

CGA P-24—2006

**GUIDE TO THE PREPARATION OF
MATERIAL SAFETY DATA SHEETS**

SECOND EDITION



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Work Item 06-24
Hazard Communication Committee

NOTE—Technical changes from the previous edition are underlined.

NOTE—Appendices A, B, and C (Informative) are for information only.

SECOND EDITION: 2006
REAFFIRMED: 2002
FIRST EDITION: 1995

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1 Introduction

The Occupational Safety and Health Administration (OSHA) Title 29 of the U.S. *Code of Federal Regulations* (29 CFR) Part 1910.1200, Workplace Hazardous Materials Information System (WHMIS), and various other federal, state, and provincial authorities require the preparation and distribution of material safety data sheets (MSDSs) for all hazardous materials [1, 2].¹ The MSDS describes the hazards of a material and provides information on how the material can be safely handled, used, and stored.

The MSDS should be used in conjunction with other technical and safety information available to the gas user.

In recent years the audience for MSDS has greatly expanded to include all users of hazardous material, emergency responders, and the community. As a chemical manufacturer and/or distributor of industrial gases, you have an obligation to provide MSDSs to all distributors and users of hazardous materials.

2 Scope

This publication is for use by all manufacturers and distributors of compressed gases, and it was developed to provide guidance for preparing MSDSs for compressed gases using ANSI Z400.1, *Hazardous Industrial Chemicals—Material Safety Data Sheets—Preparation* [3]. The MSDS is prepared for product users, emergency responders, fire departments, state and local emergency planning groups, and members of the community. Because of the diverse background of the audience, the information on the MSDS must be presented in a consistent form and in language that is easy to understand. This publication is in two parts: a guide to the preparation of material safety data sheets for compressed and liquefied gases and a blank MSDS in the American National Standards Institute (ANSI) format that can be used to develop additional product MSDSs. Also, a collection of MSDSs for selected compressed and liquefied gases and carbide lime is included as [Appendix C](#).

This publication provides MSDSs for selected compressed gases, cryogenic liquids, and carbide lime, which have been developed by the CGA to promote consistency of information provided to users of compressed gases. The information found in these MSDSs is based upon sources, technical information, and experience available at the time this edition was published. This information is subject to periodic review and can change as new information becomes available. These data sheets may be used to meet the hazard communication MSDS requirements of OSHA and WHMIS and also may be used as an example to create additional product MSDSs.

Chemical manufacturers and importers shall obtain or develop an MSDS for each hazardous material they produce or import. Distributors shall ensure that MSDSs and updated information are provided to other distributors and employers. Retail distributors that sell hazardous materials to commercial customers shall provide MSDSs to such employers upon request and shall post a sign or otherwise inform them that MSDSs are available. In Canada, an MSDS shall be provided if the product is intended for use in the workplace.

3 Definitions

For the purpose of this publication, the following definitions apply.

3.1 Material safety data sheet

Safety, health, and technical data that should be provided to product users as part of the hazard communication program requirements established by OSHA and WHMIS [1, 2].

3.2 American National Standards Institute

Private membership organization that develops voluntary standards for a wide array of U.S. industries.

¹ References are shown by bracketed numbers and are listed in order of appearance in the reference section.

4 Guidelines for preparation of material safety data sheets

4.1 General

4.1.1 ANSI standard

To standardize the format of the MSDS, this publication follows the ANSI MSDS standard, ANSI Z400.1 [3].

4.1.2 MSDSs for select gases

An index to example MSDSs for select compressed gases, cryogenic liquids, and carbide lime is provided in Appendix C of this publication.

NOTE—Information required only in Canada under the WHMIS regulations are shown in brackets ([]) in the blank MSDS sample and the example MSDSs provided in Appendix A and C.

4.1.3 MSDSs for other gases

It is recommended that individuals who plan to prepare additional MSDSs for other gases obtain a copy of ANSI Z400.1 and follow the guidelines provided [3].

4.1.4 MSDSs for gas mixtures

MSDSs provided for gas mixtures may also be generated using the ANSI format. In the United States, an MSDS for a mixture may be prepared or the MSDS for the mixture may be a collection of the component gas MSDSs. These MSDSs must be affixed to a cover letter that states the component gas MSDSs represent the mixture MSDS. This only applies for gas mixtures where no new chemical entity has formed as a result of the combination of the component gases.

If a chemical reaction has occurred as a result of the mixture and a new chemical is formed, a new MSDS for this chemical shall be prepared.

WHMIS regulations require a mixture MSDS that represents the physical and health hazards of the entire mixture [2].

4.2 MSDS sections

The ANSI MSDS standard organizes the MSDS into 16 sections that include all required OSHA and WHMIS information and systematically addresses:

- the identity of the gas and emergency information in sections 1, 2, and 3;
- the emergency response actions in sections 4, 5, and 6;
- the preventative measures in sections 7, 8, 9, and 10; and
- any other useful information in sections 11, 12, 13, 14, 15, and 16.

If followed, the users of data sheets will be able to easily locate the information they need.

MSDSs shall contain the following sections.

4.2.1 Section 1—Product and company identification

Section 1 contains the chemical name, synonyms, and product identification. The name and address of the manufacturer or distributor shall appear in this section. A telephone number for additional information also shall be listed. A telephone number for emergency information along with hours of operation may also be included in this section.

NOTE—On the sample MSDS the manufacturer or distributor's name, address, and telephone numbers have been left blank and must be completed before distributing the MSDS.

4.2.2 Section 2—Hazards identification

This section contains an emergency overview that describes the immediate hazard for emergency responders. For compressed and liquefied gases, the statement of hazards from the label may be included as the emergency overview. The information provided in the emergency overview shall alert the emergency responder to the immediate health, physical, and environmental hazards.

This section also contains acute and chronic potential health effects such as routes of exposure, other effects of overexposure, chronic effects, medical conditions aggravated by overexposure, and carcinogenicity.

4.2.3 Section 3—Composition/information on ingredients

The ingredients that contribute to hazards associated with the gas or cryogenic liquid are listed here. If the hazardous gas is a single substance, its chemical and common name along with the Chemical Abstracts Service (CAS) number are listed here.

If the MSDS is for a gas mixture, then all components of the mixture and their CAS numbers shall be listed.

4.2.4 Section 4—First aid measures

This section should provide instructions for first aid treatment. All instructions should include simple instructions and should be in language that is easy to understand.

A “Note to Physician” section also may be included to provide additional information for specific treatment. This information is for medical professionals and may be written in medical language.

4.2.5 Section 5—Firefighting measures

This section should identify the fire and explosive properties of the gas including extinguishing media and basic firefighting instructions. It should also include hazardous combustion products and any unusual fire and explosion hazards.

4.2.6 Section 6—Accidental release measures

Information for responding to leaks or releases that include containment techniques, cleanup procedures, and any required specialized equipment should be provided. Procedures should distinguish between responses for large and small releases. This information is intended for use by trained emergency responders.

4.2.7 Section 7—Handling and storage

This section provides information for proper handling and storage of compressed gas cylinders and cryogenic containers. It should include general warnings on what practices to avoid or restrict. Precautionary label statements may be used for this section. Additional information that also may be used in this section can be found in CGA P-1, *Safe Handling of Compressed Gases in Containers* [4]. Additional handling and storage information may be obtained from NFPA 55, *Standard for the Storage, Use, and Handling of Compressed Gases and Cryogenic Fluids in Portable and Stationary Containers, Cylinders, and Tanks* [5].

4.2.8 Section 8—Exposure controls/personal protection

This section contains established exposure guidelines such as OSHA's Permissible Exposure Limits (PELs), the American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Values (TLVs®) and Biological Exposure Indices (BEIs®), and established company exposure guidelines [6].

If the product is intended for use in Canada, LC₅₀ and LD₅₀ values should appear in this section.

Recommendations for engineering controls and personal protective equipment to control exposure to chemical and/or physical hazards are given here. Distinction should be made between routine work and emergency response.

4.2.9 Section 9—Physical and chemical properties

This section lists the chemical and physical properties of the gas. The chemical and physical properties shown in the MSDSs provided with this publication were taken from CGA's *Handbook of Compressed Gases* [7].

4.2.10 Section 10—Stability and reactivity

This section is used to describe potential reactivity hazards. Information included in this section should be chemical stability, conditions to avoid, incompatibility with other materials, hazardous decomposition products, and if there is a potential for hazardous polymerization.

4.2.11 Section 11—Toxicological information

This section includes any available information on toxicity of the gas such as LC₅₀ and LD₅₀ data. This information would be used by toxicologists, medical personnel, and occupational safety and health professionals.

4.2.12 Section 12—Ecological information

Information contained in this section would describe the environmental impact of a gas if released. For example, information on the ozone-depleting potential and/or the aquatic toxicity of a gas would be described in this section.

4.2.13 Section 13—Disposal considerations

Include waste disposal methods in this section if available.

4.2.14 Section 14—Transport information

This section includes required shipping information such as the hazardous material shipping description consisting of the shipping name, hazard class, identification number, and any additional transportation information that would be useful to the product user.

4.2.15 Section 15—Regulatory information

This section is for regulatory compliance personnel and should include information on health, safety, and environmental regulations impacting the gas. For example, federal regulations to be covered could include the *Toxic Substance Control Act (TSCA)*, OSHA, *Federal Insecticide Fungicide and Rodenticide Act (FIFRA)*, *Superfund Amendment and Reauthorization Act (SARA)*, and WHMIS. State and provincial regulations also may be included in this section.

4.2.16 Section 16—Other information

This section includes any additional information that a user would find helpful for safe use and handling of a compressed or liquefied gas (for example, National Fire Protection Association (NFPA) and or Hazardous Material Information System (HMIS) hazard ratings, CGA valve connections, and any special precautions not discussed elsewhere).

Additional reference sources also may be listed.

5 Sample format

5.1 Blank form

A blank material safety data sheet is available in Appendix A and may be used as a basis for preparing MSDSs for additional products.

If this format is used in preparing other data sheets and the Canadian regulations do not apply to your operations, you may enter "not applicable" for each such item.

5.2 Standard phrases

Refer to Appendix B for standard phrases used in hazard communication for the preparation of MSDSs.

6 References

Unless otherwise specified, the latest edition shall apply.

[1] *Code of Federal Regulations*, Title 29 (Labor), Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402. www.gpoaccess.gov

[2] *Canadian Workplace Hazardous Materials Information System*, Department of Corporate and Consumer Affairs Canada, Place du Portage, Phase I, Ottawa, ON, K1A 0C9, Canada. www.hc-sc.gc.ca

[3] ANSI Z400.1, *Hazardous Industrial Chemicals—Material Safety Data Sheets—Preparation*, 25 West 43rd St., New York, NY 10036. www.ansi.org

[4] CGA P-1, *Safe Handling of Compressed Gases in Containers*, Compressed Gas Association, Inc., 4221 Walney Rd., 5th Floor, Chantilly, VA 20151. www.cganet.com

[5] NFPA 55, *Standard for the Storage, Use, and Handling of Compressed Gases and Cryogenic Fluids in Portable and Stationary Containers, Cylinders, and Tanks*, National Fire Protection Association, 1 Batterymarch Park, Quincy, MA 02269. www.nfpa.org

[6] *TLVs[®] and BEIs[®] Threshold Limit Values for Chemical Substances and Physical Agents & Biological Exposure Indices*, American Conference of Governmental Industrial Hygienists, 1330 Kemper Meadow Dr., Cincinnati, OH 45240. www.acgih.org

[7] *CGA Handbook of Compressed Gases*, Compressed Gas Association, Inc., 4221 Walney Rd., 5th Floor, Chantilly, VA 20151. www.cganet.com

Appendix A—Blank Material Safety Data Sheet
(Informative)

Effective Date:

MATERIAL SAFETY DATA SHEET

1. PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME:

CHEMICAL NAME:

CHEMICAL FAMILY:

FORMULA:

SYNONYMS:

NAME AND ADDRESS:

TELEPHONE: Emergency Phone -

For routine information call:

WEB ADDRESS:

[USE]:

2. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW:

OSHA REGULATORY STATUS:

POTENTIAL HEALTH EFFECTS INFORMATION:

ROUTES OF EXPOSURE:

INHALATION:

EYE CONTACT:

SKIN CONTACT:

[SKIN ABSORPTION]:

[INGESTION]:

CHRONIC EFFECTS:

MEDICAL CONDITIONS AGGRAVATED BY OVEREXPOSURE:

OTHER EFFECTS OF OVEREXPOSURE:

CARCINOGENICITY:

POTENTIAL ENVIRONMENTAL EFFECTS:

3. COMPOSITION/INFORMATION ON INGREDIENTS

INGREDIENT NAME

CAS NUMBER

PERCENTAGE

4. FIRST AID MEASURES

FIRST AID PROCEDURES:

INHALATION:

EYE CONTACT:

SKIN CONTACT:

INGESTION:

NOTES TO PHYSICIAN:

5. FIREFIGHTING MEASURES

FLAMMABLE PROPERTIES:

EXTINGUISHING MEDIA:

PROTECTION OF FIREFIGHTERS:

SPECIFIC HAZARDS ARISING FROM THE CHEMICAL:

PROTECTIVE EQUIPMENT AND PRECAUTIONS FOR FIREFIGHTERS:

[SENSITIVITY TO STATIC DISCHARGE]:

[SENSITIVITY TO MECHANICAL IMPACT]:

6. ACCIDENTAL RELEASE MEASURES

PERSONAL PRECAUTIONS:

ENVIRONMENTAL PRECAUTIONS:

METHODS FOR CONTAINMENT:

METHODS FOR CLEAN-UP:

OTHER INFORMATION:

7. HANDLING AND STORAGE

HANDLING:

STORAGE:

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

EXPOSURE GUIDELINES:

OSHA PEL-TWA:

ACGIH TLV:

NIOSH IDLH:

ENGINEERING CONTROLS:

VENTILATION:

PERSONAL PROTECTIVE EQUIPMENT:

EYE/FACE PROTECTION:

SKIN PROTECTION:

RESPIRATORY PROTECTION:

General Use:

Emergency Use:

9. PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE:

ODOR:

ODOR THRESHOLD:

PHYSICAL STATE:

pH:

MELTING POINT/FREEZING POINT (specify which):

BOILING POINT:

FLASH POINT:

EVAPORATION RATE (Butyl Acetate=1):

FLAMMABILITY:

FLAMMABLE LIMITS IN AIR BY VOLUME:

LOWER:

UPPER:

VAPOR PRESSURE:

GAS DENSITY:

SPECIFIC GRAVITY (Air = 1):

SOLUBILITY IN WATER:

COEFFICIENT OF WATER/OIL DISTRIBUTION:

AUTOIGNITION:

DECOMPOSITION TEMPERATURE:

MOLECULAR WEIGHT:

EXPANSION RATIO:

10. STABILITY AND REACTIVITY

CHEMICAL STABILITY:

CONDITIONS TO AVOID:

INCOMPATIBLE MATERIALS:

HAZARDOUS DECOMPOSITION PRODUCTS:

POSSIBILITY OF HAZARDOUS REACTIONS:

11. TOXICOLOGICAL INFORMATION

ACUTE DOSE EFFECTS:

LC₅₀:

LD₅₀:

REPEATED DOSE EFFECTS:

IRRITATION:

CORROSIVITY:

SENSITIZATION:

CARCINOGENICITY:

NEUROLOGICAL EFFECTS:

GENETIC EFFECTS:

REPRODUCTIVE EFFECTS:

DEVELOPMENTAL EFFECTS:

TARGET ORGAN EFFECTS:

[SYNERGISTIC MATERIALS]:

12. ECOLOGICAL INFORMATION

ECOTOXICITY:

13. DISPOSAL CONSIDERATIONS

WASTE DISPOSAL METHOD:

14. TRANSPORT INFORMATION

BASIC SHIPPING INFORMATION:

PROPER SHIPPING NAME:

HAZARD CLASS:

IDENTIFICATION NUMBER:

[PIN]:

ADDITIONAL INFORMATION:

PRODUCT RQ:

SHIPPING LABEL(s):

PLACARD (when required):

SPECIAL SHIPPING INFORMATION: Cylinders should be transported in a secure position, in a well-ventilated vehicle. The transportation of compressed gas cylinders in automobiles or in closed-body vehicles can present serious safety hazards and should be discouraged.

TRANSPORT CANADA “EMERGENCY RESPONSE ASSISTANCE PLAN”:

15. REGULATORY INFORMATION

The following information concerns selected regulatory requirements potentially applicable to this product. Not all such requirements are identified. Users of this product are responsible of their own regulatory compliance on a federal, state [provincial], and local level.

U.S. FEDERAL:

EPA–ENVIRONMENTAL PROTECTION AGENCY:

CERCLA: Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (40 CFR Parts 117 and 302):

Reportable Quantity (RQ):

SARA: Superfund Amendment and Reauthorization Act

SECTION 302/304: Requires emergency planning on threshold planning quantities (TPQ) and release reporting based on reportable quantities (RQ) of EPA's extremely hazardous substances (40 CFR Part 355).

Extremely Hazardous Substances:

Threshold Planning Quantity (TPQ):

SECTIONS 311/312: Require submission of material safety data sheets (MSDSs) and chemical inventory reporting with identification of EPA defined hazard classes (40 CFR Part 370). The hazard classes for this product are:

IMMEDIATE:

PRESSURE:

DELAYED:

REACTIVITY:

FIRE:

SECTION 313: Requires submission of annual reports of release of toxic chemicals that appear in 40 CFR Part 372.

40 CFR PART 68: Risk Management Programs for Chemical Accidental Release Prevention. Requires the development and implementation of risk management programs at facilities that manufacture, use, store, or otherwise handle regulated substances in quantities that exceed specified thresholds.

TSCA: Toxic Substance Control Act:

OSHA–OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION:

29 CFR Part 1910.119: Process Safety Management of Highly Hazardous Chemicals. Requires facilities to develop a process safety management program based on Threshold Quantities (TQ) of highly hazardous chemicals, listed on Appendix A of the standard.

CANADA:

Controlled Product Hazard Class B2, D2. This MSDS has been prepared in compliance with Controlled Product Regulations.

Canadian Domestic Substance List (DSL):

16. OTHER INFORMATION

SPECIAL PRECAUTIONS:

Shipment of compressed gas containers that have not been filled with the owner's consent is a violation of federal law (49 CFR Part 173.301(b)).

MIXTURES: When two or more gases or liquefied gases are mixed, their hazardous properties may combine to create additional, unexpected hazards. Obtain and evaluate the safety information for each component before you produce the mixture. Consult an Industrial Hygienist or other trained person when you make your safety evaluation of the end product. Remember, gases and liquids have properties which can cause serious injury or death.

HAZARD RATINGS AND RATING SYSTEMS:

NFPA RATINGS:

HEALTH: =
FLAMMABILITY: =
INSTABILITY: =
SPECIAL: =

HMIS RATINGS:

HEALTH: =
FLAMMABILITY: =
PHYSICAL HAZARD: =

STANDARD VALVE CONNECTIONS FOR U.S. AND CANADA:

THREADED:

PIN-INDEXED YOKE:

ULTRA HIGH INTEGRITY:

Use the proper CGA connections; DO NOT USE ADAPTERS.

Further information can be found in the following publications published by:
Compressed Gas Association, Inc. (CGA), 4221 Walney Rd., 5th Floor, Chantilly, VA 20151.
Telephone: (703) 788-2700. Website: www.cganet.com

P-1 *Safe Handling of Compressed Gases in Containers*

[PREPARED BY]:

Appendix B—Standard phrases for hazard communication
(Informative)

GENERAL

Close valve after each use and when empty.
Cylinder temperature should not exceed 125 °F (52 °C).
Do not breathe gas.
Do not breathe vapor.
Do not drop.
Store and use with adequate ventilation.
Use equipment rated for cylinder pressure.
Use suitable hand truck for container movement.
Do not remove this product label.
Use in accordance with.... (refer to applicable safety literature).
Use backflow preventive device in piping.
Never put cylinders into trunks of cars or unventilated areas of passenger vehicles.
Suck-back into cylinder may cause rupture.
Use in closed system.
Return cylinder with minimum 25 psi.

HEALTH

Can cause eye and skin burns.
Can cause rapid suffocation.
Can cause severe eye, skin and respiratory tract burns.
Can cause severe lung damage.
Can increase respiration and heart rate.
Cancer suspect agent.
May be fatal if inhaled.
May cause anesthetic effects.
May cause frostbite.
May cause heart rate irregularities.
May cause irritation to skin, eyes and mucous membranes.
May cause kidney and liver damage.
May cause kidney, liver, spleen and other organ damage.
May cause lung, kidney, liver and central nervous system damage.
Simple asphyxiant.
Symptoms may be delayed.
Cylinder contains acetone solvent, which may cause irritation.
Cancer hazard.

ODOR

Almond-like.
Decaying fish.
Garlic-like.
Musty hay.
Rotten eggs.
Sickly sweet.

ASPHYXIAnt GASES

Caution

Cold liquid and gas under pressure.
High pressure gas and liquid.
High pressure gas.
Liquid and gas under pressure.

ASPHYXIAN GASES (CONTINUED)**First Aid**

Call a physician.

If breathing is difficult administer oxygen.

If inhaled, remove to fresh air.

If not breathing, administer artificial respiration.

In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes.

In case of frostbite, obtain medical treatment immediately.

If inhaled or suspicion of any exposure, remove to fresh air. If not breathing, give artificial respiration. Rescuer may receive chemical burns as a result of mouth-to-mouth.

Obtain prompt medical attention.

WATER-REACTIVE GASES**General**

Water can cause violent reaction.

FLAMMABLE GASES**Danger**

Flammable liquid and gas under pressure.

Burns with an invisible flame.

Can form explosive mixtures with air.

Do not discharge at pressures above 15 psig (103 kPa).

Flammable gas under pressure.

Flammable high pressure gas.

Cylinders contain fusible metal pressure relief devices in the top, bottom, or valve that melt at 208 °F to 224 °F (98 °C to 104 °C).

May ignite if valve is opened to air.

Pyrophoric, flammable, high pressure gas.

General

Keep away from heat, flame, and sparks.

PYROPHORIC GASES**Danger**

Can ignite on contact with air.

General

Use only with equipment purged with an inert gas or evacuated prior to discharge.

OXIDIZING GASES**Danger**

Contact with organic and most inorganic materials may cause fire.

High pressure, oxidizing gas.

Use behind barricades with remote extensions on valves or regulators.

Use only with compatible materials of construction, which may require passivation before use.

Vigorously accelerates combustion.

Warning

Combustibles in contact with liquid oxygen may explode on ignition or impact.

Extremely reactive.

High pressure oxidizing liquid and gas.

May accelerate combustion.

Vigorously accelerates combustion.

OXIDIZING GASES (CONTINUED)**General**

Avoid spills.
Do not walk on or roll equipment over spills.
Keep oil, grease, and combustibles away.
Open valve slowly.
Use only with equipment cleaned for oxygen service and rated for cylinder pressure.
Can support combustion.

CRYOGENIC LIQUIDS**Warning**

Can cause rapid suffocation.
Can cause severe frostbite.
Extremely cold liquid and gas under pressure.
Always keep container in upright position.

General

See container manufacturer's operating instructions to avoid freezing air in vent lines.
Do not get liquid in eyes, on skin or clothing.
For liquid withdrawal, use face shield and gloves.
Periodic venting of internal pressure via relief device is a normal function of container.

TOXIC GASES**Danger**

Can be fatal even with adequate oxygen.
Corrosive, poisonous liquid and gas under pressure.
Poisonous Gas.
Poisonous, corrosive liquid and gas under pressure.
Poisonous, corrosive, high pressure gas.
Poisonous, corrosive, high pressure liquid and gas.
Poisonous, flammable liquid and vapor.
Poisonous, flammable liquid and vapor.
Poisonous, flammable, high pressure liquid and gas.
Poisonous, flammable, odorless high pressure gas.
Poisonous, oxidizing, corrosive liquid and gas under pressure.
Poisonous, oxidizing, corrosive, gas under pressure.

General

Contact with water or moist air liberates irritating gas.
Discard contaminated shoes.
Wash clothing before reuse.
When returning cylinder install valve outlet cap or plug leak-tight.

First Aid

Call a physician even if no symptoms are present.
Consider any potential exposure as a potentially toxic dose.
Keep under medical observation.
Symptoms may be delayed.

FIREFIGHTING MEASURES (SECTION 5)

Do not direct water spray at container vent.

If possible, without risk, remove cylinders from fire area or cool with water.

Ignitable by static electricity.

Immediately cool containers with water spray from maximum distance.

Most cylinders are designed to vent contents when exposed to elevated temperatures.

Pressure in a container can build up due to heat and it may rupture if pressure relief devices should fail to function.

Product is nonflammable and does not support combustion.

Product is nonflammable but will support combustion of other materials.

Upon exposure to intense heat or flame, cylinder will vent rapidly and or rupture violently.

Use extinguishing media appropriate for surrounding fire.

Sensitivity to mechanical impact

Decomposition may occur.

ACCIDENTAL RELEASE MEASURES (SECTION 6)

Evacuate vapor cloud area.

If leak is from cylinder or cylinder valve, contact supplier.

If possible move leaking container to a well-ventilated area.

Never enter a confined space or other area where the flammable gas concentration is greater the 10% of its lower flammable limit.

Spill will rapidly vaporize creating an immediate flammable atmosphere.

Spill will rapidly vaporize forming an oxygen deficient vapor cloud.

Spill will rapidly vaporize forming an oxygen rich vapor cloud.

Vapor cloud may obscure visibility.

Approach suspected leak areas with caution.

STORAGE AND HANDLING (SECTION 7)

All electrical equipment should be explosion proof in the storage and use areas.

Cylinder storage locations should be well-protected, well-ventilated, dry, and separated from combustible materials.

Cylinders containing oxygen or oxidizers should be separated from flammables by a minimum distance of 20 ft or by a barrier of noncombustible material at least 5 ft high having a fire resistance rating of at least 1/2 hour.

Cylinders should be stored upright with valve protection cap in place and firmly secured to prevent falling or being knocked over.

Flammable gas cylinders should be separated from oxygen cylinders or other oxidizers by a minimum distance of 20 ft, or by a barrier of noncombustible material at least 5 ft high having a fire resistance rating of at least 1/2 hour.

Full and empty cylinders should be segregated.

If user experiences any difficulty operating cylinder valve discontinue use and contact supplier.

Leak check flammable gas systems using leak detection solution, never with flame.

Never attempt to lift a cylinder by its valve protection cap.

Never attempt to refill a compressed gas cylinder without the owner's written consent.

Never insert an object (e.g., wrench, screwdriver, pry bar, etc.) into valve cap openings. Doing so may damage valve, causing a leak to occur.

Never strike an arc on a compressed gas cylinder or make a cylinder a part of an electrical circuit.

Post "No Smoking or Open Flames" signs in the storage areas.

Prevent entrapment of cryogenic liquid in closed systems not protected with relief device.

Protect cylinders from physical damage; do not drag, roll, slide or drop. Do not allow storage area temperature to exceed 125 °F (52 °C).

Storage areas must meet national electric codes for class 1 hazardous areas.

Store and use with adequate ventilation.

There should be no sources of ignition in storage area.

Use a suitable hand truck for cylinder movement.

Use an adjustable strap wrench to remove over-tight or rusted caps.

EXPOSURE CONTROLS/ PPE (SECTION 8)

Air purifying respirators will not provide protection.

Gloves must be clean and free of oil and grease.

Long sleeve shirts and trousers without cuffs.

Loose fitting thermal insulated or leather gloves.

Natural or mechanical to prevent oxygen-deficient atmospheres below 19.5% oxygen.

Natural or mechanical to prevent oxygen-enriched atmospheres above 23% oxygen.

Provide natural or explosion-proof ventilation adequate to ensure flammable gas does not reach its lower explosive limit.

Safety glasses are recommended.

Safety shoes are recommended when handling cylinders.

Self contained breathing apparatus (SCBA) or positive pressure airline with mask are to be used in oxygen-deficient atmosphere.

Work gloves are recommended when handling cylinders.

DISPOSAL (SECTION 13)

Do not attempt to dispose of residual or unused quantities.

For emergency disposal, secure the cylinder and slowly discharge gas to the atmosphere in a well ventilated area or outdoors away from all sources of ignition.

Return cylinder to supplier.

Appendix C—Index to the Material Safety Data Sheets (MSDS)
(Informative)

Product name	Formula	Date
Acetylene, dissolved	C ₂ H ₂	February 2006
Air, compressed	n/a	February 2006
Argon, compressed	Ar	February 2006
Argon, refrigerated liquid	Ar	February 2006
Carbon Dioxide	CO ₂	February 2006
Helium, compressed	He	February 2006
Hydrogen, compressed	H ₂	February 2006
Calcium Carbide Lime	Ca(OH) ₂	February 2006
Nitrogen, compressed	N ₂	February 2006
Nitrogen, refrigerated liquid	N ₂	February 2006
Nitrous Oxide	N ₂ O	February 2006
Oxygen, compressed	O ₂	February 2006
Oxygen, refrigerated liquid	O ₂	February 2006

NOTE—For Propane MSDS, contact the National Propane Gas Association, 1150 17th St, Ste 310 NW, Washington, DC, 20036 (NPGA publication #C210). www.npga.org

MATERIAL SAFETY DATA SHEET

1. PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME: Acetylene, dissolved

CHEMICAL NAME: Acetylene

CHEMICAL FAMILY: Alkyne

FORMULA: C₂H₂

SYNONYMS: Ethyne, welding gas, chemical acetylene

NAME AND ADDRESS:

TELEPHONE: Emergency Phone:

For routine information call:

WEB ADDRESS:

[USE]: Welding, instrument fuel

2. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW:

DANGER: Flammable gas under pressure.
Can form explosive mixtures with air.
Cylinders contain fusible metal pressure relief devices in the top, bottom, or valve that melt at 208 °F to 220 °F (98 °C to 104 °C).
Do not discharge cylinders at pressures above 15 psig (103 kPa).
Garlic-like odor.

OSHA REGULATORY STATUS: This material is considered hazardous by OSHA's Hazard Communication Standard (29 CFR 1910.1200).

POTENTIAL HEALTH EFFECTS INFORMATION:**ROUTES OF EXPOSURE:**

INHALATION: Simple asphyxiant. It should be noted that before suffocation could occur, the lower flammability limit of acetylene in air would be exceeded; possibly causing both an explosive and an oxygen-deficient atmosphere. Exposure to moderate concentrations may cause dizziness, headache, and unconsciousness. Lack of sufficient oxygen may cause serious injury or death.

EYE CONTACT: None

SKIN CONTACT: None

[SKIN ABSORPTION]: None

[INGESTION]: None

CHRONIC EFFECTS: Acetylene is a nontoxic gas that has no chronic harmful effects even in high concentrations. Acetylene has been used as an anesthetic.

MEDICAL CONDITIONS AGGRAVATED BY OVEREXPOSURE: None

OTHER EFFECTS OF OVEREXPOSURE: None

CARCINOGENICITY: Acetylene is not listed by NTP, OSHA, or IARC.

POTENTIAL ENVIRONMENTAL EFFECTS: No adverse ecological effects are expected. See Section 12.

3. COMPOSITION/INFORMATION ON INGREDIENTS

INGREDIENT NAME	CAS NUMBER	PERCENTAGE
ACETYLENE	74-86-2	>99%

4. FIRST AID MEASURES**FIRST AID PROCEDURES:**

INHALATION: Remove person to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Obtain prompt medical attention.

EYE CONTACT: Not applicable

SKIN CONTACT: Not applicable

INGESTION: Not applicable

NOTES TO PHYSICIAN: None

5. FIREFIGHTING MEASURES

FLAMMABLE PROPERTIES: Can form explosive mixtures with air. Unstable at pressures above 15 psig (103 kPa).

EXTINGUISHING MEDIA: Carbon Dioxide, Dry Chemical, Water

PROTECTION OF FIREFIGHTERS:

SPECIFIC HAZARDS ARISING FROM THE CHEMICAL: Excessive heat or fire will cause fusible metal pressure relief device to melt allowing acetylene to escape. Cylinders may rupture violently if sidewalls are exposed to direct flame impingement. If a flame is extinguished and acetylene continues to escape, an explosive re-ignition could occur. Internal decomposition can occur in cylinders exposed to fire. Hazardous combustion products include carbon monoxide and carbon dioxide.

PROTECTIVE EQUIPMENT AND PRECAUTIONS FOR FIREFIGHTERS: Wear full firefighting turn-out gear (full Bunker gear) and respiratory protection (SCBA). Shut off source of acetylene if possible. Extinguish fire only if flow of acetylene can be stopped. Keep adjacent cylinders cool by spraying large amounts of water until the fire burns itself out and the cylinders are cool. Cylinders exposed to fire should not be moved until they have reached ambient temperature for at least 24 hours in the event internal decomposition is taking place.

[SENSITIVITY TO STATIC DISCHARGE]: Ignitable by static electricity

[SENSITIVITY TO MECHANICAL IMPACT]: Decomposition may occur

6. ACCIDENTAL RELEASE MEASURES

PERSONAL PRECAUTIONS: Use personal protection recommended in Section 8. Before entering area you must check for flammable and oxygen-deficient atmospheres. Evacuate immediate area. Eliminate any possible sources of ignition, and provide maximum explosion-proof ventilation. If leaking from cylinder, valve, or fusible metal pressure relief device, contact your supplier. Never enter a confined space or other area where the concentration is greater than 0.25%, which is 10% of the lower flammable limit.

ENVIRONMENTAL PRECAUTIONS: Not applicable.

METHODS FOR CONTAINMENT: Shut off source of acetylene, if possible. Isolate any leaking cylinder. Do not attempt to contain or capture leaking product in a secondary containment device.

METHODS FOR CLEAN-UP: Not applicable.

OTHER INFORMATION: None.

7. HANDLING AND STORAGE

HANDLING: Use a suitable hand truck for cylinder movement. All acetylene piped systems and associated equipment must be grounded. Nonsparking tools should be used. Never use copper piping for acetylene service, only steel or wrought iron pipe should be used. An acetylene cylinder valve should be opened the minimum amount required to deliver acceptable flow so that it can be closed as quickly as possible in an emergency situation. Do not open acetylene cylinder valves more than one and one-half turns. Never use acetylene in excess of 15 psig pressure. Acetylene cylinders are heavier than other cylinders because they are packed with a porous filler material and acetone. Leak check with soapy water; never use a flame. Never insert an object (e.g., wrench, screwdriver, pry bar, etc.) into valve cap openings. Doing so may damage valve, causing a leak to occur. Do not strike cap with a hammer. Use an adjustable strap wrench to remove over-tight or rusted caps. Never strike an arc on a compressed gas cylinder or make a cylinder a part of an electrical circuit. For additional precautions in using acetylene see Section 16 - Other Information.

When used in welding and cutting: Read and understand the manufacturer's instructions and the precautionary label on the products. See American National Standard Institute (ANSI) Z49.1 *Safety in Welding and Cutting*, published by the American Welding Society, 550 N.W. LeJeune Rd., Miami, Florida 33126, www.aws.org; and National Fire Protection Association (NFPA) 51, *Standard for the Design and Installation of Oxygen-Fuel Gas Systems for Welding, Cutting, and Allied Processes*, NFPA, 1 Batterymarch Park, Quincy, MA 02169, www.nfpa.org.

STORAGE: Store and use with adequate ventilation. Compressed gas cylinders shall be separated from materials and conditions that present exposure hazards to or from each other. Cylinders should be separated from oxygen and other oxidizers by a minimum distance of 20 ft or by a barrier of noncombustible material at least 5 ft high having a fire resistance rating of at least 1/2 hour. Storage in excess of 2,500 ft³ is prohibited in buildings with other occupancies. Cylinders should be stored upright with valve protection cap in place and firmly secured to prevent falling or being knocked over. Protect cylinders from physical damage; do not drag, roll, slide, or drop. Post "No Smoking Or Open Flames" signs in the storage or use areas. There should be no sources of ignition. All electrical equipment should be explosion-proof in the storage and use areas. Storage areas must meet national electric codes for Class 1 hazardous areas.

Do not allow storage temperature to exceed 125 °F (52 °C). Full and empty cylinders should be segregated. Use a first-in, first-out inventory system to prevent full containers from being stored for long periods of time.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

EXPOSURE GUIDELINES:

OSHA PEL-TWA: None

ACGIH TLV: Simple asphyxiant

NIOSH IDLH: None

ENGINEERING CONTROLS:

VENTILATION: Provide adequate natural or explosion-proof mechanical ventilation to ensure acetylene does not accumulate and reach its lower explosive limit of 2.5%.

PERSONAL PROTECTIVE EQUIPMENT:

EYE/FACE PROTECTION: Safety glasses are recommended when handling cylinders.

SKIN PROTECTION: Leather work gloves are recommended when handling cylinders. Safety shoes are recommended when handling cylinders. Cotton clothing is recommended for use to prevent static electric buildup.

RESPIRATORY PROTECTION:

General Use: None required

Emergency Use: Air supplied respirators are required in oxygen-deficient atmospheres (air purifying respirators will not function). Before entering area you must check for flammable and oxygen-deficient atmospheres.

9. PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE: Colorless

ODOR: Acetylene of 100% purity is odorless but commercial purity generated from calcium carbide has a distinctive garlic-like odor.

ODOR THRESHOLD: 565 ppm

PHYSICAL STATE: Gaseous

pH: Not applicable

MELTING POINT: -116 °F (-82.2 °C) @ 10 psig (69 kPa):

BOILING POINT: -103.4 °F (-75 °C) @ 10 psig (69 kPa)

FLASH POINT: Gas, not applicable

EVAPORATION RATE (Butyl Acetate = 1): Gas, not applicable

FLAMMABILITY: Flammable gas

FLAMMABLE LIMITS IN AIR BY VOLUME:

LOWER: 2.5%

UPPER: 80%

VAPOR PRESSURE: 635 psig (kPa) @ 70 °F (21.1 °C)

GAS DENSITY: 0.07314 lb/ft³ (1.1716 kg/m³) @ 32 °F (0 °C) and 1 atm

SPECIFIC GRAVITY (Air =1): 0.906 @ 70 °F (21.1 °C) and 1 atm

SOLUBILITY IN WATER: Vol/Vol at 32 °F (0 °C) @ 1 atm: 1.7 Vol/Vol at 60 °F (15.6 °C) @ 1 atm: 1.1

COEFFICIENT OF WATER/OIL DISTRIBUTION: Not available

AUTOIGNITION: 581°F (305 °C) @ 1 atm

DECOMPOSITION TEMPERATURE: Not available

MOLECULAR WEIGHT: 26.04

EXPANSION RATIO: Not applicable

10. STABILITY AND REACTIVITY

CHEMICAL STABILITY: Unstable. Stable as shipped. Do not use at pressure above 15 psig (103 kPa).

CONDITIONS TO AVOID: Cylinders should not be exposed to sudden mechanical shock or sources of heat.

INCOMPATIBLE MATERIALS: Under certain conditions, acetylene can react with copper, silver, and mercury to form acetylides, compounds which can act as ignition sources. Brasses containing less than 65% copper in the alloy and certain nickel alloys are suitable for acetylene service under normal conditions.

HAZARDOUS DECOMPOSITION PRODUCTS: Hydrogen, carbon

POSSIBILITY OF HAZARDOUS REACTIONS: Acetylene can react explosively when combined with oxygen and other oxidizers including all halogens and halogen compounds. The presence of moisture, certain acids, or alkaline materials tends to enhance the formation of copper acetylides.

11. TOXICOLOGICAL INFORMATION

Acetylene is a simple asphyxiant.

ACUTE DOSE EFFECTS:

LD₅₀: None

LC₅₀: None

REPEATED DOSE EFFECTS: Acetylene is a nontoxic gas that has no chronic, harmful effects even in high concentrations. Acetylene has been used as an anesthetic.

IRRITATION: None

SENSITIZATION: None

GENETIC EFFECTS: None

REPRODUCTIVE EFFECTS: None

DEVELOPMENTAL EFFECTS: None

TARGET ORGAN EFFECTS: None

[TERATOGENICITY]: None

[MUTAGENICITY]: None

[SYNERGISTIC MATERIALS]: None

12. ECOLOGICAL INFORMATION

ECOTOXICITY: No adverse ecological effects are expected. Acetylene does not contain any Class I or Class II ozone-depleting chemicals (40 CFR Part 82). Acetylene is not listed as a marine pollutant by DOT (49 CFR Part 171).

13. DISPOSAL CONSIDERATIONS

WASTE DISPOSAL METHOD: Do not attempt to dispose of residual or unused quantities. Return cylinder to supplier.

Unserviceable cylinders should be returned to the supplier for safe and proper disposal.

14. TRANSPORT INFORMATION**BASIC SHIPPING DESCRIPTION:**

PROPER SHIPPING NAME: Acetylene, dissolved

HAZARD CLASS: 2.1 (Flammable gas)

IDENTIFICATION NUMBER: UN 1001

[PIN]: 1001

ADDITIONAL INFORMATION:

PRODUCT RQ: None

SHIPPING LABEL(s): Flammable gas

PLACARD (when required): Flammable gas

SPECIAL SHIPPING INFORMATION: Cylinders should be transported in a secure position, in a well-ventilated vehicle. The transportation of compressed gas cylinders in automobiles or in closed-body vehicles can present serious safety hazards and should be discouraged.

TRANSPORT CANADA "EMERGENCY RESPONSE ASSISTANCE PLAN": Not required.

15. REGULATORY INFORMATION

The following information concerns selected regulatory requirements potentially applicable to this product. Not all such requirements are identified. Users of this product are responsible for their own regulatory compliance on a federal, state [provincial], and local level.

U.S. FEDERAL:**EPA-ENVIRONMENTAL PROTECTION AGENCY**

CERCLA: Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (40 CFR Parts 117 and 302):

Reportable Quantity (RQ): None

SARA: Superfund Amendment and Reauthorization Act

SECTION 302/304: Requires emergency planning on threshold planning quantities (TPQ) and release reporting based on reportable quantities (RQ) of EPA's extremely hazardous substances (40 CFR Part 355).

Extremely Hazardous Substances: None

Threshold Planning Quantity (TPQ): None

SECTIONS 311/312: Require submission of material safety data sheets (MSDSs) and chemical inventory reporting with identification of EPA defined hazard classes (40 CFR Part 370). The hazard classes for this product are:

IMMEDIATE: No
DELAYED: No

PRESSURE: Yes
REACTIVITY: Yes
FIRE: Yes



Documents

Document Sharing Hub

Acetylene, dissolved—5

SECTION 313: Requires submission of annual reports of release of toxic chemicals that appear in 40 CFR Part 372.

Acetylene does not require reporting under Section 313.

40 CFR PART 68: Risk Management for Chemical Accidental Release. Requires the development and implementation of risk management programs at facilities that manufacture, use, store, or otherwise handle regulated substances in quantities that exceed specified thresholds.

Acetylene is listed as a regulated substance in quantities of 10,000 pounds (4,553 kg) or greater.

TSCA: Toxic Substance Control Act: Acetylene is listed on the TSCA inventory.

OSHA—OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION:

29 CFR 1910.119: Process Safety Management of Highly Hazardous Chemicals. Requires facilities to develop a process safety management program based on Threshold Quantities (TQ) of highly hazardous chemicals as listed in Appendix A.

Acetylene is not listed in Appendix A as a highly hazardous chemical. However, any process that involves a flammable gas on site in one location, in quantities of 10,000 pounds (4,553 kg) or greater is covered under this regulation unless it is used as fuel.

CANADA:

Controlled Product Hazard Class A, B1, F. This MSDS has been prepared in compliance with Controlled Product Regulations.

Canadian Domestic Substance List (DSL): Acetylene is listed on the DSL inventory.

16. OTHER INFORMATION

SPECIAL PRECAUTIONS: Use piping and equipment adequately designed to withstand pressures to be encountered. Use a check valve or other protective apparatus in any line or piping from the cylinder to prevent reverse flow. Cross contamination of gases, liquids, or both can also create a hazardous condition inside a cylinder, dewar, or vessel (e.g., flammable and oxidizing gases can create an explosive mixture), which may result in rupture.

Shipment of compressed gas cylinders that have not been filled with the owners consent is a violation of federal law (49 CFR Part 173.301(b)).

MIXTURES: When two or more gases or liquefied gases are mixed, their hazardous properties may combine to create additional, unexpected hazards. Obtain and evaluate the safety information for each component before you produce the mixture. Consult an Industrial Hygienist or other trained person when you make your safety evaluation of the end product. Remember, gases and liquids have properties that can cause serious injury or death.

HAZARD RATINGS AND RATING SYSTEMS:

NFPA RATINGS:

HEALTH: = 0
FLAMMABILITY: = 4
INSTABILITY: = 2
SPECIAL: None

HMIS RATINGS:

HEALTH: = 2
FLAMMABILITY: = 4
PHYSICAL HAZARD: = 2

STANDARD VALVE CONNECTIONS FOR U.S. AND CANADA:

THREADED: CGA 510 standard for cylinders greater than 50 ft³. For additional limited standard connections see CGA V-1, *Standard for Compressed Gas Cylinder Valve Outlet and Inlet Connections*.

PIN-INDEXED YOKE: Not applicable

ULTRA HIGH INTEGRITY: Not applicable

Use the proper CGA connections; DO NOT USE ADAPTERS

Further information about acetylene can be found in the following publications published by:
Compressed Gas Association, Inc. (CGA), 4221 Walney Road, 5th Floor, Chantilly, VA 20151.
Telephone: (703) 788-2700. Website: www.cganet.com

G-1.1	<i>Commodity Specification for Acetylene</i>
G-1	<i>Acetylene</i>
P-1	<i>Safe Handling of Compressed Gases in Containers</i>
SB-4	<i>Handling Acetylene Cylinders in Fires</i>
SB-8	<i>Use of Oxy-Fuel Gas Welding and Cutting Apparatus</i>

[PREPARED BY]: Compressed Gas Association
4221 Walney Road, 5th Floor
Chantilly, VA 20151
(703) 788 - 2700

MATERIAL SAFETY DATA SHEET

1. PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME: Air, compressed

CHEMICAL NAME: Air

CHEMICAL FAMILY: Nonflammable gas

FORMULA: N/A

SYNONYMS: Medical Air, Breathing Air, Compressed Air

NAME AND ADDRESS:

TELEPHONE: Emergency Phone:

For routine information call:

WEB ADDRESS:

[USE]: Various

2. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW:

CAUTION! High pressure gas.
May accelerate combustion.

OSHA REGULATORY STATUS: This material is considered hazardous by OSHA's Hazard Communication Standard (29 CFR 1910.1200).

POTENTIAL HEALTH EFFECTS INFORMATION:

ROUTES OF EXPOSURE:

INHALATION: At atmospheric pressure air has no adverse health effects. For elevated pressure exposure see Section 11, Toxicological Information.

EYE CONTACT: Not applicable

SKIN CONTACT: Not applicable

[SKIN ABSORPTION]: Not applicable

[INGESTION]: Not applicable

CHRONIC EFFECTS: None established

MEDICAL CONDITIONS AGGRAVATED BY OVEREXPOSURE: None

OTHER EFFECTS OF OVEREXPOSURE: None

CARCINOGENICITY: Air is not listed by NTP, OSHA, or IARC.

POTENTIAL ENVIRONMENTAL EFFECTS: No adverse ecological effects are expected. See Section 12.

3. COMPOSITION/INFORMATION ON INGREDIENTS

INGREDIENT NAME

Air

CAS NUMBER

132259-10-0

PERCENTAGE

100%

4. FIRST AID MEASURES

FIRST AID PROCEDURES:

INHALATION: Not applicable

EYE CONTACT: None

SKIN CONTACT: None

INGESTION: None

NOTES TO PHYSICIAN: Not applicable

5. FIREFIGHTING MEASURES

FLAMMABLE PROPERTIES: Nonflammable; will support combustion.

EXTINGUISHING MEDIA: Use extinguishing media appropriate for surrounding fire.

PROTECTION OF FIREFIGHTERS:

SPECIFIC HAZARDS ARISING FROM THE CHEMICAL: Compressed air at high pressures may accelerate combustion of other materials. Upon exposure to intense heat or flame, cylinder will vent rapidly and or rupture violently. Most cylinders are designed to vent contents when exposed to elevated temperatures. Pressure in a container can build up due to heat and it may rupture if pressure relief devices should fail to function.

PROTECTIVE EQUIPMENT AND PRECAUTIONS FOR FIREFIGHTERS: Evacuate all personnel from the danger area. If possible, shut off flow of air that is supporting the fire. Immediately cool containers with water spray from maximum distance. When cool, move containers from fire area, if without risk.

[SENSITIVITY TO STATIC DISCHARGE]: None

[SENSITIVITY TO MECHANICAL IMPACT]: None

6. ACCIDENTAL RELEASE MEASURES

PERSONAL PRECAUTIONS: Use personal protection recommended in Section 8.

ENVIRONMENTAL PRECAUTIONS: Not applicable

METHODS FOR CONTAINMENT: Shut off source of gas, if possible. If leaking from cylinder or its valve, contact your supplier.

METHODS FOR CLEAN-UP: Not applicable

OTHER INFORMATION: None

7. HANDLING AND STORAGE

HANDLING: Use a suitable hand truck for cylinder movement. Never attempt to lift a cylinder by its valve protection cap. Keep cylinders and their valves free from oil and grease. Open valve slowly. If user experiences difficulty operating cylinder valve, discontinue use and contact supplier. Never insert an object (e.g., wrench, screwdriver, pry bar, etc.) into valve cap openings. Doing so may damage valve, causing a leak to occur. Never strike an arc on a compressed gas cylinder or make a cylinder a part of an electrical circuit. Use an adjustable strap wrench to remove over-tight or rusted caps. For additional precautions in using air see Section 16, Other Information.

STORAGE: Compressed gas cylinders shall be separated from materials and conditions that present exposure hazards to or from each other. Cylinders should be stored upright with valve protection cap in place and firmly secured to prevent falling or being knocked over. Protect cylinders from physical damage; do not drag, roll, slide or drop. Do not allow storage area temperature to exceed 125 °F (52 °C). Full and empty cylinders should be segregated. Use a first-in, first-out inventory system to prevent full containers from being stored for long periods of time.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION**EXPOSURE GUIDELINES:**OSHA PEL-TWA: NoneACGIH TLV: NoneNIOSH IDLH: None**ENGINEERING CONTROLS:****VENTILATION:** None required**PERSONAL PROTECTIVE EQUIPMENT:****EYE/FACE PROTECTION:** Safety glasses are recommended when handling cylinders.**SKIN PROTECTION:** Work gloves are recommended when handling cylinders. If used, gloves must be clean and free of oil and grease. Safety shoes are recommended when handling cylinders.**RESPIRATORY PROTECTION (SPECIFY TYPE):****General Use:** Not required**Emergency Use:** Not required**9. PHYSICAL AND CHEMICAL PROPERTIES****APPEARANCE:** Colorless**ODOR:** Odorless, tasteless at normal temperature and pressure.**ODOR THRESHOLD:** Not applicable**PHYSICAL STATE:** Gaseous**pH:** Not applicable**FREEZING POINT:** -357.2 °F (-216.2 °C) @ 1 atm**BOILING POINT:** -317.8 °F (-194.3 °C) @ 1 atm**FLASH POINT:** Gas, not applicable**EVAPORATION RATE (Butyl Acetate=1):** Gas, not applicable**FLAMMABILITY:** Nonflammable gas**FLAMMABLE LIMITS IN AIR BY VOLUME:****LOWER:** Not applicable**UPPER:** Not applicable**VAPOR PRESSURE (AT 20°C):** Not applicable**GAS DENSITY:** 0.07493 lb/ft³ (1.2 kg/m³) @ 70 °F (21.1 °C) and 1 atm**SPECIFIC GRAVITY (Air =1):** 1.00 @ 70 °F (21.1 °C) and 1 atm**SOLUBILITY IN WATER:** Vol/Vol at 32 °F (0 °C): 0.0292**COEFFICIENT OF WATER/OIL DISTRIBUTION:** Not applicable**AUTOIGNITION:** Not applicable**DECOMPOSITION TEMPERATURE:** Not applicable**MOLECULAR WEIGHT:** 28.975**EXPANSION RATIO:** Not applicable

10. STABILITY AND REACTIVITY

CHEMICAL STABILITY: Stable

CONDITIONS TO AVOID: None

INCOMPATIBLE MATERIALS: None

HAZARDOUS DECOMPOSITION PRODUCTS: None

POSSIBILITY OF HAZARDOUS REACTIONS: Not applicable

11. TOXICOLOGICAL INFORMATION

Air is nontoxic and is necessary to support life. Inhalation of air in high pressure environments can result in symptoms similar to overexposure to oxygen. These include tingling of fingers, impaired coordination, and confusion. Decompression sickness (Bends) is possible following rapid decompression. Decompression equipment may be required if exposed to high pressure environment.

ACUTE DOES EFFECTS:

LD₅₀: None

LC₅₀: None

REPEATED DOSE EFFECTS: None established

IRRITATION]: None **SENSITIZATION:** None

GENETIC EFFECTS: None

REPRODUCTIVE EFFECTS: None

DEVELOPMENTAL EFFECTS: None

TARGET ORGAN EFFECTS: None

[TERATOGENICITY]: None

[MUTAGENICITY]: None

[SYNERGISTIC MATERIALS]: None

12. ECOLOGICAL INFORMATION

ECOTOXICITY: No adverse ecological effects are expected. Air does not contain any Class I or Class II ozone depleting chemicals (40 CFR Part 82). Air is not listed as a marine pollutant by DOT (49 CFR Part 171).

13. DISPOSAL CONSIDERATIONS

WASTE DISPOSAL METHOD: Do not attempt to dispose of residual or unused quantities. Return cylinder to supplier.

For emergency disposal, secure the cylinder and slowly discharge gas to the atmosphere.

14. TRANSPORT INFORMATION

BASIC SHIPPING DESCRIPTION:

PROPER SHIPPING NAME: Air, compressed

HAZARD CLASS: 2.2 (Nonflammable Gas)

IDENTIFICATION NUMBER: UN 1002

[PIN]: 1002

ADDITIONAL INFORMATION:

PRODUCT RQ: Not applicable

SHIPPING LABEL(s): Nonflammable gas

PLACARD (When required): Nonflammable gas

SPECIAL SHIPPING INFORMATION: Cylinders should be transported in a secure position, in a well-ventilated vehicle. The transportation of compressed gas cylinders in automobiles or in closed-body vehicles can present serious safety hazards and should be discouraged.

TRANSPORT CANADA “EMERGENCY RESPONSE ASSISTANCE PLAN”: Not required.

15. REGULATORY INFORMATION

The following information concerns selected regulatory requirements potentially applicable to this product. Not all such requirements are identified. Users of this product are responsible for their own regulatory compliance on a federal, state [provincial], and local level.

U.S. FEDERAL:

EPA—ENVIRONMENTAL PROTECTION AGENCY:

CERCLA: Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (40 CFR Parts 117 and 302):

Reportable Quantity (RQ): None

SARA: Superfund Amendment and Reauthorization Act

SECTION 302/304: Requires emergency planning on threshold planning quantities (TPQ) and release reporting based on reportable quantities (RQ) of EPA's extremely hazardous substances (40 CFR Part 355).

Extremely Hazardous Substances: None

Threshold Planning Quantity (TPQ): None

SECTIONS 311/312: Require submission of material safety data sheets (MSDSs) and chemical inventory reporting with identification of EPA defined hazard classes (40 CFR Part 370). The hazard classes for this product are:

IMMEDIATE:	No	PRESSURE:	Yes
DELAYED:	No	REACTIVITY:	No
		FIRE:	No

SECTION 313: Requires submission of annual reports of release of toxic chemicals that appear in 40 CFR Part 372.

Air does not require reporting under Section 313.

40 CFR PART 68: Risk Management for Chemical Accidental Release. Requires the development and implementation of risk management programs at facilities that manufacture, use, store, or otherwise handle regulated substances in quantities that exceed specified thresholds.

Air is not listed as a regulated substance.

TSCA: Toxic Substance Control Act: Air is listed on the TSCA inventory.

OSHA—OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION:

29 CFR 1910.119: Process Safety Management of Highly Hazardous Chemicals. Requires facilities to develop a process safety management program based on Threshold Quantities (TQ) of highly hazardous chemicals as listed in Appendix A.

Air is not listed in Appendix A as a highly hazardous chemical.

FDA—FOOD AND DRUG ADMINISTRATION:

Air USP is regulated by the FDA as a prescription drug.

CANADA:

Controlled Product Hazard Class A. This MSDS has been prepared in compliance with Controlled Product Regulations.

Canadian Domestic Substance List (DSL): Air is not listed on the DSL inventory.

16. OTHER INFORMATION

SPECIAL PRECAUTIONS: Use piping and equipment adequately designed to withstand pressures to be encountered. Use a check valve or other protective apparatus in any line or piping from the cylinder to prevent reverse flow. Cross contamination of gases, liquids, or both can also create a hazardous condition inside a cylinder, dewar, or vessel (e.g., flammable and oxidizing gases can create an explosive mixture), which may result in rupture.

Shipment of compressed gas cylinders that have not been filled with the owner's consent is a violation of Federal law (49 CFR Part 173.301 (b)).

MIXTURES: When two or more gases or liquefied gases are mixed, their hazardous properties may combine to create additional, unexpected hazards. Obtain and evaluate the safety information for each component before you produce the mixture. Consult an Industrial Hygienist or other trained person when you make your safety evaluation of the end product. Remember, gases and liquids have properties that can cause serious injury or death.

HAZARD RATINGS AND RATING SYSTEMS:

Atmospheric air that is compressed is composed of the following gases:

Nitrogen:	78%
Oxygen	21%
Argon	0.9%

Compressed air is also synthetically produced by mixing 79% nitrogen and 21% oxygen.

NFPA RATINGS:

HEALTH:	= 0
FLAMMABILITY:	= 0
INSTABILITY:	= 0
SPECIAL:	= None

HMIS RATINGS:

HEALTH:	= 0
FLAMMABILITY:	= 0
<u>PHYSICAL HAZARD:</u>	= <u>3</u>

STANDARD VALVE CONNECTIONS FOR U.S. AND CANADA:

THREADED:	0-3000 psig	CGA 346 (CGA 590 (alternate for industrial air))
	3001-5500 psig	CGA 347
	5501-7500 psig	CGA 702
PIN-INDEXED YOKE:	0-3000 psig	CGA 950 (Medical Use)
ULTRA HIGH INTEGRITY:	Not applicable	

Use the proper CGA connections; DO NOT USE ADAPTERS.

Further information about air can be found in the following pamphlets published by:
Compressed Gas Association, Inc. (CGA), 4221 Walney Road, 5th Floor, Chantilly, VA 20151.
Telephone: (703) 788-2700. Website: www.cganet.com

G-7	<i>Compressed Air for Human Respiration</i>
G-7.1	<i>Standard Commodity Specification for Air</i>
P-1	<i>Safe Handling of Compressed Gases in Containers</i>
AV-1	<i>Safe Handling and Storage of Compressed Gases</i>

[PREPARED BY]: Compressed Gas Association
4221 Walney Road, 5th Floor
Chantilly, VA 20151
(703) 788-2700

MATERIAL SAFETY DATA SHEET

1. PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME: Argon, compressed

CHEMICAL NAME: Argon

CHEMICAL FAMILY: Inert gas

FORMULA: Ar

SYNONYMS: Argon

NAME AND ADDRESS:

TELEPHONE: Emergency Phone:

For routine information call:

WEBSITE:

[USE]: Various, inerting, medical, instrumentation

2. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW:

CAUTION! High pressure gas.
Can cause rapid suffocation.
Do not breathe gas.
Self-contained breathing apparatus may be required by rescue workers.

OSHA REGULATORY STATUS: This material is considered hazardous by OSHA's Hazard Communication Standard (29 CFR 1910.1200).

POTENTIAL HEALTH EFFECTS INFORMATION:

ROUTES OF EXPOSURE:

INHALATION: Simple asphyxiant. Nontoxic, but may cause suffocation by displacing the oxygen in air. Exposure to oxygen-deficient atmosphere (<19.5%) may cause dizziness, drowsiness, nausea, vomiting, excess salivation, diminished mental alertness, loss of consciousness and death. Exposure to atmospheres containing 8% to 10% or less oxygen will bring about unconsciousness without warning and so quickly that the individuals cannot help or protect themselves. Lack of sufficient oxygen may cause serious injury or death.

EYE CONTACT: Not applicable

SKIN CONTACT: Not applicable

[SKIN ABSORPTION]: Not applicable

[INGESTION]: Not applicable

CHRONIC EFFECTS: None established

MEDICAL CONDITIONS AGGRAVATED BY OVEREXPOSURE: None

OTHER EFFECTS OF OVEREXPOSURE: None

CARCINOGENICITY: Not listed by NTP, OSHA, or IARC.

POTENTIAL ENVIRONMENTAL EFFECTS: No adverse ecological effects are expected. See Section 12.

3. COMPOSITION/INFORMATION ON INGREDIENTS

INGREDIENT NAME	CAS NUMBER	PERCENTAGE
ARGON	7440-37-1	>99%