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Material Safety Data Sheets Collection:

Sheet No. 457
Ethylene

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Section 1. Material Identification

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Ethylene Description: Prepared by decomposition of petroleum gases or by dehydration of alcohol. Found in ripening fruit and in illuminating gas (up to 4%). Used for oxyethylene welding and cutting metals; to manufacture alcohols, mustard gas, plastics, and many other organics; to accelerate the ripening of various fruits.
Other Designations: Ethene; elayl; olefiant gas; C_2H_4; CAS No. 0074-85-1.
Manufacturer: Contact your supplier or distributor. Consult the latest *Chemicalweek Buyers' Guide* (Genium ref. 73) *for a suppliers list.*

R 1
I -
S -
K 4

NFPA

HMIS
H 1
F 4
R 2
PPG*
* Sec. 8

Section 2. Ingredients and Occupational Exposure Limits

*Ethylene, ca 100%**

OSHA PEL	ACGIH TLV, 1988-89	NIOSH REL	Toxicity Data†
None established	None established	None established	Mammal, inhalation, LC_{Lo}: 950,000 ppm/5 min

* Check with your supplier to determine your purchased ethylene's exact composition.
† See NIOSH. *RTECS* (KU5340000), for additional data.

Section 3. Physical Data

Boiling Point: -152.32 °F (-102.4 °C) at 700 torr
Melting Point: -272 °F (-169 °C)
Vapor Density (Air = 1): 0.978
Molecular Weight: 28 g/mol
Water Solubility: Complete*
Appearance and Odor: A colorless, extremely flammable gas; a sweet odor and taste.

* Soluble in alcohol and ethyl ether.

Section 4. Fire and Explosion Data

Flash Point: -213 °F (-136.11 °C) | **Autoignition Temperature:** 1009 °F (543 °C) | **LEL:** 3% v/v | **UEL:** 34% v/v

Extinguishing Media: Ethylene's extreme flammability, extensive explosibility range, and very low flash point represent dangerous fire and explosion risks. *Treat any fire situation involving rapidly escaping and burning ethylene gas as an emergency.* Ethylene fires can be extinguished by shutting off the source of the gas. Use water sprays to cool fire-exposed containers and to protect the personnel attempting to seal the source of the escaping gas.
Unusual Fire or Explosion Hazards: Ethylene gas is very flammable with an extensive explosibility range. The best fire-fighting technique may be to let the burning gas escape from the pressurized cylinder or tank car. Never extinguish the burning gas without first locating and sealing its source. Otherwise, the gas that continues to leak could explosively re-ignite without warning and cause more damage than if the original fire had been allowed to burn itself out.
Special Fire-fighting Procedures: Wear a self-contained breathing apparatus (SCBA) with a full facepiece operated in the pressure-demand or positive-pressure mode.

Section 5. Reactivity Data

Stability/Polymerization: Ethylene is stable at room temperature during routine operations. Hazardous polymerization cannot occur.
Chemical Incompatibilities: Ethylene can react violently with aluminum chloride, benzoyl peroxide and carbon tetrachloride, bromotrichloromethane, carbon tetrachloride, chlorine, chlorine dioxide, nitrogen dioxide, nitromethane and aluminum chloride, and ozone.
Conditions to Avoid: Never expose ethylene to ignition sources such as open flame, lighted cigarettes or pipes, uninsulated heating elements, or electrical or mechanical sparks. Prevent any accidental or uncontrollably rapid release of ethylene gas from high-pressure cylinders, tank cars, or pipelines. Operations which purposely burn ethylene gas (welding, cutting, or soldering) involve intensely hot, sooty flames.
Hazardous Products of Decomposition: Thermal oxidative degradation of ethylene can produce carbon dioxide (CO_2) and toxic carbon monoxide (CO).

Section 6. Health Hazard Data

Carcinogenicity: Neither the NTP, IARC, nor OSHA lists ethylene as a carcinogen.
Summary of Risks: Although as a simple asphyxiant ethylene causes no significant physiological responses, it can displace the minimum required atmospheric oxygen level. Significant displacement results in an oxygen-deficient atmosphere with no adequate warning properties. Asphyxiation can occur especially in confined, poorly ventilated, undisturbed spaces infrequently entered by workers. Skin contact with liquid ethylene may cause frostbite (cryogenic damage) because of its extremely low temperature. **Medical Conditions Aggravated by Long-Term Exposure:** None reported. **Target Organs:** None reported. **Primary Entry:** Inhalation. **Acute Effects:** The initial symptoms of simple asphyxiant gases's effects are rapid respiration and air hunger, diminished mental alertness, and impaired muscular coordination. Continuing lack of oxygen causes faulty judgement, depression of all sensations, rapid fatigue, emotional instability, nausea, vomiting, prostration, unconsciousness, and finally, convulsions, coma, and death. **Chronic Effects:** None reported.

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Section 6. Health Hazard Data (continued)

FIRST AID

Skin: (Liquid ethylene) Promptly flush the affected area with lots of tepid/lukewarm water to reduce freezing of tissues. Never apply direct heat to the frostbitten areas. Loosely apply dry, sterile, bulky dressings to protect the area from infection and further injury. Get treatment from qualified medical personnel. **Inhalation:** Rescuers need to protect their own safety when entering confined, poorly ventilated, oxygen-deficient areas. Self-contained breathing equipment must be readily available for rescuers. Rescuers must use nonsparking tools and equipment; e.g., floodlights lowered into any incident area must be electrically grounded and bonded, shatter-resistant, and sparkproof.

After first aid, get appropriate in-plant, paramedic, or community medical attention and support. Seek prompt medical assistance for further observation and treatment.

Physicians Note: Ethylene work processes (cutting, welding, soldering, etc.) may present different health hazards such as the generation of toxic carbon monoxide and metal oxide fumes.

Section 7. Spill, Leak, and Disposal Procedures

Spill/Leak: *Design and practice an ethylene spill control and countermeasure plan (SCCP).* When a spill ocurs, notify safety personnel, eliminate heat and ignition sources, evacuate unnecessary personnel, provide maximum explosion-proof ventilation, and implement the SCCP. Use only nonsparking tools and equipment. Locate and seal the source of the leaking gas. Use water sprays to protect the personnel attempting this shut off. Large releeases of ethylene can result in spectacular explosions. If attempts to seal the leaking gas are unsuccessful, consider evacuating the possible exlosion area. **Disposal:** Contact your supplier or a licensed contractor for detailed recommendations. Follow applicable Federal, state, and local regulations. Remove leaking or defective cylinders to a safe, outside, posted, discharge location. Let the ethylene gas discharge at a moderate rate. When it is empty, return the cylinder to the supplier properly tagged, labelled, or stenciled MT (empty) or defective.

OSHA Designations
Air Contaminant (29 CFR 1910.1000, Subpart Z): Not listed

EPA Designations
RCRA Hazardous Waste (40 CFR 261.33): Not listed
CERCLA Hazardous Substance (40 CFR 302.4): Not listed
SARA Extremely Hazardous Substance (40 CFR 355): Not listed
SARA Toxic Chemical (40 CFR 372.65): Not listed

Section 8. Special Protection Data

Goggles: Wear protective eyeglasses or chemical safety goggles, per OSHA eye- and face-protection regulations (29 CFR 1910.133). Where splashing is possible, wear a full face shield. **Gloves:** Workers handling liquid ethylene should wear appropriate insulating gloves, safety glasses, and splash aprons, as required by the particular work conditions, to prevent any skin contact. **Respirator:** Wear a NIOSH-approved respirator if necessary. Follow OSHA respirator regulations (29 CFR 1910.134). For emergency or nonroutine operations (spills or cleaning reactor vessels and storage tanks), wear an SCBA. **Warning:** Air-purifying respirators do *not* protect workers in oxygen-deficient atmospheres; self-contained breathing equipment must be used there. **Other:** Wear gloves, boots, aprons, and gauntlets to prevent prolonged or repeated skin contact. **Ventilation:** Provide general and local, explosion-proof ventilation systems tomaintain airborne concentrations below the 3% v/v (Sec. 4). Local exhaust ventulation is preferred since it prevents contaminant dispersion into the work area by eliminating it at its source (Genium ref. 103). **Safety Stations:** Make available in the work area emergency eyewash stations, safety/quick-drench showers, and washing facilities, fire extinguishers, and oxygen bottles for emergency first aid. **Contaminated Equipment:** Never wear contact lenses in the work area: soft lenses may absorb, and all lenses concentrate, irritants. Launder contaminated clothing before wearing. Remove this material from your shoes and equipment. **Other:** If appropriate, consider installing automatic sensing equipment that warns workers of oxygen-deficient atmospheres or perferably of potentially explosive air-gas mixtures. Design explosion-proof engineering systems for any area that stores, handles, or processes this gas so that they have no spark potential or hot spots. Pressurized systems must use only approved valves, manifolds, flanges, or flame arrestors. **Comments:** Ethylene gas presents dangerous fire, explosion, and reactivity risks. Regularly inspect and service piping systems which transport ethylene gas in production and storage areas.

Section 9. Special Precautions and Comments

Storage Requirements: Store ethylene in closed, pressurized cylinders, tank cars, pipelines, or other containers in a cool, dry, well-ventilated, fireproof area away from heat and ignition sources and incompatible chemicals (Sec. 5). Protect these containers from physical damage and heat. Shield them from form direct sunlight.

Special Handling/Storage: Electrically ground and bond all containers, tanks, cylinders, tank cars, and pipelines used in shipping, receiving, or transferring operations. Never smoke in any work area where there exists the possibility of ethylene gas (fire hazard). Recommended storage containers include steel.

Transportation Data (49 CFR 172.101-2)

DOT Shipping Name: Ethylene
DOT Hazard Class: Flammable gas
DOT ID No. : UN1962
DOT Label: Flammable gas
DOT Packaging Requirements: 49 CFR 173.304
DOT Packaging Exceptions: 49 CFR 173.306

IMO Shipping Name: Ethylene, compressed
IMO Hazard Class: 2.1
IMO Label: Flammable gas

MSDS Collection **References:** 1, 6, 7, 84-94, 100, 116, 117, 119, 120, 122

Prepared by: PJ Igoe, BS; **Industrial Hygiene Review:** DJ Wilson, CIH; **Medical Review:** W Silverman, MD