapid suffocation.  
May cause severe frostbite.

LIQUID:  
Extremely cold liquid and gas under pressure.  
Can cause rapid suffocation.  
May cause severe frostbite.

Do not puncture or incinerate container.  
Contact with rapidly expanding gases or liquids can cause frostbite.

Routes of entry : Inhalation

### Potential acute health effects

Eyes : Contact with rapidly expanding gas may cause burns or frostbite. Contact with cryogenic liquid can cause frostbite and cryogenic burns.

Skin : Contact with rapidly expanding gas may cause burns or frostbite. Contact with cryogenic liquid can cause frostbite and cryogenic burns.

Inhalation : Acts as a simple asphyxiant.

Ingestion : Ingestion is not a normal route of exposure for gases. Contact with cryogenic liquid can cause frostbite and cryogenic burns.

Potential chronic health effects : **CARCINOGENIC EFFECTS:** Not available.  
**MUTAGENIC EFFECTS:** Not available.  
**TERATOGENIC EFFECTS:** Not available.

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

See toxicological information (section 11)

Argon

### Section 3. Composition, Information on Ingredients

| <u>Name</u> | <u>CAS number</u> | <u>% Volume</u> | <u>Exposure limits</u>        |
|-------------|-------------------|-----------------|-------------------------------|
| Argon       | 7440-37-1         | 100             | Oxygen Depletion [Asphyxiant] |

### 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.
- Products of combustion** : No specific data.
- 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** : High pressure gas. Do not puncture or incinerate container. Use equipment rated for cylinder pressure. Close valve after each use and when empty. Protect cylinders from physical damage; do not drag, roll, slide, or drop. Use a suitable hand truck for cylinder movement.
- Never allow any unprotected part of the body to touch uninsulated pipes or vessels that contain cryogenic liquids. Prevent entrapment of liquid in closed systems or piping without pressure relief devices. Some materials may become brittle at low temperatures and will easily fracture.

## Argon

**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).  
For additional information concerning storage and handling refer to Compressed Gas Association pamphlets P-1 Safe Handling of Compressed Gases in Containers and P-12 Safe Handling of Cryogenic Liquids available from the Compressed Gas Association, Inc.

## 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.

When working with cryogenic liquids, wear a full face shield.

**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.

Insulated gloves suitable for low temperatures

**Personal protection in case of a large spill** : Self-contained breathing apparatus (SCBA) should be used to avoid inhalation of the product.

### Product name

argon Oxygen Depletion [Asphyxiant]

**Consult local authorities for acceptable exposure limits.**

## Section 9. Physical and chemical properties

**Molecular weight** : 39.95 g/mole

**Molecular formula** : Ar

**Boiling/condensation point** : -185.7°C (-302.3°F)

**Melting/freezing point** : -189.2°C (-308.6°F)

**Critical temperature** : -122.4°C (-188.3°F)

**Vapor density** : 1.38 (Air = 1). Liquid Density@BP: 87 lb/ft<sup>3</sup> (1393 kg/m<sup>3</sup>)

**Specific Volume (ft<sup>3</sup>/lb)** : 9.70874

**Gas Density (lb/ft<sup>3</sup>)** : 0.103

## Section 10. Stability and reactivity

**Stability and reactivity** : The product is stable.

**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

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

Not available.

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  |
|------------------------|-----------|----------------------------|-------|-----------------------|---|---|
| DOT Classification     | UN1006    | ARGON, COMPRESSED          | 2.2   | Not applicable (gas). |  | <b>Limited quantity</b><br>Yes.   |
|                        | UN1951    | Argon, refrigerated liquid |       |                       |   | <b>Packaging instruction</b><br><b>Passenger aircraft</b><br>Quantity limitation:<br>75 kg<br><b>Cargo aircraft</b><br>Quantity limitation:<br>150 kg |
| TDG Classification     | UN1006    | ARGON, COMPRESSED          | 2.2   | Not applicable (gas). |  | <b>Explosive Limit and Limited Quantity Index</b><br>0.125  |
|                        | UN1951    | Argon, refrigerated liquid |       |                       |   | <b>Passenger Carrying Road or Rail Index</b><br>75<br><b>Special provisions</b><br>42   |

## Argon

|                          |        |                               |     |                       |   |   |
|--------------------------|--------|-------------------------------|-----|-----------------------|---|---|
| Mexico<br>Classification | UN1006 | ARGON,<br>COMPRESSED          | 2.2 | Not applicable (gas). |  | - |
|                          | UN1951 | Argon, refrigerated<br>liquid |     |                       |   |   |

"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):** This material is listed or exempted.  
**SARA 302/304/311/312 extremely hazardous substances:** No products were found.  
**SARA 302/304 emergency planning and notification:** No products were found.  
**SARA 302/304/311/312 hazardous chemicals:** argon  
**SARA 311/312 MSDS distribution - chemical inventory - hazard identification:**  
argon: Sudden release of pressure  
**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:** No products were found.  
**Clean Air Act (CAA) 112 regulated flammable substances:** No products were found.  
**Clean Air Act (CAA) 112 regulated toxic substances:** No products were found.
- State regulations : **Connecticut Carcinogen Reporting:** This material is not listed.  
**Connecticut Hazardous Material Survey:** This material is not listed.  
**Florida substances:** This material is not listed.  
**Illinois Chemical Safety Act:** This material is not listed.  
**Illinois Toxic Substances Disclosure to Employee Act:** This material is not listed.  
**Louisiana Reporting:** This material is not listed.  
**Louisiana Spill:** This material is not listed.  
**Massachusetts Spill:** This material is not listed.  
**Massachusetts Substances:** This material is listed.  
**Michigan Critical Material:** This material is not listed.  
**Minnesota Hazardous Substances:** This material is not listed.  
**New Jersey Hazardous Substances:** This material is listed.  
**New Jersey Spill:** This material is not listed.  
**New Jersey Toxic Catastrophe Prevention Act:** This material is not listed.  
**New York Acutely Hazardous Substances:** This material is not listed.  
**New York Toxic Chemical Release Reporting:** This material is not listed.  
**Pennsylvania RTK Hazardous Substances:** This material is listed.  
**Rhode Island Hazardous Substances:** This material is not listed.

### Canada

- WHMIS (Canada) : Class A: Compressed gas.  
**CEPA Toxic substances:** This material is not listed.  
**Canadian ARET:** This material is not listed.  
**Canadian NPRI:** This material is not listed.  
**Alberta Designated Substances:** This material is not listed.  
**Ontario Designated Substances:** This material is not listed.  
**Quebec Designated Substances:** This material is not listed.

## Section 16. Other information

### United States

**Argon**

**Label requirements** : **GAS:**  
 CONTENTS UNDER PRESURE.  
 Do not puncture or incinerate container.  
 Can cause rapid suffocation.  
 May cause severe frostbite.  
**LIQUID:**  
 Extremely cold liquid and gas under pressure.  
 Can cause rapid suffocation.  
 May cause severe frostbite.

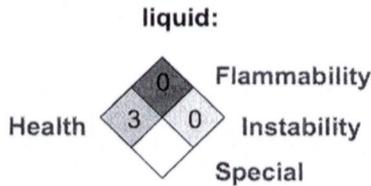
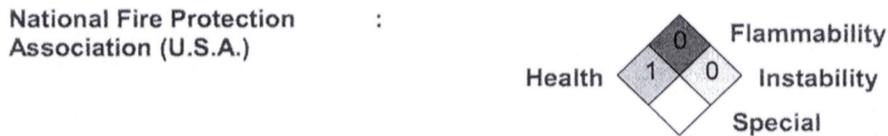
**Canada**  
**Label requirements** : Class A: Compressed gas.

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

|                  |   |
|------------------|---|
| Health           | 1 |
| Flammability     | 0 |
| Physical hazards | 0 |
|                  |   |

**liquid:**

|                     |   |
|---------------------|---|
| Health              | 3 |
| Fire hazard         | 0 |
| Reactivity          | 0 |
| Personal protection | x |



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.

# Material Safety Data Sheet

# Airgas

Nonflammable Gas Mixture: Argon / Carbon Dioxide / Carbon Monoxide / Hydrogen / Methane

## Section 1. Chemical product and company identification

**Product name** : Nonflammable Gas Mixture: Argon / Carbon Dioxide / Carbon Monoxide / Hydrogen / Methane

**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 #** : 008500

**Date of Preparation/Revision** : **2/23/2009.**

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

## Section 2. Hazards identification

**Physical state** : Gas.  
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

**Potential chronic health effects** : **CARCINOGENIC EFFECTS:** Not available.  
**MUTAGENIC EFFECTS:** Not available.  
**TERATOGENIC EFFECTS:** Not available.

**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>   |
|----------------|-------------------|-----------------|--|
| Argon          | 7440-37-1         | 98 - 99         | Oxygen Depletion [Asphyxiant]  |
| Carbon Dioxide | 124-38-9          | 0.0001 - 0.5    | <b>ACGIH TLV (United States, 1/2008).</b><br>STEL: 54000 mg/m <sup>3</sup> 15 minute(s).<br>STEL: 30000 ppm 15 minute(s).<br>TWA: 9000 mg/m <sup>3</sup> 8 hour(s).<br>TWA: 5000 ppm 8 hour(s).<br><b>NIOSH REL (United States, 6/2008).</b><br>STEL: 54000 mg/m <sup>3</sup> 15 minute(s).<br>STEL: 30000 ppm 15 minute(s).<br>TWA: 9000 mg/m <sup>3</sup> 10 hour(s).<br>TWA: 5000 ppm 10 hour(s).<br><b>OSHA PEL (United States, 11/2006).</b><br>TWA: 9000 mg/m <sup>3</sup> 8 hour(s).<br>TWA: 5000 ppm 8 hour(s).<br><b>OSHA PEL 1989 (United States, 3/1989).</b> |

**Nonflammable Gas Mixture: Argon / Carbon Dioxide / Carbon Monoxide / Hydrogen / Methane**

STEL: 54000 mg/m<sup>3</sup> 15 minute(s).  
STEL: 30000 ppm 15 minute(s).  
TWA: 18000 mg/m<sup>3</sup> 8 hour(s).  
TWA: 10000 ppm 8 hour(s).

Carbon Monoxide

630-08-0

0.0001 - 0.5

**ACGIH TLV (United States, 1/2008).**

TWA: 29 mg/m<sup>3</sup> 8 hour(s).

TWA: 25 ppm 8 hour(s).

**NIOSH REL (United States, 6/2008).**

CEIL: 229 mg/m<sup>3</sup>

CEIL: 200 ppm

TWA: 40 mg/m<sup>3</sup> 10 hour(s).

TWA: 35 ppm 10 hour(s).

**OSHA PEL (United States, 11/2006).**

TWA: 55 mg/m<sup>3</sup> 8 hour(s).

TWA: 50 ppm 8 hour(s).

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

CEIL: 229 mg/m<sup>3</sup>

CEIL: 200 ppm

TWA: 40 mg/m<sup>3</sup> 8 hour(s).

TWA: 35 ppm 8 hour(s).

Hydrogen

1333-74-0

0.0001 - 0.5

Oxygen Depletion [Asphyxiant]

Methane

74-82-8

0.0001 - 0.5

**ACGIH TLV (United States, 1/2008).**

TWA: 1000 ppm 8 hour(s).

## 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.
- Products of combustion** : No specific data.
- 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.

**Nonflammable Gas Mixture: Argon / Carbon Dioxide / Carbon Monoxide / Hydrogen / Methane**

## 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** : High pressure gas. Do not puncture or incinerate container. Use equipment rated for cylinder pressure. Close valve after each use and when empty. 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 supplied 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.
- Hands** : The applicable standards are (US) 29 CFR 1910.134 and (Canada) Z94.4-93  
: 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.

### Product name

argon  
carbon dioxide

Oxygen Depletion [Asphyxiant]

**ACGIH TLV (United States, 1/2008).**

STEL: 54000 mg/m<sup>3</sup> 15 minute(s).

STEL: 30000 ppm 15 minute(s).

TWA: 9000 mg/m<sup>3</sup> 8 hour(s).

TWA: 5000 ppm 8 hour(s).

**NIOSH REL (United States, 6/2008).**

STEL: 54000 mg/m<sup>3</sup> 15 minute(s).

STEL: 30000 ppm 15 minute(s).

TWA: 9000 mg/m<sup>3</sup> 10 hour(s).

TWA: 5000 ppm 10 hour(s).

**OSHA PEL (United States, 11/2006).**

TWA: 9000 mg/m<sup>3</sup> 8 hour(s).

TWA: 5000 ppm 8 hour(s).

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

STEL: 54000 mg/m<sup>3</sup> 15 minute(s).

STEL: 30000 ppm 15 minute(s).

TWA: 18000 mg/m<sup>3</sup> 8 hour(s).

**Nonflammable Gas Mixture: Argon / Carbon Dioxide / Carbon Monoxide / Hydrogen / Methane**

TWA: 10000 ppm 8 hour(s).

carbon monoxide

**ACGIH TLV (United States, 1/2008).**

TWA: 29 mg/m<sup>3</sup> 8 hour(s).

TWA: 25 ppm 8 hour(s).

**NIOSH REL (United States, 6/2008).**

CEIL: 229 mg/m<sup>3</sup>

CEIL: 200 ppm

TWA: 40 mg/m<sup>3</sup> 10 hour(s).

TWA: 35 ppm 10 hour(s).

**OSHA PEL (United States, 11/2006).**

TWA: 55 mg/m<sup>3</sup> 8 hour(s).

TWA: 50 ppm 8 hour(s).

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

CEIL: 229 mg/m<sup>3</sup>

CEIL: 200 ppm

TWA: 40 mg/m<sup>3</sup> 8 hour(s).

TWA: 35 ppm 8 hour(s).

hydrogen

methane

Oxygen Depletion [Asphyxiant]

**ACGIH TLV (United States, 1/2008).**

TWA: 1000 ppm 8 hour(s).

Consult local authorities for acceptable exposure limits.

**Section 9. Physical and chemical properties**

- Melting/freezing point : -189.2°C (-308.6°F) This is based on data for the following ingredient: argon.
- Critical temperature : Lowest known value: -122.4°C (-188.3°F) (argon).
- Vapor density : Highest known value: 1.38 (Air = 1) (argon).
- Gas Density (lb/ft<sup>3</sup>) : Only known value: 0.103 (argon).

**Section 10. Stability and reactivity**

- Stability and reactivity : The product is stable.
- 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 dioxide          | LC50 Inhalation Gas.  | Rat     | 470000 ppm              | 30 minutes |
| carbon monoxide         | TDLo Intraperitoneal  | Rat     | 35 mL/kg                | -          |
|                         | LC50 Inhalation Vapor | Rat     | 13500 mg/m <sup>3</sup> | 15 minutes |
|                         | LC50 Inhalation Vapor | Rat     | 1900 mg/m <sup>3</sup>  | 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    |

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**  
**Mutagenic effects**

No known significant effects or critical hazards.  
: No known significant effects or critical hazards.

Build 1.1

**Nonflammable Gas Mixture: Argon / Carbon Dioxide / Carbon Monoxide / Hydrogen / Methane**

Reproduction toxicity : No known significant effects or critical hazards.

**Section 12. Ecological information**

Aquatic ecotoxicity

Not available.

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   |
|------------------------|-----------|------------------------|-------|-----------------------|---|--|
| 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). |    | <b>Explosive Limit and Limited Quantity Index</b><br>0.125<br><b>Passenger Carrying Road or Rail Index</b><br>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:** No products were found.  
**SARA 302/304 emergency planning and notification:** No products were found.  
**SARA 302/304/311/312 hazardous chemicals:** argon  
**SARA 311/312 MSDS distribution - chemical inventory - hazard identification:**  
 argon: Sudden release of pressure  
**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:** hydrogen; methane  
**Clean Air Act (CAA) 112 regulated flammable substances:** hydrogen; methane  
**Clean Air Act (CAA) 112 regulated toxic substances:** No products were found.

**Nonflammable Gas Mixture: Argon / Carbon Dioxide / Carbon Monoxide / Hydrogen / Methane**

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.
- Massachusetts Substances:** The following components are listed: ARGON
- 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: ARGON
- 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: ARGON
- 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

| <u>Cancer</u>          | <u>Reproductive</u> | <u>No significant risk level</u> | <u>Maximum acceptable dosage level</u> |
|------------------------|---------------------|----------------------------------|--|
| Carbon Monoxide<br>No. | Yes.                | No.                              | No.                                    |

Canada

Canada  
WHMIS (Canada)

- : Class A: Compressed gas.
- Class D-2A: Material causing other toxic effects (Very toxic).
- CEPA Toxic substances:** None of the components are listed.
- Canadian ARET:** None of the components are listed.
- Canadian NPRI:** None of the components are listed.
- 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

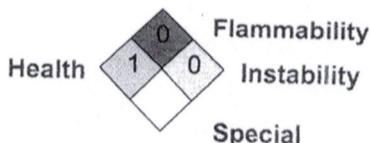
Label requirements

- : 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.

# Material Safety Data Sheet

# Airgas

Carbon Dioxide

## Section 1. Chemical product and company identification

**Product name** : Carbon 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.  
**Synonym** : Carbonic Acid, Carbon Dioxide Liquid, Carbon Dioxide, Refrigerated Liquid,  
Carbonic Anhydride  
**MSDS #** : 001013  
**Date of Preparation/Revision** : **2/25/2009.**  
**In case of emergency** : 1-866-734-3438

## Section 2. Hazards identification

**Physical state** : Gas or Liquid.  
**Emergency overview** : **WARNING!**  
GAS:  
CONTENTS UNDER PRESURE.  
MAY CAUSE RESPIRATORY TRACT, EYE, AND SKIN IRRITATION.  
CAN CAUSE TARGET ORGAN DAMAGE.  
Do not puncture or incinerate container.  
Can cause rapid suffocation.  
LIQUID:  
MAY CAUSE RESPIRATORY TRACT, EYE, AND SKIN IRRITATION.  
CAN CAUSE TARGET ORGAN DAMAGE.  
Extremely cold liquid and gas under pressure.  
Can cause rapid suffocation.  
May cause severe frostbite.  
  
Do not puncture or incinerate container. Avoid contact with eyes, skin and clothing. May cause target organ damage, based on animal data. Wash thoroughly after handling. Keep container closed. Avoid breathing gas. Use with adequate ventilation.  
Contact with rapidly expanding gas, liquid, or solid can cause frostbite.  
**Target organs** : May cause damage to the following organs: lungs, cardiovascular system, skin, eyes, central nervous system (CNS).  
**Routes of entry** : Inhalation Dermal Eyes  
**Potential acute health effects**  
**Eyes** : Moderately irritating to eyes. Contact with rapidly expanding gas may cause burns or frostbite. Contact with cryogenic liquid can cause frostbite and cryogenic burns.  
**Skin** : Moderately irritating to the skin. Contact with rapidly expanding gas may cause burns or frostbite. Contact with cryogenic liquid can cause frostbite and cryogenic burns.  
**Inhalation** : Moderately irritating to the respiratory system.  
**Ingestion** : Ingestion is not a normal route of exposure for gases. Contact with cryogenic liquid can cause frostbite and cryogenic burns.  
**Potential chronic health effects** : **CARCINOGENIC EFFECTS:** Not available.  
**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>   |
|----------------|-------------------|-----------------|--|
| Carbon Dioxide | 124-38-9          | 100             | <p><b>ACGIH TLV (United States, 1/2008).</b><br/>           STEL: 54000 mg/m<sup>3</sup> 15 minute(s).<br/>           STEL: 30000 ppm 15 minute(s).<br/>           TWA: 9000 mg/m<sup>3</sup> 8 hour(s).<br/>           TWA: 5000 ppm 8 hour(s).</p> <p><b>NIOSH REL (United States, 6/2008).</b><br/>           STEL: 54000 mg/m<sup>3</sup> 15 minute(s).<br/>           STEL: 30000 ppm 15 minute(s).<br/>           TWA: 9000 mg/m<sup>3</sup> 10 hour(s).<br/>           TWA: 5000 ppm 10 hour(s).</p> <p><b>OSHA PEL (United States, 11/2006).</b><br/>           TWA: 9000 mg/m<sup>3</sup> 8 hour(s).<br/>           TWA: 5000 ppm 8 hour(s).</p> <p><b>OSHA PEL 1989 (United States, 3/1989).</b><br/>           STEL: 54000 mg/m<sup>3</sup> 15 minute(s).<br/>           STEL: 30000 ppm 15 minute(s).<br/>           TWA: 18000 mg/m<sup>3</sup> 8 hour(s).<br/>           TWA: 10000 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.  |
| Products of combustion                         | : Decomposition products may include the following materials:<br>carbon dioxide<br>carbon monoxide  |
| Fire-fighting media and instructions           | : Use an extinguishing agent suitable for the surrounding fire.<br><br>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.<br><br>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** : 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. Keep container closed. Avoid contact with skin and clothing. Use with adequate ventilation. Avoid contact with eyes. Protect cylinders from physical damage; do not drag, roll, slide, or drop. Use a suitable hand truck for cylinder movement. Never allow any unprotected part of the body to touch uninsulated pipes or vessels that contain cryogenic liquids. Prevent entrapment of liquid in closed systems or piping without pressure relief devices. Some materials may become brittle at low temperatures and will easily fracture.
- 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). For additional information concerning storage and handling refer to Compressed Gas Association pamphlets P-1 Safe Handling of Compressed Gases in Containers and P-12 Safe Handling of Cryogenic Liquids available from the Compressed Gas Association, Inc.

## 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.  
When working with cryogenic liquids, wear a full face shield.
- 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.  
Insulated gloves suitable for low temperatures
- 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

## Carbon Dioxide

carbon dioxide

### ACGIH TLV (United States, 1/2008).

STEL: 54000 mg/m<sup>3</sup> 15 minute(s).

STEL: 30000 ppm 15 minute(s).

TWA: 9000 mg/m<sup>3</sup> 8 hour(s).

TWA: 5000 ppm 8 hour(s).

### NIOSH REL (United States, 6/2008).

STEL: 54000 mg/m<sup>3</sup> 15 minute(s).

STEL: 30000 ppm 15 minute(s).

TWA: 9000 mg/m<sup>3</sup> 10 hour(s).

TWA: 5000 ppm 10 hour(s).

### OSHA PEL (United States, 11/2006).

TWA: 9000 mg/m<sup>3</sup> 8 hour(s).

TWA: 5000 ppm 8 hour(s).

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

STEL: 54000 mg/m<sup>3</sup> 15 minute(s).

STEL: 30000 ppm 15 minute(s).

TWA: 18000 mg/m<sup>3</sup> 8 hour(s).

TWA: 10000 ppm 8 hour(s).

Consult local authorities for acceptable exposure limits.

## Section 9. Physical and chemical properties

|                                       |   |  |
|---------------------------------------|---|--|
| Molecular weight                      | : 44.01 g/mole                                |  |
| Molecular formula                     | : C-O <sub>2</sub>                            |  |
| Boiling/condensation point            | : -78.6°C (-109.5°F)                          |  |
| Melting/freezing point                | : Sublimation temperature: -78.5°C (-109.3°F) |  |
| Critical temperature                  | : 30.9°C (87.6°F)                             |  |
| Vapor pressure                        | : 830 (psig)                                  |  |
| Vapor density                         | : 1.53 (Air = 1)                              | Liquid Density@BP: Solid density = 97.5 lb/ft <sup>3</sup> (1562 kg/m <sup>3</sup> ) |
| Specific Volume (ft <sup>3</sup> /lb) | : 8.7719                                      |  |
| Gas Density (lb/ft <sup>3</sup> )     | : 0.114                                       |  |

## Section 10. Stability and reactivity

|                                  |  |
|----------------------------------|--|
| Stability and reactivity         | : The product is stable.   |
| 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 dioxide          | LC50 Inhalation<br>Gas. | Rat     | 470000 ppm | 30 minutes |

IDLH : 40000 ppm

Chronic effects on humans : May cause damage to the following organs: lungs, cardiovascular system, skin, eyes, central nervous system (CNS).

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.

Carbon Dioxide

## Section 12. Ecological information

### Aquatic ecotoxicity

Not available.

Toxicity of the products of biodegradation : not available

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   |
|------------------------|------------------|---|-------|-----------------------|---|--|
| DOT Classification     | UN1013<br>UN2187 | CARBON DIOXIDE<br>Carbon dioxide, refrigerated liquid | 2.2   | Not applicable (gas). |    | <b>Limited quantity</b><br>Yes.<br><br><b>Packaging instruction</b><br><b>Passenger aircraft</b><br>Quantity limitation:<br>75 kg<br><br><b>Cargo aircraft</b><br>Quantity limitation:<br>150 kg |
| TDG Classification     | UN1013<br>UN2187 | CARBON DIOXIDE<br>Carbon dioxide, refrigerated liquid | 2.2   | Not applicable (gas). |  | <b>Explosive Limit and Limited Quantity Index</b><br>0.125<br><br><b>Passenger Carrying Road or Rail Index</b><br>75   |
| Mexico Classification  | UN1013<br>UN2187 | CARBON DIOXIDE<br>Carbon dioxide, refrigerated liquid | 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):** This material is listed or exempted.  
**SARA 302/304/311/312 extremely hazardous substances:** No products were found.  
**SARA 302/304 emergency planning and notification:** No products were found.  
**SARA 302/304/311/312 hazardous chemicals:** carbon dioxide  
**SARA 311/312 MSDS distribution - chemical inventory - hazard identification:**  
carbon dioxide: 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:** No products were found.  
**Clean Air Act (CAA) 112 regulated flammable substances:** No products were found.  
**Clean Air Act (CAA) 112 regulated toxic substances:** No products were found.

### State regulations

: **Connecticut Carcinogen Reporting:** This material is not listed.  
**Connecticut Hazardous Material Survey:** This material is not listed.  
**Florida substances:** This material is not listed.  
**Illinois Chemical Safety Act:** This material is not listed.  
**Illinois Toxic Substances Disclosure to Employee Act:** This material is not listed.  
**Louisiana Reporting:** This material is not listed.  
**Louisiana Spill:** This material is not listed.  
**Massachusetts Spill:** This material is not listed.  
**Massachusetts Substances:** This material is listed.  
**Michigan Critical Material:** This material is not listed.  
**Minnesota Hazardous Substances:** This material is not listed.  
**New Jersey Hazardous Substances:** This material is listed.  
**New Jersey Spill:** This material is not listed.  
**New Jersey Toxic Catastrophe Prevention Act:** This material is not listed.  
**New York Acutely Hazardous Substances:** This material is not listed.  
**New York Toxic Chemical Release Reporting:** This material is not listed.  
**Pennsylvania RTK Hazardous Substances:** This material is listed.  
**Rhode Island Hazardous Substances:** This material is not listed.

### Canada

#### WHMIS (Canada)

: Class A: Compressed gas.  
**CEPA Toxic substances:** This material is listed.  
**Canadian ARET:** This material is not listed.  
**Canadian NPRI:** This material is not listed.  
**Alberta Designated Substances:** This material is not listed.  
**Ontario Designated Substances:** This material is not listed.  
**Quebec Designated Substances:** This material is not listed.

## Section 16. Other information

### United States

#### Label requirements

: GAS:  
CONTENTS UNDER PRESURE.  
MAY CAUSE RESPIRATORY TRACT, EYE, AND SKIN IRRITATION.  
CAN CAUSE TARGET ORGAN DAMAGE.  
Do not puncture or incinerate container.  
Can cause rapid suffocation.  
LIQUID:  
MAY CAUSE RESPIRATORY TRACT, EYE, AND SKIN IRRITATION.  
CAN CAUSE TARGET ORGAN DAMAGE.  
Extremely cold liquid and gas under pressure.  
Can cause rapid suffocation.  
May cause severe frostbite.

### Canada

**Carbon Dioxide**

Label requirements : Class A: Compressed gas.

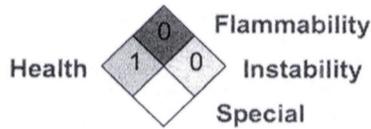
Hazardous Material Information System (U.S.A.) :

|                  |   |   |
|------------------|---|---|
| Health           | * | 1 |
| Flammability     |   | 0 |
| Physical hazards |   | 0 |
|                  |   |   |

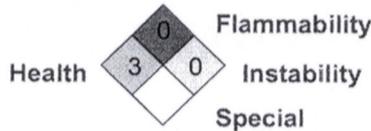
liquid:

|                     |  |   |
|---------------------|--|---|
| Health              |  | 3 |
| Fire hazard         |  | 0 |
| Reactivity          |  | 0 |
| Personal protection |  |   |

National Fire Protection Association (U.S.A.) :



liquid:



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.

# Material Safety Data Sheet

# Airgas

Oxygen

## Section 1. Chemical product and company identification

Product name : 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.  
Synonym : Molecular oxygen; Oxygen molecule; Pure oxygen; O<sub>2</sub>; Liquid-oxygen-; UN 1072; UN 1073; Dioxygen  
MSDS # : 001043  
Date of Preparation/Revision : 2/16/2009.  
In case of emergency : 1-866-734-3438

## Section 2. Hazards identification

Physical state : Gas.  
Emergency overview : DANGER!  
GAS:  
OXIDIZER.  
CONTACT WITH COMBUSTIBLE MATERIAL MAY CAUSE FIRE.  
CONTENTS UNDER PRESURE.  
Do not puncture or incinerate container.  
May cause severe frostbite.  
LIQUID:  
OXIDIZER.  
CONTACT WITH COMBUSTIBLE MATERIAL MAY CAUSE FIRE.  
Extremely cold liquid and gas under pressure.  
May cause severe frostbite.  
Do not puncture or incinerate container. Store in tightly-closed container. Avoid contact with combustible materials.  
Contact with rapidly expanding gases or liquids can cause frostbite.  
Routes of entry : Inhalation  
Potential acute health effects  
Eyes : May cause eye irritation. Contact with rapidly expanding gas may cause burns or frostbite. Contact with cryogenic liquid can cause frostbite and cryogenic burns.  
Skin : May cause skin irritation. Contact with rapidly expanding gas may cause burns or frostbite. Contact with cryogenic liquid can cause frostbite and cryogenic burns.  
Inhalation : Acts as a simple asphyxiant.  
Ingestion : Ingestion is not a normal route of exposure for gases. Contact with cryogenic liquid can cause frostbite and cryogenic burns.  
Potential chronic health effects : **CARCINOGENIC EFFECTS:** Not available.  
**MUTAGENIC EFFECTS:** Not available.  
**TERATOGENIC EFFECTS:** Not available.  
Medical conditions aggravated by over-exposure : Acute or chronic respiratory conditions may be aggravated by overexposure to this gas.

See toxicological information (section 11)

Oxygen

### Section 3. Composition, Information on Ingredients

| <u>Name</u> | <u>CAS number</u> | <u>% Volume</u> | <u>Exposure limits</u> |
|-------------|-------------------|-----------------|------------------------|
| Oxygen      | 7782-44-7         | 100             |                        |

### 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** : If inhaled, remove to fresh air. If not breathing, give artificial respiration. Get medical attention.
- Ingestion** : As this product is a gas, refer to the inhalation section.

### Section 5. Fire-fighting measures

- Flammability of the product** : Non-flammable.
- Products of combustion** : No specific data.
- Fire hazards in the presence of various substances** : Extremely flammable in the presence of the following materials or conditions: reducing materials, combustible materials and organic materials.
- 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.

### 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.
- Never allow any unprotected part of the body to touch uninsulated pipes or vessels that contain cryogenic liquids. Prevent entrapment of liquid in closed systems or piping without pressure relief devices. Some materials may become brittle at low temperatures and will easily fracture.

## Oxygen

- Storage** : Keep container tightly closed. Keep container in a cool, well-ventilated area. Separate from acids, alkalies, 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).  
For additional information concerning storage and handling refer to Compressed Gas Association pamphlets P-1 Safe Handling of Compressed Gases in Containers and P-12 Safe Handling of Cryogenic Liquids available from the Compressed Gas Association, Inc.

## 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.  
When working with cryogenic liquids, wear a full face shield.
- 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.  
Insulated gloves suitable for low temperatures
- Personal protection in case of a large spill** : Self-contained breathing apparatus (SCBA) should be used to avoid inhalation of the product.

### Product name

oxygen

Consult local authorities for acceptable exposure limits.

## Section 9. Physical and chemical properties

- Molecular weight** : 32 g/mole  
**Molecular formula** : O<sub>2</sub>  
**Boiling/condensation point** : -183.1°C (-297.6°F)  
**Melting/freezing point** : -218.6°C (-361.5°F)  
**Critical temperature** : -118.6°C (-181.5°F)  
**Vapor density** : 1.105 (Air = 1)      Liquid Density@BP: 71.23 lb/ft<sup>3</sup> (1141 kg/m<sup>3</sup>)  
**Specific Volume (ft<sup>3</sup>/lb)** : 12.0482  
**Gas Density (lb/ft<sup>3</sup>)** : 0.083

## Section 10. Stability and reactivity

- Stability and reactivity** : The product is stable.
- Incompatibility with various substances** : Extremely reactive or incompatible with the following materials: oxidizing materials, reducing materials and combustible materials.
- 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

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

Not available.

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   |
|------------------------|-----------|-----------------------------|-------|-----------------------|--|--|
| DOT Classification     | UN1072    | OXYGEN, COMPRESSED          | 2.2   | Not applicable (gas). | <br> | <p><b>Limited quantity</b><br/>Yes.</p> <p><b>Packaging instruction</b><br/><b>Passenger aircraft</b><br/>Quantity limitation:<br/>75 kg</p> <p><b>Cargo aircraft</b><br/>Quantity limitation:<br/>150 kg</p> <p><b>Special provisions</b><br/>A52</p> |
|                        | UN1073    | Oxygen, refrigerated liquid |       |                       |  | <p><b>Explosive Limit and Limited Quantity Index</b><br/>0.125</p> <p><b>ERAP Index</b><br/>3000</p> <p><b>Passenger Carrying Ship</b></p>   |
| TDG Classification     | UN1072    | OXYGEN, COMPRESSED          | 2.2   | Not applicable (gas). | <br> | <p><b>Explosive Limit and Limited Quantity Index</b><br/>0.125</p> <p><b>ERAP Index</b><br/>3000</p> <p><b>Passenger Carrying Ship</b></p>   |
|                        | UN1073    | Oxygen, refrigerated liquid |       |                       |  | <p><b>Explosive Limit and Limited Quantity Index</b><br/>0.125</p> <p><b>ERAP Index</b><br/>3000</p> <p><b>Passenger Carrying Ship</b></p>   |

**Oxygen**

|                          |        |                                |     |                       |  |  |
|--------------------------|--------|--------------------------------|-----|-----------------------|--|--|
|                          |        |                                |     |                       |  | Index<br>50<br><b>Passenger<br/>Carrying<br/>Road or Rail<br/>Index</b><br>75<br><b>Special<br/>provisions</b><br>42 |
| Mexico<br>Classification | UN1072 | OXYGEN,<br>COMPRESSED          | 2.2 | Not applicable (gas). | <br> | -  |
|                          | UN1073 | Oxygen, refrigerated<br>liquid |     |                       |  |  |

“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):** This material is listed or exempted.
  - SARA 302/304/311/312 extremely hazardous substances:** No products were found.
  - SARA 302/304 emergency planning and notification:** No products were found.
  - SARA 302/304/311/312 hazardous chemicals:** oxygen
  - SARA 311/312 MSDS distribution - chemical inventory - hazard identification:** oxygen: Fire hazard, Sudden release of pressure, 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:** No products were found.
  - Clean Air Act (CAA) 112 regulated flammable substances:** No products were found.
  - Clean Air Act (CAA) 112 regulated toxic substances:** No products were found.

State regulations

- :
- Connecticut Carcinogen Reporting:** This material is not listed.
  - Connecticut Hazardous Material Survey:** This material is not listed.
  - Florida substances:** This material is not listed.
  - Illinois Chemical Safety Act:** This material is not listed.
  - Illinois Toxic Substances Disclosure to Employee Act:** This material is not listed.
  - Louisiana Reporting:** This material is not listed.
  - Louisiana Spill:** This material is not listed.
  - Massachusetts Spill:** This material is not listed.
  - Massachusetts Substances:** This material is listed.
  - Michigan Critical Material:** This material is not listed.
  - Minnesota Hazardous Substances:** This material is not listed.
  - New Jersey Hazardous Substances:** This material is listed.
  - New Jersey Spill:** This material is not listed.
  - New Jersey Toxic Catastrophe Prevention Act:** This material is not listed.
  - New York Acutely Hazardous Substances:** This material is not listed.
  - New York Toxic Chemical Release Reporting:** This material is not listed.
  - Pennsylvania RTK Hazardous Substances:** This material is listed.
  - Rhode Island Hazardous Substances:** This material is not listed.

Canada

WHMIS (Canada)

- :
- Class A: Compressed gas.
  - Class C: Oxidizing material.

**Oxygen**

**CEPA Toxic substances:** This material is not listed.  
**Canadian ARET:** This material is not listed.  
**Canadian NPRI:** This material is not listed.  
**Alberta Designated Substances:** This material is not listed.  
**Ontario Designated Substances:** This material is not listed.  
**Quebec Designated Substances:** This material is not listed.

**Section 16. Other information**

**United States**

**Label requirements** : GAS:  
OXIDIZER.  
CONTACT WITH COMBUSTIBLE MATERIAL MAY CAUSE FIRE.  
CONTENTS UNDER PRESURE.  
Do not puncture or incinerate container.  
May cause severe frostbite.  
LIQUID:  
OXIDIZER.  
CONTACT WITH COMBUSTIBLE MATERIAL MAY CAUSE FIRE.  
Extremely cold liquid and gas under pressure.  
May cause severe frostbite.

**Canada**

**Label requirements** : Class A: Compressed gas.  
Class C: Oxidizing material.

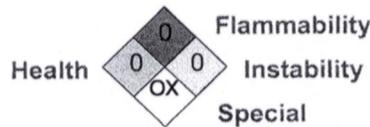
**Hazardous Material Information System (U.S.A.)**

|                  |   |
|------------------|---|
| Health           | 0 |
| Flammability     | 0 |
| Physical hazards | 2 |
|                  |   |

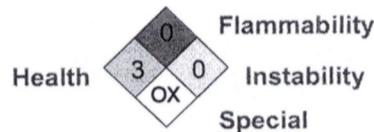
**liquid:**

|                     |   |
|---------------------|---|
| Health              | 3 |
| Fire hazard         | 0 |
| Reactivity          | 0 |
| Personal protection |   |

**National Fire Protection Association (U.S.A.)**



**liquid:**



**Notice to reader**

## Oxygen

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.

**MATERIAL SAFETY DATA SHEET FOR RADNOR® WATER BASED ANTI-SPATTER - PREMIUM AEROSOL**

**SECTION 1. PRODUCT AND COMPANY IDENTIFICATION**

PRODUCT NAME : RADNOR® ANTI-SPATTER PREMIUM WATER BASE - AEROSOL  
PRODUCT USE : PREVENTS SPATTER BUILD UP  
PART NUMBER(S) : 64000111  
ADDRESS : RADNOR WELDING PRODUCTS  
259 N. RADNOR-CHESTER ROAD SUITE 100  
RADNOR, PA 19087-5283  
EMERGENCY TELEPHONE : 866-734-3438  
PREPARATION DATE : MARCH 01, 2006  
OSHA REGULATORY STATUS : REGULATED  
WHMIS CLASSIFICATION : B5, A

**SECTION 2. COMPOSITION / INFORMATION ON INGREDIENTS**

| HAZARDOUS INGREDIENTS | CAS      | OSHA PEL |  | ACGIH TLV |  | LD50          | LC50          | %WT    |
|-----------------------|----------|----------|--|-----------|--|---------------|---------------|--------|
|                       |          |          |  |           |  | SPECIES/ROUTE | SPECIES/ROUTE |        |
| Dimethyl ether        | 115-10-6 | N/E      |  | N/E       |  | N/E           | N/E           | 10-30% |

**SECTION 3. HAZARDS IDENTIFICATION**

**EMERGENCY OVERVIEW**

CONTENTS UNDER PRESSURE. STORE BELOW 120°F (49°C), OUT OF SUNLIGHT AND AWAY FROM HEAT SOURCES. DO NOT PUNCTURE OR INCINERATE. AVOID CONTACT WITH SKIN AND EYES. VAPOR HARMFUL. INTENTIONAL MISUSE BY DELIBERATELY CONCENTRATING AND INHALING THE CONTENTS MAY BE HARMFUL OR FATAL.

EYE: Liquid or vapors may cause redness, burning, tearing, swelling and/or pain.

SKIN: Frequent or prolonged contact can result in defatting and drying of the skin which may result in skin irritation and dermatitis (rash).

INGESTION: Due to being an aerosol, product does not lend itself to ingestion. Should ingestion occur, it may cause irritation to membranes of the mouth, throat and gastrointestinal tract, resulting in vomiting and/or cramps.

INHALATION: Prolonged or repeated overexposure is anesthetic. May cause irritation of the respiratory tract, or acute nervous system depression characterized by headache, dizziness, staggering gait, or confusion.

EFFECTS OF ACUTE EXPOSURE: N/Av

EFFECTS OF CHRONIC EXPOSURE: N/ Av

OTHER IMPORTANT HAZARDS: N/Av

SUGGESTED HMIS RATING: HEALTH | 1 | FLAMMABILITY | 1 | REACTIVITY | 0 | PERSONAL PROTECTION | A |

**SECTION 4. FIRST AID MEASURES**

INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Seek medical attention if symptoms persist or if unconscious.

INGESTION: Unlikely due to being in aerosol form. Should actual ingestion occur, do not induce vomiting! Drink a glass of water or milk to dilute. Call a physician or poison control center immediately. Never give anything by mouth to an unconscious person.

EYE CONTACT: Immediately flush with plenty of clear water for at least 15 minutes. Make sure to flush under the eyelids. Consult a physician for definitive treatment.

SKIN CONTACT: Remove with soap and water. Continue flushing with water for several minutes. Use skin cream to counter resulting dryness. Consult a physician if irritation continues or if large skin area is affected.

## **SECTION 5. FIRE FIGHTING MEASURES**

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CONDITIONS OF FLAMMABILITY: Heat, sparks, flame, red hot metal.

MEANS OF EXTINCTION: For warehouse and storage conditions, use NFPA Class B extinguishers (CO<sub>2</sub>, dry chemical or universal aqueous film forming foam).

SPECIAL FIRE FIGHTING PROCEDURES: Use water spray to cool fire exposed aerosol containers for containers can rupture violently from heat developed pressure.

UNUSUAL FIRE AND EXPLOSION HAZARDS: Contents extremely flammable and under pressure. In addition, when liquid or vapor comes into contact with flames or red hot metal, products of combustion will be created. Firemen should wear self-contained breathing apparatus.

FLASH POINT / DETERMINATION: Propellant < 0°F (<-18°C)

UPPER FLAMMABLE LIMIT: 9.5%

LOWER FLAMMABLE LIMIT: 1.8%

AUTO-IGNITION TEMPERATURE: N/Av

HAZARDOUS COMBUSTION PRODUCTS: N/Av

EXPLOSION DATA - SENSITIVITY TO MECHANICAL IMPACT: N/Av

EXPLOSION DATA - SENSITIVITY TO STATIC DISCHARGE: N/Av

## **SECTION 6. ACCIDENTAL RELEASE MEASURES**

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LEAK / SPILL RESPONSE: Product is an aerosol, therefore spills and leaks are unlikely. In case of rupture, released content should be contained as any other solvent spill. Spills from aerosol cans are unlikely and are generally of small volume. Large spills are therefore not normally considered a problem. In case of actual rupture, avoid breathing vapors and ventilate area well. Remove all sources of ignition and use non-sparking equipment. Soak up material with inert absorbent and place in safety containers for proper disposal.

SPECIAL INSTRUCTIONS: Aerosol products represent a limited hazard and will not spill or leak unless ruptured. In case of rupture contents are generally evacuated from the can rapidly. Area should be ventilated immediately and continuous ventilation provided until all fumes and vapors have been removed. Aerosol cans should never be incinerated or burned. See Section 13 for disposal considerations.

## **SECTION 7. HANDLING AND STORAGE**

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HANDLING PROCEDURES / EQUIPMENT: Avoid prolonged or repeated skin contact. Avoid breathing vapors.

STORAGE REQUIREMENTS: Store in area below 120°F (49°C). Do not incinerate (burn) containers. Assure can is in a secure place to prevent knocking over and accidental rupture. Always replace overcap when not in use. For store of pallet quantities, compliance with ANSI/NFPA 30B is recommended.

## **SECTION 8. EXPOSURE CONTROLS / PERSONAL PROTECTION**

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EYE PROTECTION: Safety glasses with side shields are recommended as a minimum for any type of industrial chemical handling. Where eye contact could occur, chemical splash proof goggles are recommended.

SKIN PROTECTION: For brief contact, no precautions other than clean body-covering clothing should be needed. When prolonged or repeated contact could occur, use protective clothing such as Sol-Vex® gloves or other clothing impervious to the ingredient listed in Section 2.

ENGINEERING CONTROLS: General ventilation (typically 10 air changes for hour) should be used. Ventilation rates should be matched to conditions. Local exhaust ventilation or an enclosed handling system, may be needed to control air contamination below that of the lowest TLV/PEL rated ingredient from Section 2.

EXPOSURE GUIDELINE LEVELS: Since this product is a mixture, an OSHA or ACGIH exposure value is not available. In determination of any exposure procedures, protection or testing use the lowest rated ingredient in Section 2.

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EFFECTIVE: MARCH 01, 2006

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## SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

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|                                       |   |                             |
|---------------------------------------|---|-----------------------------|
| PHYSICAL STATE                        | : | Liquid / Gas                |
| ODOR AND APPEARANCE                   | : | Mild odor, light tan liquid |
| ODOR THRESHOLD                        | : | N/Av                        |
| SPECIFIC GRAVITY (H <sub>2</sub> O=1) | : | Below 1.0                   |
| VAPOUR PRESSURE (mm HG)               | : | N/Av                        |
| VAPOUR DENSITY (AIR=1)                | : | Above 1.0                   |
| EVAPORATION RATE (BA=1)               | : | N/Av                        |
| BOILING POINT (°F)                    | : | Propellant <0°F (<-18°C)    |
| FREEZING POINT (°F)                   | : | N/Av                        |
| pH                                    | : | N/Av                        |
| COEFFICIENT OF WATER/OIL DISTRIBUTION | : | N/Av                        |
| DENSITY                               | : | N/Av                        |
| SOLUBILITY IN WATER                   | : | Insoluble                   |
| % VOLATILE BY VOLUME                  | : | 93.0% Wt Max                |
| VOC'S                                 | : | N/Av                        |

## SECTION 10. STABILITY AND REACTIVITY

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STABILITY: Stable.

CONDITIONS TO AVOID: Heat, sparks, flame, red hot metal.

MATERIALS TO AVOID (INCOMPATIBILITIES): Strong oxidizing materials.

CONDITIONS OF REACTIVITY: N/Av

HAZARDOUS DECOMPOSITION BYPRODUCTS: Oxides of carbon.

HAZARDOUS POLYMERIZATION: Will not occur.

## SECTION 11. TOXICOLOGICAL INFORMATION

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LD50: N/Av

LC50: N/Av

ROUTES OF ENTRY: INHALATION[Y] EYE CONTACT[Y] SKIN CONTACT[Y] SKIN ABSORPTION[Y] INGESTION[N]

EXPOSURE LIMITS: Since this product is a mixture, an OSHA or ACGIH exposure value is not available. In determination of any exposure procedures, protection or testing use the lowest rated ingredient in Section 2.

IRRITANCY OF PRODUCT: N/Av

SENSITIZATION TO PRODUCT / MEDICAL CONDITIONS AGGRAVATED: N/Av

CARCINOGENICITY: None of the ingredients in this product are listed with IARC, NTP or OSHA as being carcinogenic.

TERATOGENICITY / MUTAGENICITY / REPRODUCTIVE TOXICITY: N/Av

TOXICOLOGICAL DATA: N/Av

## SECTION 12. ECOLOGICAL INFORMATION

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ENVIRONMENTAL EFFECTS: This product has not been tested for environmental effects.

IMPORTANT ENVIRONMENTAL CHARACTERISTICS: N/Av

AQUATIC TOXICITY: N/Av

## SECTION 13. DISPOSAL CONSIDERATIONS

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An aerosol container that does not contain a significant amount of liquid would meet the definition of scrap metal (40 CFR 261.1(c)(6)), and would be exempt from RCRA regulation under 40 CFR 261.6(a)(3)(iv) if it is to be recycled. If containers are to be disposed of (not recycled) it must be managed under all applicable RCRA and state regulations.

## SECTION 14. TRANSPORTATION INFORMATION

SPECIAL SHIPPING INFORMATION : N/Av

### DOT HM-181 SHIPPING INFORMATION

PROPER SHIPPING NAME : Consumer Commodity  
HAZARD CLASS OR DIVISION : ORM-D  
UN NUMBER : 1950  
PACKAGING GROUP : none  
LABEL(S) REQUIRED : none

### TDG SHIPPING INFORMATION

TDG SHIPPING NAME : Aerosols, Flammable Limited Quantity  
TDG CLASSIFICATION : 2.1  
UN NUMBER : 1950  
PACKAGING GROUP : none  
LABEL(S) REQUIRED : none  
NAERG : 126  
EMERGENCY TELEPHONE NUMBER : (613) 996-6666

### INTERNATIONAL TRANSPORT INFORMATION

PROPER SHIPPING NAME : Consumer Commodity  
CLASS OR DIVISION : 9  
SUBSIDIARY RISK : none  
HAZARDOUS LABEL(S) : Miscellaneous  
PACKAGING GROUP : none  
UN OR ID NUMBER : ID8000

## SECTION 15. REGULATORY INFORMATION

TOXIC SUBSTANCES CONTROL ACT (TSCA): The product on this MSDS, or all of its components, is listed under TSCA.  
SARA TITLE III, SECTION 313: The following ingredients are subject to the reporting requirements of section 313 of Title III of the Superfund and Reauthorization Act of 1986 and 40 CFR Part 372: None  
CLEAN AIR ACT (CAA): The following ingredients appear on the List of Hazardous Air Pollutants (HAP – 42 USC 7412, Title I, Part A, p112): None  
CLEAN WATER ACT (CWA): The following ingredients appear on the CWA List of Hazardous Substances (40 CFR 116.4): None  
CALIFORNIA PROPOSITION 65: The following ingredients appear on the Proposition 65 list(s): None  
CANADIAN WORKPLACE HAZARDOUS MATERIALS INFORMATION SYSTEM (WHMIS): This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.  
DOMESTIC SUBSTANCES LIST (DSL): The product on this MSDS, or all of its components, is included in the DSL.  
NEW JERSEY RIGHT TO KNOW (TITLE 34:5A-1): Water (CAS 7732-18-5), Dimethyl Ether (CAS 115-10-06), Lard Oil CAS 8016-28-2), Sorbitan Monooleate (CAS 9005-65-6).

## SECTION 16. OTHER INFORMATION

N/E Not Established  
N/Av Not Available  
N/Ap Not Applicable  
IARC International Agency for Research on Cancer  
ACGIH American Conference of Governmental Industrial Hygienists  
NIOSH National Institute for Occupational Health and Safety  
TLV-TWA Threshold Limit Values, Time Weighted Average  
NAERG North American Emergency Response Guidebook  
WHMIS Workplace Hazardous Materials Information System

The information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. This document is intended only as a guide to the appropriate precautionary handling of the material by a properly trained person using this product. Product use and conditions of use are beyond our control. Warranty of materials is limited to test results of product performance as detailed in certificates of compliance. Interpretation of test results is the responsibility of end-user. No other warranties, expressed or implied, are made.

EFFECTIVE: MARCH 01, 2006

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**MATERIAL SAFETY DATA SHEET**

This Material Safety Data Sheet (MSDS) complies with the requirements of OSHA's Hazard Communication Standard

**4043, 5356 ALUMINUM WELDING WIRE**

Emergency Phone Number:

866-734-3438

Date: April 30, 2006

Product Information Number: 888-838-0615

Product Name/Class: AWS A5.10, ER-4043, 5356 Aluminum Welding Wire (Spool and Cut Length)

Product Number: 004020

Manufacturer: Radnor Welding Products 259 N. Radnor-Chester Road, Suite 100 Radnor, PA 19087-5283

**SECTION 1 - PRODUCT IDENTIFICATION**

| SECTION 2 - HAZARDOUS INGREDIENTS |            |         |                 |
|-----------------------------------|------------|---------|-----------------|
| Ingredient                        | CAS Number | Percent | Exposure Limits |
| Aluminum wire                     |            |         |                 |
| Aluminum***                       | 7429-90-5  | 100     | TLV 10* PEL 10* |
| Magnesium (5356 only)             | 7439-95-4  | <5      | 10* 10*         |
| Silicon (4043 only)               | 7440-21-3  | 5-13    | 10* 10*         |

Supplemental Information: (\*) Not listed. Nuisance value maximum is 10 mg/m<sup>3</sup> per cubic meter. PEL value for iron oxide is 10 mg/m<sup>3</sup>.

**SECTION 3 - PHYSICAL CHARACTERISTICS**

|                          |     |  |     |                      |                                   |
|--------------------------|-----|--|-----|----------------------|-----------------------------------|
| Boiling Point:           | N/A | Specific Gravity (H <sub>2</sub> O = 1): | N/A | Solubility in Water: | N/A                               |
| Vapor Pressure (mm Hg):  | N/A | Melting Point:                           | N/A | % Volatile:          | N/A                               |
| Vapor Density (Air = 1): | N/A | Evaporation Rate (Butyl Acetate=1):      | N/A | Appearance and Odor: | Shiny metallic wire with no odor. |

**SECTION 4 - FIRE and EXPLOSION HAZARD DATA**

|                            |     |                   |                      |
|----------------------------|-----|-------------------|----------------------|
| Flash Point (Method Used): | N/A | Flammable Limits: | LEL: N/A<br>UEL: N/A |
|----------------------------|-----|-------------------|----------------------|

Extinguishing Media: N/A  
Special Fire Fighting Procedures: Welding arc and sparks can ignite combustibles and flammables. Refer to American National Standard Z49.1 for fire prevention during the use of welding and allied procedures.  
Unusual Fire and Explosion Hazards: N/A

**SECTION 5 - REACTIVITY DATA**

Hazardous Decomposition Products: Welding fumes and gases cannot be classified simply. The composition and quantity of both are dependent upon the metal being welded, the process, procedures, and electrodes used. Other conditions which also influence the composition and quantity of the fumes and gases to which workers may be exposed include: coatings on the metal being welded (such as paint, plating, or galvanizing), the number of welders and the volume of the work area, the quality and amount of ventilation, the position of the welder's head with respect to the fume plume, as well as the presence of contaminants in the atmosphere (such as chlorinated hydrocarbon vapors from cleaning and degreasing activities). When the electrode is consumed, the fume and gas decomposition products generated are different in percent and form from the ingredients listed in Section 2. Decomposition products of normal operation include those originating from the volatilization, reaction, or oxidation of the materials shown in Section 2, plus those from the base metal and coating, etc., as noted above. It is understood, however, that the elements and/or oxides to be mentioned are virtually always present as complex oxides and not as metals. (Characterization of Arc Welding Fume: American Welding Society). The elements or oxides listed below correspond to the ACGIH categories located in (TLV) Threshold Limit Values for Chemical Substances and Physical Agents in the Workroom Environment). Reasonably expected constituents of the fume would include: primarily iron oxide and fluorides; secondarily complex oxides of aluminum, calcium, chromium, magnesium, manganese, nickel, potassium, silicon, sodium and zirconium when used with recommended fluxes. Primarily iron oxide, manganese oxide, and complex chromium oxides; secondarily complex oxides of molybdenum and nickel when used with gas shielding.

Stability: Unstable  Stable   
Conditions to Avoid: Avoid breathing fumes created by the welding process.

Incompatibility (Materials to Avoid): N/A

Hazardous Decomposition or Byproducts: Welding fumes and gases cannot be classified simply. The composition and quantity of both are dependent upon the metal being welded, the process, procedure and electrodes used.

Hazardous Polymerization: May Occur  Will Not Occur  Conditions to Avoid: N/A

**SECTION 6 - HEALTH HAZARD DATA**

Threshold Limit Value: The exposure level for welding fume has been established at 5 mg/m<sup>3</sup> with OSHA's PEL and ACGIH's TLV. TLV-TWAs should be used as a guide in the control of health hazards and not as time lines between safe and excessive concentrations. Effects of Overexposure: Electric arc welding may create one or more of the following health hazards: Fumes and Gases can be dangerous to your health. Common entry is by inhalation. Other possible routes are skin contact and ingestion. Short-Term (Acute) Overexposure to welding fumes may result in discomfort such as metal fume fever, dizziness, nausea, or dryness or irritation of nose, throat or eyes. May aggravate pre-existing respiratory problems (e.g. asthma, emphysema). Chromates present in the fume have been known to cause severe irritation of the bronchial tubes and lungs. Asbestos has been reported. Exposure to extremely high levels of fluorides can cause abdominal pain, diarrhea, muscular weakness and convulsions. In extreme cases it can cause loss of consciousness and death. Long-Term (Chronic) Overexposure may lead to siderosis (iron deposits in lungs) and is believed by some investigators to affect pulmonary functions. Manganese overexposure can affect the central nervous system, resulting in impaired speech and movement. Bronchitis and some lung fibrosis have been reported. Chromates may cause ulceration and perforation of the nasal septum. Liver damage and allergic reactions, including skin rash, have been reported. Repeated exposure to fluorides may cause excessive calcification of the bone and calcification of ligaments of the ribs, pelvis, and spinal column. May cause skin rash. Chromium and nickel and their compounds are on the IARC (International Agency for Research on Cancer) and NTP (National Toxicology Program) lists as posing a carcinogenic risk to humans. Rays can injure eyes and burn skin. Electric Shock can kill. Emergency and First Aid Procedures: Call for medical aid. Employ first aid techniques recommended by the American Red Cross. Eyes & Skin: If irritation or flash burns develop after exposure, consult a physician. Carcinogenicity: The composition of welding fumes may contain carcinogens, depending on several factors that are unknown and unknowable to the product manufacturer (see Section 5). Always assume that welding fumes may contain toxic and/or carcinogenic materials, and follow sound Work/Hygienic practices as recommended by ANSI Z49.1.

| HMIS Rating                                      | HMIS Scale  | NFPA Rating   | NFPA Scale  |
|--|---|---|---|
| Health = 2<br>Flammability = 0<br>Reactivity = 0 | 4 = Severe Hazard<br>3 = Serious Hazard<br>2 = Moderate Hazard<br>1 = Slight Hazard<br>0 = Minimal Hazard | Health = 1<br>Flammability = 0<br>Reactivity = 0<br>Other = 0 | 4 = Severe Hazard<br>3 = Serious Hazard<br>2 = Moderate Hazard<br>1 = Slight Hazard<br>0 = Minimal Hazard |

**SECTION 7 - PRECAUTIONS for SAFE HANDLING and USE**

Read and understand the manufacturer's instructions and precautionary label on the product. See American National Standard Z49.1, "Safety in Welding and Cutting", published by the American Welding Society, P.O. Box 351040, Miami, FL 33135 and OSHA Publication 2206 (29CFR1910), U.S. Government Printing Office, Washington, D.C. 20402 for more details on many of the following:  
Steps to Be Taken in Case Material is Released or Spilled: N/A  
Waste Disposal Method: Discard any product, residue, disposable container, or liner as ordinary waste in an environmentally acceptable manner according to Federal, State and Local Regulations unless otherwise noted.

**SECTION 8 - CONTROL MEASURES**

Respiratory Protection (Specify Type): Use respirable fume respirator or air supplied respirator when welding in confined space or general work area when local exhaust or ventilation does not keep exposure below TLV. Ventilation: Use enough ventilation, local exhaust at the arc, or both to keep the fumes and gases from the worker's breathing zone and the general area. Train the welder to keep his head out of the fumes. Keep exposure as low as possible.  
Eye Protection: Wear helmet or use face shield with filter lens shade number 12\* or darker. Shield others by providing screens and flash goggles. (\*) No specific recommendation for submerged arc.  
Other Protective Clothing or Equipment: Wear hand, head, and body protection which help to prevent injury from radiation, sparks and electrical shock. See Z49.1. At a minimum this includes welder's gloves and a protective face shield, and may include arm protectors, aprons, hats, shoulder protection, as well as dark substantial clothing. Train the welder not to permit electrically live parts or electrodes to contact skin or clothing or gloves if they are wet. Insulate from work and ground.  
Work/Hygienic Practices: Maintain exposure below the PEL/TLV. Use industrial hygiene monitoring to ensure that your use of this material does not create exposures for important additional information. ANSI Z49.1 The American Welding Society, P.O. Box 351040, Miami, FL 33135 - OSHA (29CFR1910) U.S. Dept. of Labor, Washington, D.C. 20210.

**OTHER INFORMATION REQUIRED BY STATE OR FEDERAL LAW**

California Proposition 65 Information: Warning: This product contains a chemical known to the State of California to cause cancer.  
New Jersey Right-To-Know Information: 5 most predominant ingredients/hazardous and non-hazardous)  
1. Aluminum; 2. Silicon; 3. Magnesium  
SARA Title III Notification Information: All chemical compounds marked with an asterisk (\*) are toxic chemicals subject to the reporting requirements of Section 313 of Title III of the Super Fund Amendments and Reauthorization Act (SARA) of 1986 and 40 CFR Part 372.  
Disclaimer of Expressed and Implied Warranties: The information in this document is believed to be correct as of the date issued. However, no warranty of merchantability, fitness for any particular purpose, or any other warranty is expressed or is to be implied regarding the accuracy or completeness of this information, the results to be obtained from the use of this information or the product, the safety of this product, or the hazards related to its use.