



Aceti-Oxígeno, S.A.

FABRICANTES DE GASES PARA USO MÉDICO, ALIMENTICIO E INDUSTRIALES

MATERIAL SAFETY DATA SHEET

(MSDS MATERIAL SAFETY DATA SHEET)

Annex 5

ACETYLENE

1. Product and company identification

1.1	Product name:	Industrial acetylene, dissolved
1.2	Common chemical name:	Acetylene
1.3	IUPAC chemical name:	Ethyne
1.4	Chemical family:	Family of the alkynes (Organic chemistry)
1.5	Condensed formula:	C ₂ H ₂
1.6	Synonyms:	Ethyne, Welding Gas
1.7	Company name:	Aceti-Oxígeno, S.A.
1.8	Company address:	Panama Mañanitas-Industrial Zone
1.9	Telephone:	Tel. 321-8888
1.10	Emergency Telephone:	103 Fire Brigade
1.11	REVISION DATE:	June 20. of 2022, rev. 1, valid until: June 20, 2027
1.12	Use:	In welding. Fuel in special analytical equipment.

2. Composition or information on ingredients

2.1	Ingredient name:	Acetylene
2.2	CAS ^[1] Number:	74-86-2
2.3	Percentage:	> 99%
2.4	OSHA PEL-TWA ^[2] :	None
2.5	ACGIH TLV ^[3] :	Simple Asphyxiant
2.6	[LD ₅₀]:	None
2.7	[LC ₅₀]:	None

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^[1] Chemical Abstracts Service (International Material Identification Number according to the Chemical Abstracts Service)

^[2] Occupational Safety and Health Administration. Permissible Exposure Limits. Time Weighted Average (Occupational Safety and Hygiene Administration. Permissible Exposure Limits. Time weighted average exposure)

^[3] American Conference of Governmental Industrial Hygienists. Threshold Limit Value (North American Conference of Governmental Industrial Public Health. Threshold Limit Value)

3. Risk identification

- 3.1 Considerations and Hazards during Emergencies
 - 3.1.1 Flammable gas under pressure
 - 3.1.2 Can form explosive mixtures with air
 - 3.1.3 The cylinder contains a pressure relief device in the form of a meltable metal or valve that melts between 208 and 220°F (98 and 104°C).
 - 3.1.4 Do not use cylinders at pressures greater than 15 psi (103 kPa)
 - 3.1.5 Garlic-like odor

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Panama, July 28, 2022

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- 3.2 Information on potential health effects
- 3.2.1 Exposure Routes
- 3.2.1.1 Inhalation: Simple asphyxiant. It is important to note that before the suffocation level is reached, the flammability level of acetylene in air may be exceeded causing both explosive and deficient breathing atmospheres. Exposure to moderate concentrations can cause dizziness, headache and unconsciousness. Severe oxygen deficiency can cause serious damage and even death.
- 3.2.1.2 Contact with eyes: No risk
- 3.2.1.3 Skin contact: No risk
- 3.2.1.4 Skin absorption: No risk
- 3.2.1.5 Ingestion: No risk
- 3.2.2 Chronic Effects: Acetylene is a non-toxic gas that does not have dangerous chronic effects even in high concentrations. Acetylene has been used as an anaesthetic.
- 3.2.3 Medical Conditions aggravated by overexposure: None
- 3.2.4 Other effects of overexposure: None
- 3.2.5 Carcinogenicity: Acetylene is not listed by NTP^[4], OSHA, or IARC^[5].

^[4] National Toxicology Program

^[5] International Agency for Research on Cancer

4. First aid

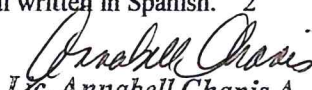
- 4.1 Inhalation: Take the person to a place with fresh air. If there is no breathing, administer artificial respiration. If breathing is difficult, administer oxygen. Get immediate medical attention.
- 4.2 Contact with eyes: No first aid required.
- 4.3 Skin contact: No first aid required.
- 4.4 Ingestion: No first aid required
- 4.5 Remarks to the doctor: None

5. Measures in case of fire

- 5.1 Ignition point: Not applicable because it is a gas.
- 5.2 Auto ignition: 581°F (305°C) at 1 atmospheric pressure
- 5.3 Flammable limits in air, volume by volume:
 - 5.3.1 Lower: 2.5%
 - 5.3.2 Superior: 80.0%
- 5.4 Extinguishing media: Carbon dioxide, dry chemical, water
- 5.5 Special instructions to firefighters: Shut off acetylene source if possible. Extinguish fire only if flow of acetylene from source can be stopped. Keep adjacent cylinders cool by spraying large amounts of water until fire burns itself out and cylinders remain at room temperature. If the flame is extinguished and acetylene continues to escape from its source, an explosive reignition may occur.
- 5.6 Unusual fire and explosion hazards: Fire or excessive heat will cause the fusible metal pressure relief device to melt, allowing acetylene to escape. Cylinders may rupture violently if cylinder walls are exposed to direct fire. The cylinders that have been exposed to fire should not be moved until they have reached room temperature, in case internal decomposition is taking place.
- 5.7 Hazardous combustion products: Carbon Monoxide (incomplete combustion) and Carbon Dioxide (complete combustion).
- 5.8 Sensitivity to static discharge: Ignitable by static electricity.
- 5.9 Sensitivity to mechanical impact: Explosive decomposition may occur.

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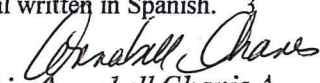
6. Measures in case of accidental release

- 6.1 Steps to be taken if material is released or spilled:
 - 6.1.1 Evacuate the area immediately
 - 6.1.2 Eliminate any possible sources of ignition and provide maximum explosion-proof ventilation.
 - 6.1.3 Close connection to acetylene source if possible.
 - 6.1.4 Isolate any cylinder that is expelling acetylene
 - 6.1.5 If acetylene is being expelled from the cylinder body, valve, or fusible metal pressure relief device, contact the gas supplier immediately. Never enter a confined space or any other area where the acetylene concentration is greater than 0.25%, which represents the 10% lower flammability limit.

7. Handling and storage

- 7.1 Precautions for storage
 - 7.1.1 Store and use with adequate ventilation
 - 7.1.2 Acetylene cylinders must be separated from oxygen cylinders or other oxidizers by a minimum distance of 20 feet (6 meters) or by a barrier of non-combustible material at least 5 feet high (1.52 meters) that have a fire resistance rating of at least half an hour.
 - 7.1.3 Storage of more than 2,500 cubic feet (70 cubic meters) in buildings with other additional occupancy is prohibited.
 - 7.1.4 Cylinders must be stored upright with the valve protection cap in place, properly secured to prevent them from falling or being hit.
 - 7.1.5 Protect cylinders from any physical damage. Do not drag, roll, slide or drop them.
 - 7.1.6 Place "No Smoking" and "Avoid flames or sparks" signs in areas of use or storage.
 - 7.1.7 There should be no sources of ignition in the storage area.
 - 7.1.8 All electrical equipment that must be installed in the storage area must be explosion-proof.
 - 7.1.9 Storage areas must meet the National Electric Codes specifications for Class 1 hazard areas.
 - 7.1.10 Do not allow storage temperature to exceed 125°F (52°C).
 - 7.1.11 Full and empty cylinders must be separated.
 - 7.1.12 Use a FIFO (first-in, first-out) inventory system to prevent full cylinders from being stored for long periods of time.
- 7.2 Precautions to be taken in handling
 - 7.2.1 Use a handcart to move cylinders.
 - 7.2.2 All acetylene piping systems and associated equipment must be grounded.
 - 7.2.3 Any tool that is required to be used must be non-sparking.
 - 7.2.4 Never use copper as material for acetylene piping. Use steel or soft iron pipe.
 - 7.2.5 The valve on an acetylene cylinder should be opened the minimum amount required to obtain acceptable flow so that it can be closed as quickly as possible in an emergency situation.
 - 7.2.6 Do not open the acetylene cylinder valve more than 1 to 1.5 turns.
 - 7.2.7 Do not use acetylene at pressures above 15 psig (pounds square inch gauge).
 - 7.2.8 Take into account that the acetylene cylinder is heavier than other types of cylinders because they additionally contain internally a porous material and acetone.
 - 7.2.9 Check and detect leaks with soapy water, never with a flame.
 - 7.2.10 Never insert an object (tool such as wrench, screwdriver, etc.) into the openings of the valve protection cap, because it can be damaged and generate an acetylene leak.
 - 7.2.11 Do not hit the valve protection cap with a hammer. Use an adjustable strap wrench to remove rusted or overtightened plugs.
 - 7.2.12 Never bring an electric arc near a compressed gas cylinder or make it part of an electrical circuit.
 - 7.2.13 When used in cutting and welding: Read and understand the manufacturer's instructions and the product precautions label. Review the American National Standard Institute (ANSI) Z49.1 Safety in Welding and Cutting published by the American Welding Society AWS, P.O. Box 351040, Miami,

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Florida 33135 and the National Fire Protection Association (NFPA) 51, Oxygen Fuel Gas Welding and Cutting.

7.2.14 For additional precautions in the use of acetylene, see Section 16. Other Information.

8. Exposure control and personal protection

8.1 Infrastructure Controls

8.1.1 Ventilation: Provide adequate natural ventilation or explosion-proof mechanical ventilation to ensure that acetylene will not accumulate and reach its lower flammability limit of 2.5% v/v.

8.2 Respiratory Protection

8.2.1 General routine use: Not required

8.2.2 Use in emergencies: Respirators that supply air are required in oxygen deficient atmospheres or environments (air purifying respirators are not functional in these cases). Before entering the area, the conditions of flammability and oxygen deficiency of the internal atmosphere must be reviewed.

8.3 Protective Gloves: It is recommended to wear work gloves when handling cylinders.

8.4 Eye protection: The use of safety glasses is recommended for handling the cylinders.

8.5 Other protective equipment: The use of safety footwear is recommended for handling cylinders. It is advisable to wear cotton clothing to prevent the accumulation of static electricity.

9. Physical and chemical properties

9.1 Molecular weight: 26.0378 g/mol

9.2 Boiling point: -103.4°F (-75°C) at 10 psig (69 kPa) pressure

9.3 Specific gravity (Air = 1) at 70°F (21.1°C) and 1 atmospheric pressure: 0.906

9.4 Melting point: -116°F (-82.2°C) at 10 psig (69 kPa) pressure.

9.5 Vapor pressure at 70°F (21.1°C): 635 psig

9.6 Gas density at 32°F (0°C) and 1 atmospheric pressure: 0.07314 lb/cf or 1.1716 Kg/m³

9.7 Evaporation rate (Butyl Acetate = 1): Not applicable because it is a gas.

9.8 Solubility in water:

9.8.1 Vol/Vol at 32°F (0°C) and 1 atmospheric pressure: 1.7

9.8.2 Vol/Vol at 60°F (15.6°C) and 1 atmospheric pressure: 1.1

9.9 Expansion ratio: Not applicable

9.10 pH: Not applicable

9.11 Appearance, odor and condition: Colorless gas. 100% pure acetylene is odourless, but the commercial purity obtained by hydration of calcium carbide generates a distinctive garlic-like odor.

9.12 Water/Oil distribution coefficient: Not available

9.13 Odor threshold: 565 ppm v/v

10. Stability and reactivity

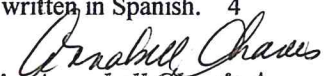
10.1 Stability: unstable. Stable in the form in which it is packaged and transported. Not to be used at pressures above 15 psig (103 kPa).

10.2 Conditions to avoid: Cylinders must not be exposed to sudden mechanical shocks or heat sources.

10.3 Incompatibilities (Materials to avoid): Under certain conditions acetylene reacts with copper, silver and mercury to form acetylides, compounds that can act as sources of ignition. Bronzes containing

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less than 65% copper in the alloy and certain nickel alloys are permitted and available for acetylene service under normal conditions. Acetylene can react explosively when combined with oxygen and other oxidants including all halogens (Fluorine, Chlorine, Bromine and Iodine) and halogenated compounds. The presence of moisture and certain acidic or alkaline materials increase the formation of copper acetylides.

- 10.4 Reactivity:
- 10.4.1 Hazardous decomposition products: Hydrogen, Carbon.
- 10.4.2 Hazardous polymerization products: Will not occur.

11. Toxicological information

- 11.1 General toxicological effect: Simple asphyxiant
- 11.2 Lowest lethal concentration tested in air: 50% inhalation-man/5 minutes
- 11.3 Total lethal concentration tested in air: 33% inhalation-man/7 minutes
- 11.4 Ability to cause irritation: None
- 11.5 Sensitization to material: None
- 11.6 Effects on the reproductive system: None
- 11.7 Teratogenicity: None
- 11.8 Mutagenicity: None
- 11.9 Synergistic Materials: None

12. Ecological information

No adverse or negative ecological impacts are expected. Acetylene does not contain Class I or Class II chemicals, which deplete the ozone layer (40 CFR ^[6] Part 82). Acetylene is not listed as a marine pollutant by DOT ^[7] (49 CFR Part 171).

^[6] Code of Federal Regulations (United States Code of Federal Regulations)

^[7] Department of Transportation of the United States of America

13. Disposal considerations

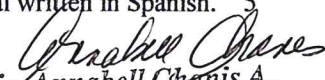
- 13.1 Waste disposal method: Do not attempt to dispose of residual or unused amounts. Return the cylinder to the supplier.
- 13.2 Discarded cylinders must be returned to the supplier for proper and safe disposal.

14. Transport information

- 14.1 DOT/IMO Shipping name: Acetylene, dissolved
- 14.2 Hazard classification: 2.1 (Flammable Gas)
- 14.3 Identification number: UN 1001
- 14.4 Product identification number: 1001
- 14.5 Product reportable quantity: Not applicable
- 14.6 Shipping labels: Flammable gas
- 14.7 Placard: Flammable gas

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14.8 Special Shipping Information: Cylinders must be transported in a secure upright position, in a well-ventilated vehicle. The transport of compressed gases in automobiles or closed body vehicles can present great safety risks and should not be recommended or encouraged.

15. Related regulations

The following information is related to United States regulatory requirements potentially applicable to this product in Panama. Users of this product are responsible for complying with their local or general regulatory requirements.

15.1 United States Federal Regulations

15.1.1 EPA - Environmental Protection Agency

15.1.1.1 CERCLA: Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (40 CFR Parts 117 and 302). Reportable Quantity RQ: Not applicable

15.1.1.2 SARA: Superfund Amendment and Reauthorization Act

Section 302/304: Requires emergency planning based on Threshold Planning Quantities (TPQ) and release reporting based on Reportable Quantities (RQ) of EPA-scheduled substances as extremely hazardous (40 CFR Part 355)

Extremely Hazardous Substance: Not Applicable

Planning Threshold Quantity: Not applicable

Section 311/312: Requires the submission of a Material Safety Data Sheet (MSDS) and a chemical inventory report with identification of the risk classes defined by the EPA (40 CFR Part 370). The hazard classes for this product are:

Immediate:	No
Late:	No
Pressure:	Yes
Reactivity:	Yes
Fire:	Yes

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Section 313: Requires submission of annual toxic chemical release reports listed in 40 CFR Part 372. Acetylene is not required to report under this Section.

15.1.2 40 CFR Part 68: Risk Management for Chemical Accidental Release: Requires the development and implementation of risk management programs in manufacturing facilities, use, storage, or any other Controlled substance handled in amounts exceeding specified thresholds. Acetylene is listed as a regulated substance in quantities equal to or greater than 10,000 lb (4,553 Kg).

15.1.3 TSCA Toxic Substance Control Act: Acetylene is listed on the inventory of controlled products by TSCA.

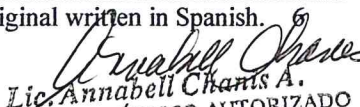
15.2 OSHA Occupational Safety and Health Administration

15.2.1 29 CFR 1910.119: Process Safety Management of Highly Hazardous Chemicals: Requires facilities to develop Process Safety Management based on Threshold Quantities (TQ) of products high-risk chemicals, such as those listed in Appendix A. Acetylene is not listed in Appendix A as a high-risk chemical. In any case, any process that involves a flammable gas on site, in quantities equal to or greater than 10,000 lbs (4,553 Kg) is affected by this regulation unless it is used as a fuel.

16. Additional information

16.1 Special precautions: Use piping and equipment properly designed to withstand working pressures. Use a check valve or other cylinder protection device to prevent and avoid reverse flow.

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Shipping compressed gas cylinders that have been filled without the consent of the cylinder owner is a violation of US federal law [49CFR Part 173.301(b)]. From the point of view of security, the filling of a container or cylinder without the consent of the legitimate owner is considered a specific case of usurpation of ownership quality that exponentially increases the risk of confusion, accidents or incidents related to the operation.

16.2 Mixtures: When two or more gases or liquefied products are mixed, their properties can combine to create additional unexpected hazards. Obtain and evaluate the safety information for each component before manufacturing the mixture. Seek advice from an industrial health worker or other qualified person, when carrying out the safety evaluation of the final product. Remember that gases and liquids have properties that can cause severe harm or death.

16.3 Other data:

16.3.1 NFPA (National Fire Protection Association) valuation

Health 0

Flammability 4

Instability 3

Special None

16.3.2 HMIS (Hazardous Materials Identification Systems) valuation

Health 0

Flammability 4

Reactivity 2

Classification of the chemical substance according to the SGA:

Physical hazards: Flammable gases – Category 1.

Gases under pressure – Dissolved gas.

Health Hazards: N/A.

Environmental Hazards: N/A.

Elements for the communication and signalization of hazards:

Signal word: Danger.

Hazard statements:

H220: Extremely flammable gas.

H280: Contains gas under pressure; may explode if heated.

Precautionary advice:

Prevention:

P210: Keep away from heat/sparks/open flames/hot surfaces.

No Smoking.

Response:

P377: Leak of flammable gas: Do not put out the flames of the flammable gas if it cannot be done without risk.

P381: Eliminate all sources of ignition if it can be done without risk.

Storage:

P410+P403: Protect from sunlight. Store in a well-ventilated place.

Elimination: N/A.

Other hazards:

Can form explosive mixes with the air.

For safety reasons, the acetylene is dissolved in acetone inside the cylinder. The solvent vapor comes out as an impurity when the acetylene is removed from the container. The concentration of the solvent in the gas is negligible to influence the hazard classification of this product.

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Pictogram/ Hazard Symbol



- 16.4 Standard valve connection for the United States and Canada
- 16.4.1 Coiled: CGA 510 standard for cylinders greater than 50 cubic feet. For limited use standard connections see ANSI/CGA document V-1, Compressed Gas Association Standard for Compressed Gas Cylinder Valve Outlet and Inlet Connections. For Panama the standard is CGA 300.
- 16.4.2 Indexed Pin Yoke: Not Applicable
- 16.4.3 Ultra high integrity: Not applicable

Use the proper CGA connection. DO NOT USE ADAPTERS.

More detailed information on acetylene can be found in the following documents published by the Compressed Gas Association Inc. (CGA), 1725 Jefferson Davis Highway, Suite 1004, Arlington, VA 22202-4102. Phone (703) 412-0900:

- G-1.1 Commodity Specifications for Acetylene
- G-1 Acetylene
- P-1 Safe Handling of Compressed Gases in Containers
- SB-4 Handling Acetylene Cylinders in Fire Situations
- SB-8 Use of Oxy-fuel Gas Welding and Cutting Apparatus

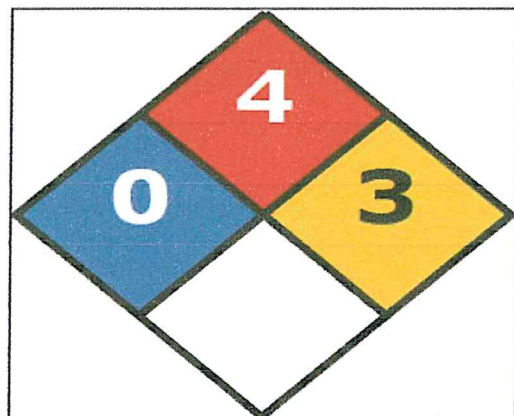
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Conversion Table

ACETYLENE (C ₂ H ₂) 26.038 g/mol P _{F(10.0psi)} = -75.0 °C P _S = -83.3 °C						
UNITS	WEIGHT		GAS VOLUME		LIQUID VOLUME	
	Pounds	Kilograms	SCF Gas	Nm ³ Gas	Liquid gallons	Liquid liters
Pounds	1.000	0.454	14.738	0.387	0.312	1.181
Kilograms	2.205	1.000	32.498	0.854	0.688	2.604
SCF Gas	0.068	0.031	1.000	0.026	0.021	0.080
Nm ³ Gas	2.583	1.172	38.040	1.000	0.806	3.051
Liquid gallons	3.205	1.454	47.200	1.241	1.000	3.785
Liquid liters	0.847	0.384	12.479	0.328	0.264	1.000



COMPATIBILITY OF ACETYLENE WITH OTHER MATERIALS

304 stainless steel	Excellent
316 stainless steel	Excellent
Delrin	Excellent
Aluminum	Excellent
Brass	Good
Bronze	Normal
Buna N	Good
Molten iron	Excellent
Copper	Terrible (Do not use)
Hypalon	Good
Hytrel	Excellent
Low density polyethylene	Terrible (Do not use)
Natural rubber	Good
Nylon	Excellent
Polycarbonate	Terrible (Do not use)
Polyether ether ketone	Excellent
Polypropylene	Excellent
Ryton	Excellent
Teflon	Excellent
PVC	Excellent
Rynar	Excellent
Silicone	Good
Tygon	Excellent
Viton	Excellent

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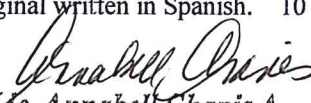
Change control:

Revision 01:

- Added safety color code for NFPA and the global harmonized system.
- The format was modified to the standards and approved by the sister companies Infra and Productos del Aire.

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