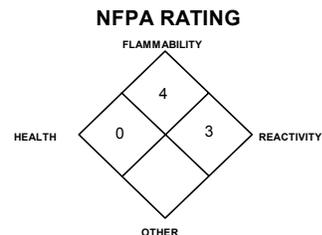




**GAS DISSOLVED IN
ACETONE**



MATERIAL SAFETY DATA SHEET

Prepared to U.S. OSHA, CMA, ANSI and Canadian WHMIS Standards

PART I

What is the material and what do I need to know in an emergency?

1. PRODUCT IDENTIFICATION

CHEMICAL NAME; CLASS:

ACETYLENE - C₂H₂

Document Number: 001001

PRODUCT USE:

For welding, cutting, and general analytical/synthetic chemical uses.

SUPPLIER/MANUFACTURER'S NAME:

AIRGAS INC.

ADDRESS:

259 N. Radnor-Chester Road
Suite 100

Radnor, PA 19087-5283

BUSINESS PHONE:

1-610-687-5253

EMERGENCY PHONE:

1-800-949-7937

International: 423-479-0293 (Call Collect)

DATE OF PREPARATION:

May 20, 1996

REVISION DATE:

September 10, 2003

2. COMPOSITION and INFORMATION ON INGREDIENTS

CHEMICAL NAME	CAS #	mole %	EXPOSURE LIMITS IN AIR					
			ACGIH-TLV		OSHA-PEL		NIOSH IDLH ppm	OTHER ppm
			TWA ppm	STEL ppm	TWA ppm	STEL ppm		
Acetylene	74-86-2	> 99	Acetylene is a simple asphyxiant (SA). Oxygen levels should be maintained above 19.5%.				NIOSH REL: STEL = 2500 (ceiling) Matheson maximum recommended limit for exposure: 5000 ppm	
Maximum Impurities		< 1	None of the trace impurities in this mixture contribute significantly to the hazards associated with the product. All hazard information pertinent to this product has been provided in this Material Safety Data Sheet, per the requirements of the OSHA Hazard Communication Standard (29 CFR 1910.1200) and State equivalent standards.					

NE = Not Established.

See Section 16 for Definitions of Terms Used.

NOTE (1): ALL WHMIS required information is included in appropriate sections based on the ANSI Z400.1-1998 format. This gas has been classified in accordance with the hazard criteria of the CPR and the MSDS contains all the information required by the CPR.

3. HAZARD IDENTIFICATION

EMERGENCY OVERVIEW: Acetylene is a colorless, flammable gas, with a garlic-like odor, that is dissolved in acetone. The main health hazard associated with a release of this gas is asphyxiation by displacement of oxygen. Acetylene gas poses an extreme fire hazard when accidentally released. The gas is lighter than air, and may spread long distances. Distant ignition and flashback are possible. Flame or high temperature impinging on a localized area of the cylinder of this product can cause the cylinder to explode without activating the cylinder's relief devices. Acetylene gas may decompose explosively at elevated temperatures and pressures. Acetylene can form very explosive metallic salts (such as with copper, mercury, and silver). Provide adequate fire protection during emergency response situations.

3. HAZARD IDENTIFICATION (Continued)

SYMPTOMS OF OVEREXPOSURE BY ROUTE OF EXPOSURE:
The most significant route of overexposure for this gas is by inhalation. The following paragraphs describe symptoms of exposure by route of exposure.

INHALATION: At concentration below the LEL of 2.5% (25,000 ppm) this gas is essentially non-toxic. At higher concentrations, Acetylene has anesthetic effects. Symptoms of overexposure to such high concentrations may include drowsiness, dizziness, and a general feeling of weakness. Intentional inhalation of Acetylene has resulted in depressed consciousness, metabolic acidosis, hyperglycemia, ketonuria, and elevated creatinine levels.

High concentrations of this gas can cause an oxygen-deficient environment. Individuals breathing such an atmosphere may experience symptoms which include headaches, ringing in ears, dizziness, drowsiness, unconsciousness, nausea, vomiting, and depression of all the senses. The skin of a victim of overexposure may have a blue color. Under some circumstances of overexposure, death may occur. The following effects associated with various levels of oxygen are as follows:

CONCENTRATION	SYMPTOMS OF EXPOSURE
12-16% Oxygen:	Breathing and pulse rate increased, muscular coordination slightly disturbed.
10-14% Oxygen:	Emotional upset, abnormal fatigue, disturbed respiration.
6-10% Oxygen:	Nausea and vomiting, collapse or loss of consciousness.
Below 6%:	Convulsive movements, possible respiratory collapse, and death.

When administered with oxygen at concentrations of 10% or greater, Acetylene produces varying degrees of temporary narcosis.

OTHER POTENTIAL HEALTH EFFECTS: The gas is generally non-irritating to the skin and eyes. Acetylene is dissolved in acetone. Any skin or eye contact with the acetone component of this product may be slightly irritating to contaminated skin or eyes.

HEALTH EFFECTS OR RISKS FROM EXPOSURE: An Explanation in **Lay Terms**. Overexposure to Acetylene may cause the following health effects:

ACUTE: The most significant hazard associated with Acetylene is inhalation of oxygen-deficient atmospheres. Symptoms of oxygen deficiency include respiratory difficulty, ringing in ears, headaches, shortness of breath, wheezing, headache, dizziness, indigestion, and nausea. At high concentrations, unconsciousness or death may occur.

CHRONIC: Chronic exposure to oxygen-deficient atmospheres (below 18% oxygen in air) may affect the heart and nervous system. Refer to Section 11 (Toxicology Information) for more detailed information.

TARGET ORGANS: ACUTE: Respiratory system, central nervous system. CHRONIC: Skin, heart, central nervous system.

HAZARDOUS MATERIAL IDENTIFICATION SYSTEM			
HEALTH HAZARD		(BLUE)	1
FLAMMABILITY HAZARD		(RED)	4
PHYSICAL HAZARD		(YELLOW)	3
PROTECTIVE EQUIPMENT			
EYES	RESPIRATORY	HANDS	BODY
	See Section 8		See Section 8
For Routine Industrial Use and Handling Applications			

See Section 16 for Definition of Ratings

PART II *What should I do if a hazardous situation occurs?*

4. FIRST-AID MEASURES

RESCUERS SHOULD NOT ATTEMPT TO RETRIEVE VICTIMS OF EXPOSURE TO THIS PRODUCT WITHOUT ADEQUATE PERSONAL PROTECTIVE EQUIPMENT. At a minimum, Self-Contained Breathing Apparatus and Fire-Retardant equipment should be worn. Adequate fire protection must be provided during rescue situations. NOTE: Acetylene releases which have not spontaneously ignited must be considered extremely dangerous, and should not be approached!

Remove victim(s) to fresh air, as quickly as possible. Only trained personnel should administer supplemental oxygen and/or cardio-pulmonary resuscitation, if necessary. Victim(s) must be taken for medical attention. Rescuers should be taken for medical attention, if necessary. Take copy of label and MSDS to physician or other health professional with victim(s).

SKIN EXPOSURE: If the Acetone carrier contaminates the skin, immediately begin decontamination with running water. Minimum flushing is for 15 minutes. Remove exposed or contaminated clothing, taking care not to contaminate eyes. Victim must seek medical attention if irritation persists, or if there are other adverse health effects.

4. FIRST-AID MEASURES (Continued)

EYE EXPOSURE: If this gas contaminates the eyes, immediately begin decontamination with running water, open victim's eyes while under gently running water. Use sufficient force to open eyelids. Have victim "roll" eyes. Minimum flushing is for 15 minutes. Victim must seek medical attention.

THERMAL BURNS: In the event personnel are burned as a result of an Acetylene release, trained personnel should provide first aid treatment. Get medical attention immediately.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: Acute or chronic respiratory conditions may be aggravated by overexposure to Acetylene, due to the presence of the acetone carrier.

RECOMMENDATIONS TO PHYSICIANS: Administer oxygen, if necessary. Treat symptoms and eliminate exposure.

5. FIRE-FIGHTING MEASURES

FLASH POINT (Closed Cup): 0°C (32°F)

AUTOIGNITION TEMPERATURE: 305°C (581°F)

FLAMMABLE LIMITS (in air by volume, %):

Lower (LEL): 2.5%

Upper (UEL): 82%

100% with substantial energy source and under certain conditions of pressure, container size and shape.

FIRE EXTINGUISHING MATERIALS: Extinguish fires of this gas by shutting-off the source of the gas. Use water spray to cool fire-exposed structures and equipment.

UNUSUAL FIRE AND EXPLOSION HAZARDS: When involved in a fire, this material ignites to produce toxic gases including carbon monoxide and carbon dioxide. Acetylene gas is extremely flammable and can readily form explosive mixtures with air over a very wide range. An explosion hazard exists in confined spaces when the gas is released. Pure Acetylene can explode under certain conditions of elevated pressure, temperature and container size. Acetylene reacts with active metals to form explosive acetylide compounds.

DANGER! Fires impinging (direct flame) on the outside surface of cylinders or storage vessels can be very dangerous. Direct flame exposure on the cylinder wall can cause an explosion by exothermic decomposition. The resulting fire and explosion can result in severe equipment damage and personnel injury or death over a large area around the vessel. For massive fires in large areas, use unmanned hose holder or monitor nozzles; if this is not possible, withdraw from area and allow fire to burn.

Explosion Sensitivity to Mechanical Impact: Not Sensitive.

Explosion Sensitivity to Static Discharge: Static discharge may cause this gas to ignite explosively.

SPECIAL FIRE-FIGHTING PROCEDURES: The best fire-fighting technique may be simply to let the burning gas escape from the pressurized cylinder, tank car, or pipeline. Stop the leak before extinguishing fire. If the fire is extinguished before the leak is sealed, the still-leaking gas could explosively re-ignite without warning and cause extensive damage, injury, or fatality. In this case, increase ventilation (in enclosed areas) to prevent flammable or explosive mixture formation. Structural fire-fighters must wear Self-Contained Breathing Apparatus and full protective equipment. Because of the potential for explosive rupture of cylinders of Acetylene, evacuation of non-emergency personnel is essential. Because of possible internal decomposition of Acetylene if cylinders are exposed to heat during a fire, exposed cylinders must be cooled with a water spray for an extended period to prevent possible cylinder rupture. If water is not available for cooling or protection of vessel exposures, evacuate the area. Refer to the North American Emergency Response Guidebook (Guide #116).

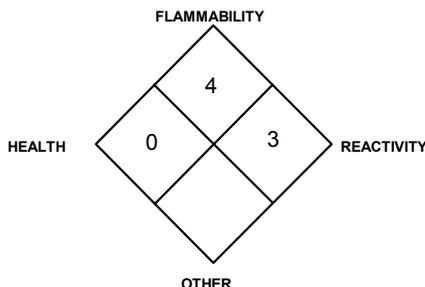
6. ACCIDENTAL RELEASE MEASURES

SPILL AND LEAK RESPONSE: Uncontrolled releases should be responded to by trained personnel using pre-planned procedures. Proper protective equipment should be used. In case of a release, clear the affected area and protect people. Adequate fire protection must be provided. Minimum Personal Protective Equipment should be **Level B: fire-retardant protective clothing, mechanically-resistant gloves and Self-Contained Breathing Apparatus**. Use only non-sparking tools and equipment. Locate and seal the source of the leaking gas. Protect personnel attempting the shut-off with water-spray. Allow the gas to dissipate. Monitor the surrounding area for oxygen and combustible gas levels. Combustible gas concentration must be below 10% of the LEL (LEL = 2.5%) prior to entry of any response personnel. The atmosphere must have at least 19.5 percent oxygen before personnel can be allowed in the area without Self-Contained Breathing Apparatus. Attempt to close the main source valve prior to entering the area. If this does not stop the release (or if it is not possible to reach the valve), allow the gas to release in-place or remove it to a safe area and allow the gas to be released there.

THIS IS AN EXTREMELY FLAMMABLE GAS. Protection of all personnel and the area must be maintained.

GAS DISSOLVED IN ACETONE

NFPA RATING



See Section 16 for
Definition of Ratings

7. HANDLING and STORAGE

WORK PRACTICES AND HYGIENE PRACTICES: As with all chemicals, avoid getting Acetylene IN YOU. Do not eat or drink while handling chemicals. Be aware of any signs of dizziness or fatigue; exposures to fatal concentrations of Acetylene could occur without any significant warning symptoms.

STORAGE AND HANDLING PRACTICES: Cylinders should be stored in dry, well-ventilated areas away from sources of heat. Compressed gases can present significant safety hazards. Store containers away from heavily trafficked areas and emergency exits. Post "No Smoking or Open Flames" signs in storage or use areas. Avoid storage for over six months and keep the smallest amount necessary on-site at any one-time. In the United States, from NFPA 51, cylinders of Acetylene stored inside buildings at the locations of use, must be limited to a total capacity of 2500 ft³ (70m³). In Canada, the limit is for a total capacity of 2160 ft³ (60 m³) in non-sprinklered buildings and 6130 ft³ (170 m³) in building with sprinkler systems. After these quantities are exceeded, a special room must be built for the storage of Acetylene. Consider installation of leak detection and alarm for storage area. Cylinders should be stored upright and be firmly secured to prevent falling or being knocked over. This will prevent acetone from being released from the cylinder. Cylinders can be stored in the open, but in such cases, should be protected against extremes of weather and from the dampness of the ground to prevent rusting.

Use non-sparking ventilation systems, approved explosion-proof equipment, and appropriate electrical systems. Keep the quantity stored as small as possible. Store away from process and production areas, away from elevators, building and room exits or main aisles leading to exits. Keep storage area clear of materials which can burn. Have appropriate extinguishing equipment in the storage area (e.g., sprinkler system, portable fire extinguishers).

It is important to note that Acetylene, in its free state, under pressure, may decompose violently. The higher the pressure, the smaller the initial force necessary to cause a reaction. Therefore, **never use the free gas outside the cylinder at pressures in excess of 15 psig**. If pressures exceeding this limit are utilized, special explosion and fire safety precautions must be implemented.

SPECIAL PRECAUTIONS FOR HANDLING GAS CYLINDERS: Protect cylinders against physical damage. Store in cool, dry, well-ventilated area, away from sources of heat, ignition and direct sunlight. Do not allow area where cylinders are stored to exceed 52°C (125°F). Isolate from halogens and oxidizers such as oxygen, chlorine, or fluorine. Use a check valve or trap in the discharge line to prevent hazardous backflow. Never tamper with pressure relief devices in valves and cylinders. Electrical equipment should be non-sparking or explosion proof. The following rules are applicable to work situations in which cylinders are being used:

Before Use: Move cylinders with a suitable hand-truck. Do not drag, slide or roll cylinders. Do not drop cylinders or permit them to strike each other. Secure cylinders firmly. Leave the valve protection cap (where provided) in-place until cylinder is ready for use.

During Use: Use designated CGA fittings and other support equipment. Do not use adapters. Do not heat cylinder by any means to increase the discharge rate of the product from the cylinder. Use check valve or trap in discharge line to prevent hazardous backflow into the cylinder. Do not use oils or grease on gas-handling fittings or equipment.

After Use: Close main cylinder valve. Valves should be closed tightly, to prevent evaporation of acetone. Replace valve protection cap. Mark empty cylinders "EMPTY".

NOTE: Use only DOT or ASME code containers designed for acetylene storage. Earth-ground and bond all lines and equipment associated with this product. Close valve after each use and when empty. Cylinders must not be recharged except by or with the consent of owner. For additional information refer to the Compressed Gas Association Pamphlet P-1, *Safe Handling of Compressed Gases in Containers*. Additionally, refer to CGA Bulletin SB-2 "Oxygen Deficient Atmospheres" and NFPA Bulletin 58.

For welding and brazing operations, refer to ANSI Z-49.1 "Safety in Welding and Cutting" and OSHA safety regulations for welding, cutting, and brazing (29 CFR 1910.252).

PROTECTIVE PRACTICES DURING MAINTENANCE OF CONTAMINATED EQUIPMENT: Follow practices indicated in Section 6 (Accidental Release Measures). Make certain application equipment is locked and tagged-out safely. Purge gas handling equipment with inert gas (e.g., nitrogen) before attempting repairs.

8. EXPOSURE CONTROLS - PERSONAL PROTECTION

VENTILATION AND ENGINEERING CONTROLS: Use with adequate ventilation to ensure oxygen levels are above 19.5% in the work area. Local exhaust ventilation is preferred, because it prevents Acetylene dispersion into the work place by eliminating it at its source. If appropriate, install automatic monitoring equipment to detect the level of oxygen and the presence of potentially explosive air-gas mixtures.

RESPIRATORY PROTECTION: Maintain oxygen levels above 19.5% in the workplace. If respiratory protection is needed, use only protection authorized in the U.S. Federal OSHA Standard (29 CFR 1910.134), applicable U.S. State regulations, or the Canadian CSA Standard Z94.4-93 and applicable standards of Canadian Provinces. Oxygen levels below 19.5% are considered IDLH by OSHA. In such atmospheres, use of a full-facepiece pressure/demand SCBA or a full facepiece, supplied air respirator with auxiliary self-contained air supply is required under OSHA's Respiratory Protection Standard (1910.134-1998).

8. EXPOSURE CONTROLS - PERSONAL PROTECTION (Continued)

EYE PROTECTION: Splash goggles or safety glasses, for protection from rapidly expanding gases and splashes of the Acetone. If necessary, refer to U.S. OSHA 29 CFR 1910.133, or Canadian Standards.

HAND PROTECTION: Wear mechanically-resistant gloves when handling cylinders of this gas. Wear chemically-resistant gloves when using this gas mixture to avoid exposure to Acetone. Neoprene gloves are recommended. If necessary, refer to U.S. OSHA 29 CFR 1910.138 or appropriate Standards of Canada.

BODY PROTECTION: Use body protection appropriate for task. Fire retardant clothing may be appropriate under some circumstances of use. Cotton clothing is recommended to prevent static build-up and discharge. If a hazard of injury to the feet exists due to falling objects, rolling objects, where objects may pierce the soles of the feet or where employee's feet may be exposed to electrical hazards, use foot protection, as described in U.S. OSHA 29 CFR.

9. PHYSICAL and CHEMICAL PROPERTIES

VAPOR DENSITY (@ 0°C): 1.1716 kg/m³ (0.073 lb/ft³)

SPECIFIC GRAVITY (air = 1): 0.906

SOLUBILITY IN WATER @0°C (32°F) 1 atm: 1.7 vol/vol

EVAPORATION RATE (nBuAc = 1): Not applicable.

ODOR THRESHOLD (Detection): 226 ppm

COEFFICIENT WATER/OIL DISTRIBUTION: Not applicable.

APPEARANCE AND COLOR: Colorless gas with a garlic-like, odor dissolved in acetone.

HOW TO DETECT THIS SUBSTANCE (warning properties): There are no distinct warning properties. In terms of leak detection, fittings and joints can be painted with a soap solution to detect leaks, which will be indicated by a bubble formation.

pH: Not applicable.

FREEZING POINT (@ 10 psig): -84°C (-119°F)

BOILING POINT: -75°C (-103°F)

EXPANSION RATIO: Not applicable.

VAPOR PRESSURE (psig): 635

SPECIFIC VOLUME (ft³/lb): 14.7

10. STABILITY and REACTIVITY

STABILITY: Acetylene is stable at standard temperatures and pressures. Gaseous acetylene may decompose violently at elevated temperatures and pressures. Acetylene must not be used at pressures greater than 15 psig. The higher the pressure, the more likely it is for a reaction to occur.

DECOMPOSITION PRODUCTS: Carbon and hydrogen. When ignited in the presence of oxygen, carbon monoxide and carbon dioxide are formed.

MATERIALS WITH WHICH SUBSTANCE IS INCOMPATIBLE: Mixture with air containing between 3-82% Acetylene is explosive. Contact with bleaching powder may lead to formation of explosive chloroacetylenes. Finely divided cobalt metal decomposes and polymerizes Acetylene on contact, becoming incandescent. Copper metal forms explosive compounds with Acetylene. If warmed in air or oxygen, or on impact, copper acetylides may explode in subsequent contact with Acetylene. Interaction with halogens can be violent or explosive. Contact of Acetylene with concentrated nitric acid in presence of mercury forms explosive trinitromethane or tetranitromethane if sulfuric acid is subsequently added. Mixture with nitric oxide products will ignite at +30-50°C. Mixtures with oxygen are very explosive even at very low oxygen concentrations (< 2.5%). Molten potassium ignites in Acetylene, then explodes. Silver forms explosive compounds with Acetylene. Interaction with trifluoromethyl hypofluorite, in absence of nitrogen as diluent, is explosive on mixing. In addition, Acetylene is incompatible with mercury, mercuric salts, and silver salts, oxidizing materials, chlorine, fluorine. Zinc, hydrides (e.g. sodium hydride, cesium hydride), ozone, perchloric acid and potassium.

HAZARDOUS POLYMERIZATION: Can occur when heated or under pressure.

CONDITIONS TO AVOID: Contact with incompatible materials and exposure to heat, sparks and other sources of ignition. Cylinders exposed to high temperatures or direct flame can rupture or burst. Liquid nitrogen should not be used as a trap, as it may cause acetylene to condense to its liquid or solid state, both of which are explosive.

PART IV *Is there any other useful information about this material?*

11. TOXICOLOGICAL INFORMATION

TOXICITY DATA: The following information is for Acetylene.

TCLo (Inhalation-Human) 20 pph: Behavioral: headache; Lungs, Thorax, or Respiration: dyspnea

LCLo (Inhalation-Human) 50 pph/5 minutes

LCLo (Inhalation-Mammal-Species Unspecified) 50 pph/5 minutes

Other data pertaining to the effects of Acetylene inhalation on humans are as follows:

Concentration

100,000 ppm

200,000 ppm

300,000 ppm

350,000 ppm

Symptom

Intoxication (drowsiness, dizziness, giddiness).

Severe intoxication.

Loss of coordination.

Unconsciousness after 5 minutes of exposure.

Effects on Short-Term Inhalation: Animals have shown tolerance to 10% Acetylene. In studies with dogs, cats, and rabbits, Acetylene acts as an anesthetic at 20% exposure. Recovery occurs if the oxygen level is maintained. In an oxygen-deficient environment, death may occur after 5-10 minutes. Rodents exposed to 25, 50, and 80 percent Acetylene in oxygen for 1-2 hours daily (93 hours total exposure), evidenced no weight change or cellular damage. Mixtures of 80% Acetylene/20% oxygen caused a rise in blood pressure in an exposed cat.

11. TOXICOLOGICAL INFORMATION (Continued)

SUSPECTED CANCER AGENT: Acetylene is not found on the following lists: FEDERAL OSHA Z LIST, NTP, IARC, CAL/OSHA, and therefore is not considered to be, nor suspected to be a cancer-causing agent by these agencies.

IRRITANCY OF PRODUCT: Acetylene is not irritating; however, contact with the acetone component of Acetylene can be slightly irritating to contaminated skin or eyes.

SENSITIZATION TO THE PRODUCT: Acetylene is not known to cause sensitization in humans.

REPRODUCTIVE TOXICITY INFORMATION: Listed below is information concerning the effects Acetylene on the human reproductive system.

Mutagenicity: No mutagenicity effects have been described for Acetylene.

Embryotoxicity: No embryotoxic effects have been described for Acetylene.

Teratogenicity: No teratogenicity effects have been described for Acetylene.

Reproductive Toxicity: No reproductive toxicity effects have been described for Acetylene.

A *mutagen* is a chemical which causes permanent changes to genetic material (DNA) such that the changes will propagate through generation lines. An *embryotoxin* is a chemical which causes damage to a developing embryo (i.e. within the first eight weeks of pregnancy in humans), but the damage does not propagate across generational lines. A *teratogen* is a chemical which causes damage to a developing fetus, but the damage does not propagate across generational lines. A *reproductive toxin* is any substance which interferes in any way with the reproductive process.

BIOLOGICAL EXPOSURE INDICES (BEIs): Currently, Biological Exposure Indices (BEIs) are not applicable for this gas.

12. ECOLOGICAL INFORMATION

ENVIRONMENTAL STABILITY: This gas will be dissipated rapidly in well-ventilated areas. The following environmental data are available for this gas.

ACETYLENE: Water Solubility = 100 vol./100 vol. at 18 EC. Acetylene is not expected to be harmful to aquatic life. Only moderately toxic to fish. Volatility and low solubility suggest it would be rare for water to become critically polluted from accidental releases. Acetylene is biodegraded through various plant and bacterial systems by inactivating atmospheric acetylene through their nitrogen-fixing mechanisms.

EFFECT OF MATERIAL ON PLANTS or ANIMALS: Any adverse effect on animals would be related to oxygen deficient environments and the anesthetic properties of Acetylene at high concentrations of exposure. The following data are available for effects on plant-life:

Sweet pea: declination in seedling: 250 ppm, 3 days

Tomato: Epinasty in petiole: 50 ppm, 2 days.

EFFECT OF CHEMICAL ON AQUATIC LIFE: The following aquatic toxicity data are available for Acetylene.

LC₅₀ (river trout): 33 hours, 200 mg/L

13. DISPOSAL CONSIDERATIONS

PREPARING WASTES FOR DISPOSAL: Product removed from the cylinder must be disposed of in accordance with appropriate U.S. Federal, State, and local regulations or with regulations of Canada and its Provinces. Return cylinders with residual product to Airgas, Inc. Do not dispose of locally.

14. TRANSPORTATION INFORMATION

THIS GAS IS HAZARDOUS AS DEFINED BY 49 CFR 172.101 BY THE U.S. DEPARTMENT OF TRANSPORTATION.

PROPER SHIPPING NAME: Acetylene, dissolved

HAZARD CLASS NUMBER and DESCRIPTION: 2.1 (Flammable Gas)

UN IDENTIFICATION NUMBER: UN 1001

PACKING GROUP: Not Applicable

DOT LABEL(S) REQUIRED: Flammable Gas

NORTH AMERICAN EMERGENCY RESPONSE GUIDEBOOK NUMBER (2000): 116

MARINE POLLUTANT: Acetylene is not classified by the DOT as a Marine Pollutant (as defined by 49 CFR 172.101, Appendix B).

TRANSPORT CANADA TRANSPORTATION OF DANGEROUS GOODS REGULATIONS: Acetylene is considered as Dangerous Goods, per regulations of Transport Canada. The use of the above U.S. DOT information from the U.S. 49 CFR regulations is allowed for shipments that originate in the U.S. For shipments via ground vehicle or rail that originate in Canada, the following information is applicable.

PROPER SHIPPING NAME: Acetylene, dissolved

HAZARD CLASS NUMBER and DESCRIPTION: 2.1 (Flammable Gas)

UN IDENTIFICATION NUMBER: UN 1001

PACKING GROUP: Not Applicable

HAZARD LABEL(S) REQUIRED: Class 2.1 (Flammable Gas)

SPECIAL PROVISIONS: 38, 42

EXPLOSIVE LIMIT & LIMITED QUANTITY INDEX: 0

ERAP INDEX: None

PASSENGER CARRYING SHIP INDEX: 75

PASSENGER CARRYING ROAD OR RAIL VEHICLE INDEX: Forbidden

MARINE POLLUTANT: Acetylene is not listed by Transport Canada as a Marine Pollutant.

15. REGULATORY INFORMATION

ADDITIONAL U.S. REGULATIONS:

U.S. SARA REPORTING REQUIREMENTS: Acetylene is not subject to the reporting requirements of Sections 302, 304, and 313 of Title III of the Superfund Amendments and Reauthorization Act.

U.S. SARA THRESHOLD PLANNING QUANTITY: There are no specific Threshold Planning Quantities for this material. The default Federal MSDS submission and inventory requirement filing threshold of 10,000 lb (4,554 kg) may apply, per 40 CFR 370.20.

U.S. CERCLA REPORTABLE QUANTITY (RQ): Not applicable.

U.S. TSCA INVENTORY STATUS: Acetylene is on the TSCA Inventory.

OTHER U.S. FEDERAL REGULATIONS: Acetylene is subject to the reporting requirements of Section 112(r) of the Clean Air Act, unless used as a fuel. The Threshold Quantity for this gas is 10,000 lb (4554 kg). Depending on specific operations involving the use of Acetylene, the regulations of the Process Safety Management of Highly Hazardous Chemicals may be applicable (29 CFR 1910.119). Under this regulation Acetylene is not listed in Appendix A, however, any process that involves a flammable gas on-site, in one location, in quantities of 10,000 lb (4,554 kg) or greater is covered under this regulation unless it is used as a fuel.

U.S. STATE REGULATORY INFORMATION: Acetylene is covered under specific State regulations, as denoted below:

Alaska - Designated Toxic and Hazardous Substances: Acetylene.

California - Permissible Exposure Limits for Chemical Contaminants: Acetylene.

Florida - Substance List: Acetylene.

Illinois - Toxic Substance List: Acetylene.

Kansas - Section 302/313 List: No.

Massachusetts - Substance List: Acetylene.

Michigan - Critical Materials Register: No.

Minnesota - List of Hazardous Substances: Acetylene.

Missouri - Employer Information/Toxic Substance List: Acetylene.

New Jersey - Right to Know Hazardous Substance List: Acetylene.

North Dakota - List of Hazardous Chemicals, Reportable Quantities: No.

Pennsylvania - Hazardous Substance List: Acetylene.

Rhode Island - Hazardous Substance List: Acetylene.

Texas - Hazardous Substance List: No.

West Virginia - Hazardous Substance List: No.

Wisconsin - Toxic and Hazardous Substances: No.

CALIFORNIA SAFE DRINKING WATER AND TOXIC ENFORCEMENT ACT (PROPOSITION 65): Acetylene is not on the California Proposition 65 lists.

CGA LABELING (For Compressed Gas):

DANGER:

FLAMMABLE GAS UNDER PRESSURE.
CAN FORM EXPLOSIVE MIXTURES WITH AIR.
FUSIBLE PLUGS ON TOP, BOTTOM, OR VALVE MELT AT 212°F (100°C).
DO NOT DISCHARGE AT PRESSURES ABOVE 15 PSIG (103 kPa)

ODOR:

Garlic-like.
Keep away from heat, flames, and sparks.
Store and use with adequate ventilation.
Use equipment rated for cylinder pressure.
Close valve after each use and when empty.
Use in accordance with the Material Safety Data Sheet.
Cylinder contains acetone solvent, which may cause irritation.
DO NOT REMOVE THIS PRODUCT LABEL

NOTE:

ADDITIONAL CANADIAN REGULATIONS:

CANADIAN DSL INVENTORY: Acetylene listed on the DSL Inventory.

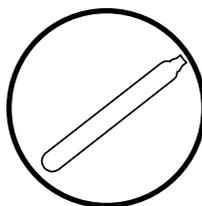
OTHER CANADIAN REGULATIONS: Not applicable.

CANADIAN ENVIRONMENTAL PROTECTION ACT (CEPA) PRIORITIES SUBSTANCES LISTS: Acetylene is not on the CEPA Priorities Substances Lists.

CANADIAN WHMIS SYMBOLS:

Class A: Compressed Gas

Class B1: Flammable Gas



PREPARED BY:

16. OTHER INFORMATION
CHEMICAL SAFETY ASSOCIATES, Inc.
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DEFINITIONS OF TERMS

A large number of abbreviations and acronyms appear on a MSDS. Some of these which are commonly used include the following

CAS #: This is the Chemical Abstract Service Number that uniquely identifies each constituent.

EXPOSURE LIMITS IN AIR:

CEILING LEVEL: The concentration that shall not be exceeded during any part of the working exposure.

LOQ: Limit of Quantitation.

MAK: Federal Republic of Germany Maximum Concentration Values in the workplace.

NE: Not Established. When no exposure guidelines are established, an entry of NE is made for reference.

NIC: Notice of Intended Change.

NIOSH CEILING: The exposure that shall not be exceeded during any part of the workday. If instantaneous monitoring is not feasible, the ceiling shall be assumed as a 15-minute TWA exposure (unless otherwise specified) that shall not be exceeded at any time during a workday.

NIOSH RELs: NIOSH's Recommended Exposure Limits.

PEL-Permissible Exposure Limit: OSHA's Permissible Exposure Limits. This exposure value means exactly the same as a TLV, except that it is enforceable by OSHA. The OSHA Permissible Exposure Limits are based in the 1989 PELs and the June, 1993 Air Contaminants Rule (Federal Register: 58: 35338-35351 and 58: 40191). Both the current PELs and the vacated PELs are indicated. The phrase, "Vacated 1989 PEL," is placed next to the PEL that was vacated by Court Order.

SKIN: Used when there is a danger of cutaneous absorption.

STEL-Short Term Exposure Limit: Short Term Exposure Limit, usually a 15-minute time-weighted average (TWA) exposure that should not be exceeded at any time during a workday, even if the 8-hr TWA is within the TLV-TWA, PEL-TWA or REL-TWA.

TLV-Threshold Limit Value: An airborne concentration of a substance that represents conditions under which it is generally believed that nearly all workers may be repeatedly exposed without adverse effect. The duration must be considered, including the 8-hour.

TWA-Time Weighted Average: Time Weighted Average exposure concentration for a conventional 8-hr (TLV, PEL) or up to a 10-hr (REL) workday and a 40-hr workweek.

IDLH-Immediately Dangerous to Life and Health: This level represents a concentration from which one can escape within 30-minutes without suffering escape-preventing or permanent injury.

HAZARDOUS MATERIALS IDENTIFICATION SYSTEM

HAZARD RATINGS: This rating system was developed by the National Paint and Coating Association and has been adopted by industry to identify the degree of chemical hazards.

HEALTH HAZARD:

0 (Minimal Hazard): No significant health risk, irritation of skin or eyes not anticipated. *Skin Irritation:* Essentially non-irritating. PII or Draize = "0". *Eye Irritation:* Essentially non-irritating, or minimal effects which clear in < 24 hours [e.g. mechanical irritation]. Draize = "0". *Oral Toxicity LD₅₀ Rat:* < 5000 mg/kg. *Dermal Toxicity LD₅₀Rat or Rabbit:* < 2000 mg/kg. *Inhalation Toxicity 4-hrs LC₅₀ Rat:* < 20 mg/L.; **1 (Slight Hazard):** Minor reversible injury may occur; slightly or mildly irritating. *Skin Irritation:* Slightly or mildly irritating. *Eye Irritation:* Slightly or mildly irritating. *Oral Toxicity LD₅₀ Rat:* > 500-5000 mg/kg. *Dermal Toxicity LD₅₀Rat or Rabbit:* > 1000-2000 mg/kg. *Inhalation Toxicity LC₅₀ 4-hrs Rat:* > 2-20 mg/L.; **2 (Moderate Hazard):** Temporary or transitory injury may occur. *Skin Irritation:* Moderately irritating; primary irritant; sensitizer. PII or Draize > 0, < 5. *Eye Irritation:* Moderately to severely irritating and/or corrosive; reversible corneal opacity; corneal involvement or irritation clearing in 8-21 days. Draize > 0, ≤ 25. *Oral Toxicity LD₅₀ Rat:* > 50-500 mg/kg. *Dermal Toxicity LD₅₀Rat or Rabbit:* > 200-1000 mg/kg. *Inhalation Toxicity LC₅₀ 4-hrs Rat:* > 0.5-2 mg/L.;

HAZARDOUS MATERIALS IDENTIFICATION SYSTEM

HAZARD RATINGS (continued):

HEALTH HAZARD (continued):

3 (Serious Hazard): Major injury likely unless prompt action is taken and medical treatment is given; high level of toxicity; corrosive. *Skin Irritation:* Severely irritating and/or corrosive; may destroy dermal tissue, cause skin burns, dermal necrosis. PII or Draize > 5-8 with destruction of tissue. *Eye Irritation:* Corrosive, irreversible destruction of ocular tissue; corneal involvement or irritation persisting for more than 21 days. Draize > 80 with effects irreversible in 21 days. *Oral Toxicity LD₅₀ Rat:* > 1-50 mg/kg. *Dermal Toxicity LD₅₀Rat or Rabbit:* > 20-200 mg/kg. *Inhalation Toxicity LC₅₀ 4-hrs Rat:* > 0.05-0.5 mg/L.); **4 (Severe Hazard):** Life-threatening; major or permanent damage may result from single or repeated exposure. *Skin Irritation:* Not appropriate. Do not rate as a "4", based on skin irritation alone. *Eye Irritation:* Not appropriate. Do not rate as a "4", based on eye irritation alone. *Oral Toxicity LD₅₀ Rat:* ≤ 1 mg/kg. *Dermal Toxicity LD₅₀Rat or Rabbit:* ≤ 20 mg/kg. *Inhalation Toxicity LC₅₀ 4-hrs Rat:* ≤ 0.05 mg/L).

FLAMMABILITY HAZARD:

0 (Minimal Hazard): Materials that will not burn in air when exposure to a temperature of 815.5°C [1500°F] for a period of 5 minutes.; **1 (Slight Hazard):** Materials that must be pre-heated before ignition can occur. Material require considerable pre-heating, under all ambient temperature conditions before ignition and combustion can occur, including: Materials that will burn in air when exposed to a temperature of 815.5°C (1500°F) for a period of 5 minutes or less; Liquids, solids and semisolids having a flash point at or above 93.3°C [200°F] (e.g. OSHA Class IIIB, or; Most ordinary combustible materials [e.g. wood, paper, etc.]; **2 (Moderate Hazard):** Materials that must be moderately heated or exposed to relatively high ambient temperatures before ignition can occur. Materials in this degree would not, under normal conditions, form hazardous atmospheres in air, but under high ambient temperatures or moderate heating may release vapor in sufficient quantities to produce hazardous atmospheres in air, including: Liquids having a flash-point at or above 37.8°C [100°F]; Solid materials in the form of course dusts that may burn rapidly but that generally do not form explosive atmospheres; Solid materials in a fibrous or shredded form that may burn rapidly and create flash fire hazards (e.g. cotton, sisal, hemp; Solids and semisolids that readily give off flammable vapors.); **3 (Serious Hazard):** Liquids and solids that can be ignited under almost all ambient temperature conditions. Materials in this degree produce hazardous atmospheres with air under almost all ambient temperatures, or, unaffected by ambient temperature, are readily ignited under almost all conditions, including: Liquids having a flash point below 22.8°C [73°F] and having a boiling point at or above 38°C [100°F] and below 37.8°C [100°F] [e.g. OSHA Class IB and IC]; Materials that on account of their physical form or environmental conditions can form explosive mixtures with air and are readily dispersed in air [e.g., dusts of combustible solids, mists or droplets of flammable liquids]; Materials that burn extremely rapidly, usually by reason of self-contained oxygen [e.g. dry nitrocellulose and many organic peroxides]; **4 (Severe Hazard):** Materials that will rapidly or completely vaporize at atmospheric pressure and normal ambient temperature or that are readily dispersed in air, and which will burn readily, including: Flammable gases; Flammable cryogenic materials; Any liquid or gaseous material that is liquid while under pressure and has a flash point below 22.8°C [73°F] and a boiling point below 37.8°C [100°F] [e.g. OSHA Class IA; Material that ignite spontaneously when exposed to air at a temperature of 54.4°C [130°F] or below [e.g. pyrophoric].

DEFINITIONS OF TERMS (Continued)

HAZARDOUS MATERIALS IDENTIFICATION SYSTEM HAZARD RATINGS (continued):

PHYSICAL HAZARD:

0 (*Water Reactivity*: Materials that do not react with water. *Organic Peroxides*: Materials that are normally stable, even under fire conditions and will not react with water. *Explosives*: Substances that are Non-Explosive. *Unstable Compressed Gases*: No Rating. *Pyrophorics*: No Rating. *Oxidizers*: No "0" rating allowed. *Unstable Reactives*: Substances that will not polymerize, decompose, condense or self-react.); **1** (*Water Reactivity*: Materials that change or decompose upon exposure to moisture. *Organic Peroxides*: Materials that are normally stable, but can become unstable at high temperatures and pressures. These materials may react with water, but will not release energy. *Explosives*: Division 1.5 & 1.6 substances that are very insensitive explosives or that do not have a mass explosion hazard. *Compressed Gases*: Pressure below OSHA definition. *Pyrophorics*: No Rating. *Oxidizers*: Packaging Group III; Solids: any material that in either concentration tested, exhibits a mean burning time less than or equal to the mean burning time of a 3:7 potassium bromate/cellulose mixture and the criteria for Packing Group I and II are not met. Liquids: any material that exhibits a mean pressure rise time less than or equal to the pressure rise time of a 1:1 nitric acid (65%)/cellulose mixture and the criteria for Packing Group I and II are not met. *Unstable Reactives*: Substances that may decompose, condense or self-react, but only under conditions of high temperature and/or pressure and have little or no potential to cause significant heat generation or explosive hazard. Substances that readily undergo hazardous polymerization in the absence of inhibitors.); **2** (*Water Reactivity*: Materials that may react violently with water. *Organic Peroxides*: Materials that, in themselves, are normally unstable and will readily undergo violent chemical change, but will not detonate. These materials may also react violently with water. *Explosives*: Division 1.4 – Explosive substances where the explosive effect are largely confined to the package and no projection of fragments of appreciable size or range are expected. An external fire must not cause virtually instantaneous explosion of almost the entire contents of the package. *Compressed Gases*: Pressurized and meet OSHA definition but < 514.7 psi absolute at 21.1°C (70°F) [500 psig]. *Pyrophorics*: No Rating. *Oxidizers*: Packaging Group II Solids: any material that, either in concentration tested, exhibits a mean burning time of less than or equal to the mean burning time of a 2:3 potassium bromate/cellulose mixture and the criteria for Packing Group I are not met. Liquids: any material that exhibits a mean pressure rise time less than or equal to the pressure rise of a 1:1 aqueous sodium chlorate solution (40%)/cellulose mixture and the criteria for Packing Group I are not met. *Unstable Reactives*: Substances that may polymerize, decompose, condense, or self-react at ambient temperature and/or pressure, but have a low potential for significant heat generation or explosion. Substances that readily form peroxides upon exposure to air or oxygen at room temperature); **3** (*Water Reactivity*: Materials that may form explosive reactions with water. *Organic Peroxides*: Materials that are capable of detonation or explosive reaction, but require a strong initiating source, or must be heated under confinement before initiation; or materials that react explosively with water. *Explosives*: Division 1.2 – Explosive substances that have a fire hazard and either a minor blast hazard or a minor projection hazard or both, but do not have a mass explosion hazard. *Compressed Gases*: Pressure ≥ 514.7 psi absolute at 21.1°C (70°F) [500 psig]. *Pyrophorics*: No Rating. *Oxidizers*: Packaging Group I Solids: any material that, in either concentration tested, exhibits a mean burning time less than the mean burning time of a 3:2 potassium bromate/cellulose mixture. Liquids: Any material that spontaneously ignites when mixed with cellulose in a 1:1 ratio, or which exhibits a mean pressure rise time less than the pressure rise time of a 1:1 perchloric acid (50%)/cellulose mixture. *Unstable Reactives*: Substances that may polymerize, decompose, condense or self-react at ambient temperature and/or pressure and have a moderate potential to cause significant heat generation or explosion.);

HAZARDOUS MATERIALS IDENTIFICATION SYSTEM HAZARD RATINGS (continued):

PHYSICAL HAZARD (continued):

4 (*Water Reactivity*: Materials that react explosively with water without requiring heat or confinement. *Organic Peroxides*: Materials that are readily capable of detonation or explosive decomposition at normal temperature and pressures. *Explosives*: Division 1.1 & 1.2-explosive substances that have a mass explosion hazard or have a projection hazard. A mass explosion is one that affects almost the entire load instantaneously. *Compressed Gases*: No Rating. *Pyrophorics*: Add to the definition of Flammability "4". *Oxidizers*: No "4" rating. *Unstable Reactives*: Substances that may polymerize, decompose, condense or self-react at ambient temperature and/or pressure and have a high potential to cause significant heat generation or explosion.);

NATIONAL FIRE PROTECTION ASSOCIATION HAZARD RATINGS:

HEALTH HAZARD: **0** (material that on exposure under fire conditions would offer no hazard beyond that of ordinary combustible materials); **1** (materials that on exposure under fire conditions could cause irritation or minor residual injury); **2** (materials that on intense or continued exposure under fire conditions could cause temporary incapacitation or possible residual injury); **3** (materials that can on short exposure could cause serious temporary or residual injury); **4** (materials that under very short exposure could cause death or major residual injury).

FLAMMABILITY HAZARD AND REACTIVITY HAZARD: Refer to definitions for "Hazardous Materials Identification System".

FLAMMABILITY LIMITS IN AIR: Much of the information related to fire and explosion is derived from the National Fire Protection Association (NFPA). Flash Point - Minimum temperature at which a liquid gives off sufficient vapors to form an ignitable mixture with air. Autoignition Temperature: The minimum temperature required to initiate combustion in air with no other source of ignition. LEL - the lowest percent of vapor in air, by volume, that will explode or ignite in the presence of an ignition source. UEL - the highest percent of vapor in air, by volume, that will explode or ignite in the presence of an ignition source.

TOXICOLOGICAL INFORMATION:

Human and Animal Toxicology: Possible health hazards as derived from human data, animal studies, or from the results of studies with similar compounds are presented. Definitions of some terms used in this section are: **LD₅₀** - Lethal Dose (solids & liquids) which kills 50% of the exposed animals; **LC₅₀** - Lethal Concentration (gases) which kills 50% of the exposed animals; **ppm** concentration expressed in parts of material per million parts of air or water; **mg/m³** concentration expressed in weight of substance per volume of air; **mg/kg** quantity of material, by weight, administered to a test subject, based on their body weight in kg. Other measures of toxicity include **TDLo**, the lowest dose to cause a symptom and **TCLo** the lowest concentration to cause a symptom; **TDo**, **LDLo**, and **LDo**, or **TC**, **TCo**, **LCLo**, and **LCo**, the lowest dose (or concentration) to cause lethal or toxic effects. **Cancer Information**: The sources are: **IARC** - the International Agency for Research on Cancer; **NTP** - the National Toxicology Program, **RTECS** - the Registry of Toxic Effects of Chemical Substances, **OSHA** and **CAL/OSHA**. IARC and NTP rate chemicals on a scale of decreasing potential to cause human cancer with rankings from 1 to 4. Subrankings (2A, 2B, etc.) are also used. **Other Information**: **BEI** - ACGIH Biological Exposure Indices, represent the levels of determinants which are most likely to be observed in specimens collected from a healthy worker who has been exposed to chemicals to the same extent as a worker with inhalation exposure to the TLV.

DEFINITIONS OF TERMS (Continued)

ECOLOGICAL INFORMATION:

EC is the effect concentration in water. **BCF** = Bioconcentration Factor, which is used to determine if a substance will concentrate in lifeforms which consume contaminated plant or animal matter. **TL_m** = median threshold limit; Coefficient of Oil/Water Distribution is represented by **log K_{ow}** or **log K_{oc}** and is used to assess a substance's behavior in the environment.

REGULATORY INFORMATION:

U.S. and CANADA:

This section explains the impact of various laws and regulations on the material. **ACGIH**: American Conference of Governmental Industrial Hygienists, a professional association which establishes exposure limits. **EPA** is the U.S. Environmental Protection Agency. **NIOSH** is the National Institute of Occupational Safety and Health, which is the research arm of the U.S. Occupational Safety and Health Administration (**OSHA**). **WHMIS** is the Canadian Workplace Hazardous Materials Information System. **DOT** and **TC** are the U.S. Department of Transportation and the Transport Canada, respectively.

Superfund Amendments and Reauthorization Act (**SARA**); the Canadian Domestic/Non-Domestic Substances List (**DSL/NDL**); the U.S. Toxic Substance Control Act (**TSCA**); Marine Pollutant status according to the **DOT**; the Comprehensive Environmental Response, Compensation, and Liability Act (**CERCLA or Superfund**); and various state regulations. This section also includes information on the precautionary warnings which appear on the material's package label. **OSHA** - U.S. Occupational Safety and Health Administration.