

MATERIAL SAFETY DATA SHEET

PRODUCT NAME: ACETYLENE

1. Product and Company Identification

BOC Gases,
Division of,
The BOC Group, Inc.
575 Mountain Avenue
Murray Hill, NJ 07974

BOC Gases
Division of
BOC Canada Limited
5975 Falbourne Street, Unit 2
Mississauga, Ontario L5R 3W6

TELEPHONE NUMBER: (908) 464-8100
24-HOUR EMERGENCY TELEPHONE NUMBER:
CHEMTREC (800) 424-9300

TELEPHONE NUMBER: (905) 501-1700
24-HOUR EMERGENCY TELEPHONE NUMBER:
(905) 501-0802
EMERGENCY RESPONSE PLAN NO: 2-0101

PRODUCT NAME: ACETYLENE
CHEMICAL NAME: Acetylene
COMMON NAMES/SYNONYMS: Ethyne, Acetylen, Ethine
TDG (Canada) CLASSIFICATION: 2.1
WHMIS CLASSIFICATION: A, B1, F

PREPARED BY: Loss Control (908)464-8100/(905)501-1700
PREPARATION DATE: 6/1/95
REVIEW DATES: 07/16/04

2. Composition, Information on Ingredients**EXPOSURE LIMITS¹:**

INGREDIENT	% VOLUME	PEL-OSHA ²	TLV-ACGIH ³	LD ₅₀ or LC ₅₀ Route/Species
Acetylene FORMULA: C ₂ H ₂ CAS: 74-86-2 RTECS #: AO9600000	95.0 to 99.6	Not Available	Simple Asphyxiant	Not Available
Acetone FORMULA: C ₃ H ₆ O CAS: 67-64-1 RTECS #: AL3150000	Not Available	1000 ppm TWA	500 ppm TWA 750 ppm STEL	LD ₅₀ : 1297 mg/kg ingestion/mouse

¹ Refer to individual state or provincial regulations, as applicable, for limits which may be more stringent than those listed here.

² As stated in 29 CFR 1910, Subpart Z (revised July 1, 1993)

³ As stated in the ACGIH 2004 Threshold Limit Values for Chemical Substances and Physical Agents.

OSHA Regulatory Status: This material is classified as hazardous under OSHA regulations.

3. Hazards Identification**EMERGENCY OVERVIEW**

Flammable colorless gas with slight garlic odor. Dangerous fire and explosion hazard. Avoid heat, sparks and flame. Simple Asphyxiant. This product does not contain oxygen and may cause asphyxia if released in a confined area. Maintain oxygen levels above 19.5%. May cause anesthetic effects. Highly flammable under pressure. Spontaneously combustible in air at pressures above 15 psig. Acetylene liquid is shock sensitive. Contents under pressure. Use and store below 125 °F.

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ROUTE OF ENTRY:

Skin Contact Yes	Skin Absorption No	Eye Contact Yes	Inhalation Yes	Ingestion No
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HEALTH EFFECTS:

Exposure Limits Yes	Irritant Yes	Sensitization No
Teratogen No	Reproductive Hazard No	Mutagen No
Synergistic Effects None Reported		

Carcinogenicity: -- NTP: No IARC: No OSHA: No

EYE EFFECTS: May cause irritation.

SKIN EFFECTS: Skin effects are not likely. Contact with liquid acetylene may cause irritation and dermatitis upon repeated exposures.

INGESTION EFFECTS: Ingestion is unlikely, since acetylene is a gas at room temperature.

INHALATION EFFECTS: Acetylene is an asphyxiant and may cause anesthetic effects at high concentrations. High concentrations may exclude an adequate supply of oxygen to the lungs. Effects of oxygen deficiency resulting from simple asphyxiants may include: rapid breathing, diminished mental alertness, impaired muscular coordination, faulty judgement, depression of all sensations, emotional instability, and fatigue. As asphyxiation progresses, nausea, vomiting, prostration, and loss of consciousness may result, eventually leading to convulsions, coma, and death.

Under normal operating conditions, acetone is not released from the cylinder. However, if the cylinder is overcharged with acetone or acetylene, acetone may occasionally "spit" out. Acetone is primarily an irritant and CNS depressant. High concentrations may have central nervous system effects causing headache, nausea, dizziness, vomiting and fatigue.

Oxygen deficiency during pregnancy has produced developmental abnormalities in humans and experimental animals.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: May aggravate pre-existing skin disorders.

POTENTIAL ENVIRONMENTAL EFFECTS: Not expected to be toxic to fish and wildlife.

4. First Aid Measures

EYES: None normally required. Consult a physician if direct contact with pressurized material occurs. Immediately flush with low pressure, cool water for at least 15 minutes, opening eyelids to ensure flushing. Get medical attention.

SKIN: Contaminated clothing presents a fire hazard and should be immediately removed. Wash affected areas with soap and warm water. If irritation develops, seek medical attention.

INGESTION: None normally required.

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INHALATION: PROMPT MEDICAL ATTENTION IS MANDATORY IN ALL CASES OF OVEREXPOSURE. PERSONNEL SHOULD BE EQUIPPED WITH SELF-CONTAINED BREATHING APPARATUS. Victims should be assisted to an uncontaminated area and inhale fresh air. Quick removal from the contaminated area is most important. If breathing has stopped administer artificial resuscitation and supplemental oxygen. Further treatment should be symptomatic and supportive. Keep victim warm and quiet.

5. Fire Fighting Measures

Conditions of Flammability: Flammable		
Flash point: Not Available	Method: Not Applicable	Autoignition: Temperature: 565°F (296°C)
LEL(%): 2.3	UEL(%): 100	
Hazardous combustion products: Carbon Monoxide, Carbon Dioxide		
Sensitivity to mechanical shock: May decompose		
Sensitivity to static discharge: May ignite		

FIRE AND EXPLOSION HAZARDS: Fire will produce carbon monoxide and carbon dioxide. Pure acetylene can ignite by decomposition above 15 psig; therefore, the UEL is 100% if the ignition source is of sufficient intensity. Pure acetylene is shock sensitive. Cylinder may vent rapidly or rupture violently from pressure when involved in a fire situation.

GASEOUS ACETYLENE IS SPONTANEOUSLY COMBUSTIBLE IN AIR AT PRESSURE ABOVE 15 PSI (207 kPa.). It requires a very low ignition energy so that fires which have been extinguished without stopping the flow of gas can easily reignite with possible explosive force. Acetylene has a density very similar to that of air so when leaking it does not readily dissipate. Gas may travel to a source of ignition and flash back.

Fires involving acetylene occur occasionally at fusible metal pressure relief plugs at the tops and bottoms of cylinders, commonly due to hot metal or slag being dropped on the fusible plugs. When the fusible plug releases a large volume of acetylene will rush out, creating a "roaring" sound. The flame may extend a foot or two away from the cylinder until the pressure is reduced. In some cases, the other end of the cylinder may develop a coating of frost.

EXTINGUISHING MEDIA: Carbon dioxide, dry chemical.

FIRE FIGHTING INSTRUCTIONS: WARNING: ALWAYS EXTINGUISH A FIRE BEFORE CLOSING THE CYLINDER VALVE. If the flame is small from the fusible plug or valve stem, try to put it out. Use non-sparking tools to close container valves. Firefighters should wear respiratory protection (SCBA) and full turnout or Bunker gear. If the fire is allowed to keep burning it is likely that the fusible plug will melt and result in a large release of acetylene. A glove or heavy cloth or any wet material slapped on the flame will frequently extinguish it.

If the flame is large, burning from a fusible plug, DO NOT try to put it out unless the cylinder is outdoors or in a very well ventilated area free from sources of ignition. Usually it is very difficult to extinguish large fires because the escaping acetylene may be reignited by adjacent ignition sources, thereby possibly creating a confined space explosion. Keep containers cool with water spray. Continue to cool fire-exposed cylinders until well after flames are extinguished. Cylinders should not be moved until they have reached ambient temperature in case internal decomposition is taking place. Be cautious of a Boiling Liquid Evaporating Vapor Explosion, BLEVE, if flame is impinging on surrounding containers. Direct 500 GPM water stream onto containers above liquid level with remote monitors. Limit the number of personnel in proximity of fire and evacuate surrounding areas in all directions. Continue to cool fire-exposed cylinders until well after flames are extinguished.

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6. Accidental Release Measures

Extinguish all ignition sources. No smoking, flames, flares, or sparks in hazard area. Evacuate all personnel from affected areas and provide maximum explosion-proof ventilation. Never enter a confined space or other area where the concentration is greater than 10% of the LEL (0.23%). Isolate the area for over 1/2 mile in all directions in the event of leakage of a tank, rail car or tank truck. Use appropriate protective equipment (See Section 8). If leak is in user's equipment, be certain to purge piping with inert gas prior to attempting repairs. If leak is in container or container valve, contact the appropriate emergency telephone number listed in Section 1 or call your closest BOC location.

If possible to do safely, shut off ignition sources and stop the leak by closing the valve. For small leaks, cylinders may be moved to an area outdoors and away from any source of ignition. Circumstances which, it is advisable to attempt removal of the cylinder are when cylinders are in close proximity to other compressed gases, when highly flammable materials or hazardous materials are in the vicinity of the acetylene cylinder(s), or where protection of the building is unusually difficult and spreading of a fire may produce a major loss of life or property. **DO NOT ATTEMPT TO REMOVE CYLINDERS THAT HAVE BEEN EXPOSED TO HEAT.** When the cylinder is removed, it may be hosed down with water to keep it cool. Open valve slowly to let the acetylene escape. Tag the cylinder with "WARNING - Leaking Flammable Gas". Close valve when empty.

7. Handling and Storage

Electrical Classification: Class 1, Group A.

All acetylene piped systems and associated equipment must be grounded. Never use copper piping for acetylene service. Only steel or wrought iron pipe should be used. Open cylinder valve minimum amount required (no more than 1-1.5 turns) to deliver acceptable flow to enable the cylinder to be closed quickly in an emergency situation. Acetylene is shipped in a cylinder packed with a porous mass material, and a liquid solvent, commonly acetone. Acetylene is dissolved in the acetone solution and dispersed throughout the porous medium. When the valve of a charged acetylene cylinder is opened, the acetylene comes out of solution and passes out in the gaseous form. **IT IS CRUCIAL THAT FUSE PLUGS IN THE TOPS AND BOTTOMS OF ALL ACETYLENE CYLINDERS BE THOROUGHLY INSPECTED WHENEVER HANDLED. REMOVE AND QUARANTINE IN A SAFE LOCATION ANY DEFECTIVE CYLINDER.**

Post "NO SMOKING OR OPEN FLAMES" signs in the storage area or use area. There should be no source for accidental ignition in the storage or use area. Never leak check with an open flame. Use only in well-ventilated areas. Stationary customer site vessels should be operated in accordance with the manufacturer's and BOC instructions. Do not attempt to repair, adjust or in any other way modify the operation of these vessels. If there is a malfunction or other type of operations problem with the vessel, contact the closest BOC location immediately for assistance.

Protect cylinders from physical damage. Store in cool, dry, well-ventilated area away from heavily trafficked areas and emergency exits. Outside or detached storage is preferred. **DO NOT** allow the temperature where cylinders are stored to exceed 125°F (52°C). Cylinders should be stored upright and firmly secured to prevent falling or being knocked over. Full and empty cylinders should be segregated. Use a "first in-first out" inventory system to prevent full cylinders from being stored for excessive periods of time.

Valve protection caps must remain in place unless container is secured with valve outlet piping to use point. Close valve after each use and when the container is empty. Do not drag, slide or roll cylinders on their sides.

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Use a suitable hand truck for container movement. Use a pressure reducing regulator when connecting container to piping or systems. Do not use gas directly from container. Do not heat container by any means to increase the discharge rate of product from the container. Never insert an object (i.e.: screwdriver, etc.) into valve cap openings as this can damage the valve causing leakage.

Never attempt to repair or alter cylinders. Never tamper with pressure relief devices or fusible plugs. Under no circumstances allow a torch flame to contact the fusible plug. While welding, avoid contact of the cylinder welding equipment or electrical circuits.

If rough handling or other occurrences should cause any fusible plug to leak, move the cylinder to an open space well away from an possible source of a sign on the cylinder warning of "Leaking Flammable Gas".

Unless oxygen and acetylene are separated, there should be a non-combustible partition of at least 5 ft high with a fire resistance rating of one-half hour between cylinders. In the U.S. cylinders stored inside a building near user locations must be limited to a total capacity of 2500 ft³ of gas, exclusive of in-use or attached for use cylinders.

Do not store cylinders on their side. This makes the acetylene less stable and less safe, and increases the likelihood of solvent loss and resultant decomposition.

For additional information, consult the Compressed Gas Association (CGA) pamphlets P-1, G-1, G-1.1, AV-9, G-1.2, G-1.3, G-1.5, C-13, SB-4, G-1.6, G-1.7, NFPA #51, and OSHA 1910 Subpart H & Q.

8. Exposure Controls, Personal Protection

ENGINEERING CONTROLS:

Use local exhaust and general ventilation systems to prevent build up of flammable concentrations. Small quantities can be handled in forced ventilation hoods. If product is handled routinely where the potential for leaks exists, all electrical equipment must be rated for use in potentially flammable atmospheres. Consult the National Electrical Code for details.

EYE/FACE PROTECTION:

Safety goggles or glasses as appropriate for the job.

SKIN PROTECTION:

Protective gloves as necessary for the job. Gloves with thermal protection should be used for welding.

RESPIRATORY PROTECTION:

For emergency release use a positive pressure NIOSH approved air-supplying respirator systems (SCBA or airline/escape bottle) using at a minimum Grade D air.

OTHER/GENERAL PROTECTION:

Safety shoes. Cotton clothing is recommended to prevent static build-up.

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9. Physical and Chemical Properties

PARAMETER	VALUE	UNITS
Physical state (gas, liquid, solid)	: Gas	
Vapor pressure (@ 70 °F; 21.1 °C)	: 635	psig
Vapor density (Air = 1)	: Not Available	
Evaporation point	: Gas	
Boiling point	: -118.8	°F
	: -83.8	°C
Freezing point	: -113	°F
	: -80.6	°C
PH	: Not Available	
Specific gravity	: 0.906	
Oil/water partition coefficient	: Not Available	
Solubility (H ₂ O)	: Soluble	
Odor threshold	: Not Available	
Odor and appearance	: Colorless; faint ethereal odor when pure. Commercial (carbide) acetylene has a distinctive garlic-like odor	

10. Stability and Reactivity

STABILITY: Unstable - shock sensitive in the liquid state. Do not allow free gas (outside of cylinder) to exceed 15 psig. Do not expose cylinders to sudden shock or heat. Acetylene will decompose violently with cylinder failure.

INCOMPATIBLE MATERIALS/CONDITIONS: Oxygen and other oxidizers including all halogens and halogen compounds. Forms explosive acetylide compounds with copper, mercury, silver, brasses containing >66% copper and brazing materials containing silver or copper. The use of acetylene and these metals, or their salts, compounds, and high concentration alloys should be avoided. Moisture, certain acids and alkaline materials may enhance the formation of copper acetylides. Keep away from heat, sparks, flames, and other ignition sources.

HAZARDOUS DECOMPOSITION PRODUCTS: Acetylene decomposes at high pressure to its constituent elements of carbon and hydrogen. Carbon monoxide and dioxide may be produced from burning.

HAZARDOUS POLYMERIZATION: Temperatures as low as 250°F (121°C) at high pressure, or at low pressure in the presence of a catalyst are sufficient to initiate a polymerization reaction. The hazard here is that the polymerization normally liberates heat and may, therefore, lead to ignition and decomposition of acetylene if conditions permit.

11. Toxicological Information

SKIN AND EYE: Adverse effects are not expected. Repeated contact may cause minor irritation.

INHALATION: High concentrations (10-20% in air) cause symptoms similar to that of being intoxicated. As a narcotic gas or intoxicant, it causes hypercapnia (an excessive amount of carbon dioxide in the blood). Repeated exposures to tolerable levels has not shown deleterious effects. TC_{LO}, human - Inhalation of 20 pph inhaled has been shown to cause headache and dyspnea. Oxygen deficiency during pregnancy has produced developmental abnormalities in humans and experimental animals.

MSDS: G-2

Revised: 07/16/04

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12. Ecological Information

Product does not contain Class I or Class II ozone depleting substances. Not toxic. Will not bioconcentrate.

13. Disposal Considerations

Do not attempt to dispose of residual waste or unused quantities. Return in the shipping container PROPERLY LABELED, WITH ANY VALVE OUTLET PLUGS OR CAPS SECURED AND VALVE PROTECTION CAP IN PLACE to BOC Gases or authorized distributor for proper disposal.

14. Transport Information

PARAMETER	United States DOT	Canada TDG
PROPER SHIPPING NAME:	Acetylene, dissolved	Acetylene, dissolved
HAZARD CLASS:	2.1	2.1
IDENTIFICATION NUMBER:	UN 1001	UN 1001
SHIPPING LABEL:	FLAMMABLE GAS	FLAMMABLE GAS

15. Regulatory Information

SARA TITLE III NOTIFICATIONS AND INFORMATION

SARA TITLE III - SECTION 313 SUPPLIER NOTIFICATION:

This product does not contain toxic chemicals subject to reporting requirements of section 313 of the Emergency Planning and Community Right-To-Know Act (EPCRA) of 1986 and of 40 CFR 372.

SARA TITLE III - HAZARD CLASSES:

Fire Hazard
Sudden Release of Pressure Hazard
Reactivity Hazard

U.S. TSCA/Canadian DSL: All ingredients are listed on the U.S. Toxic Substances Control Act (TSCA) inventory or exempt from listing and on the Canadian Domestic Substance List (DSL).

California Proposition 65: This product does not contain ingredient(s) known to the State of California to cause cancer or reproductive toxicity.

Canadian Controlled Products Regulations (CPR): This product has been classified in accordance with the hazard criteria of the CPR and the MSDS contains all the information required by the CPR.

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16. Other Information

NFPA HAZARD CODES	HMIS HAZARD CODES	RATINGS SYSTEM
Health: 0	Health: 2	0 = No Hazard
Flammability: 4	Flammability: 4	1 = Slight Hazard
Instability: 2	Physical Hazard: 2	2 = Moderate Hazard
		3 = Serious Hazard
		4 = Severe Hazard

Note: Ratings were assigned in accordance with Compressed Gas Association (CGA) guidelines as published in CGA Pamphlet P-19-2004, *CGA Recommended Hazard Ratings for Compressed Gases, 2nd Edition*.

ACGIH	American Conference of Governmental Industrial Hygienists
DOT	Department of Transportation
IARC	International Agency for Research on Cancer
NTP	National Toxicology Program
OSHA	Occupational Safety and Health Administration
PEL	Permissible Exposure Limit
SARA	Superfund Amendments and Reauthorization Act
STEL	Short Term Exposure Limit
TDG	Transportation of Dangerous Goods
TLV	Threshold Limit Value
WHMIS	Workplace Hazardous Materials Information System

Compressed gas cylinders shall not be refilled without the express written permission of the owner. Shipment of a compressed gas cylinder which has not been filled by the owner or with his/her (written) consent is a violation of transportation regulations.

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