

Oxygen

Safe Handling Guideline

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URL: <http://www-group.slac.stanford.edu/esh/eshmanual/references/chemsafetyGuideOxygen.pdf>

Synonyms

Pure oxygen, liquid oxygen, LOX, molecular oxygen

Reactivity and Physical Concerns

Substance does not burn but intensely supports combustion; may react explosively with fuels. Oxygen may ignite combustibles (wood, paper, oil, clothing, etc.). Vapors from liquefied gas are initially heavier than air and spread along ground. Runoff may create fire or explosion hazard (liquefied oxygen will react with asphalt). Containers may explode when heated. Ruptured cylinders may rocket. Incompatible with certain metals (e.g., reaction with aluminum powder will produce an explosion). Oxygen is a strong oxidizer and corrosive to metals.

Exposure Hazards

Routes of Exposure

Inhalation, skin contact, eye contact

Vapors may cause dizziness or asphyxiation without warning. Inhalation of 100% oxygen can result in fever, nausea, vomiting, dizziness, and tracheal and pulmonary irritation leading to pulmonary edema and pneumonitis. Intense and potentially fatal pulmonary edema may develop. Acute bronchitis developing several hours later, sinusitis, malaise, transient paresthesias and conjunctivitis may occur. Skin contact with gas or liquefied gas may cause burns, severe injury and/or frostbite. Eye splashes with liquid oxygen may result in burns, severe injury, and/or frostbite.

Chronic Exposure

None

First Aid

Move victim to fresh air. Call 911. Apply artificial respiration if victim is not breathing. Remove and isolate contaminated clothing and shoes. Clothing frozen to the skin should be thawed before being removed. In case of contact with liquefied gas, thaw frosted parts with lukewarm water. Keep victim warm and quiet. Obtain medical attention immediately. (See [Chemical Safety: Accidental Exposure Requirements](#) [SLAC-I-730-0A09S-041].)

Exposure Limits

No exposure limits set by NIOSH or OSHA

Exposure Controls

Engineering Controls

Bulk oxygen supply location must be outside buildings. Gas should be piped to the laboratory at the lowest usable pressure. Store extra oxygen cylinders in well ventilated outdoor locations away from flammable and combustible materials. Oxygen cylinders must be stored at least 20 feet from

all flammable gases or be separated by a noncombustible, fire-resistant barrier with at least a half-hour rating. Permanently installed containers must have substantial noncombustible supports on firm noncombustible foundations. All fittings for oxygen service must be oil and grease free to prevent fire or explosion.

Administrative Controls

Procedures should be developed for the safe use and handling of oxygen in all applications. ESHQ can provide information and guidance. Personnel working with the materials must receive detailed training on the hazards, safe use, and emergency procedures.

Personal Protective Equipment

Safety glasses or goggles are recommended when handling compressed gas cylinders.

Thermal protective gloves should be worn when handling refrigerated/cryogenic liquids.

Disposal

Contact the CMS representative or the chemical lifecycle management program manager for the return of empty or damaged cylinders or dewars to the supplier.

Medical Monitoring (if applicable)

NA

Emergency Response

Remove ignition sources. Do not touch spilled material. Stop leak if possible without personal risk. Ventilate closed spaces before entering.

In the event of a spill that poses a threat to health and/or the environment, immediately evacuate the area and call 911. Then call SLAC Site Security (ext. 5555 or 650-926-5555 from a cell phone) and notify your supervisor.

For other spills, notify your supervisor then SLAC Site Security; these may be cleaned up with appropriate spill response supplies by trained personnel who have been authorized via work planning and control. (See [Spills: Response, Cleanup, and Reporting Procedure](#) [SLAC-I-750-0A16C-006].)

Standards and Regulations

- OSHA. PEL: [29 CFR 1910.1000 Table Z-1](#); Respiratory Protection: [29 CFR 1910.134](#)
- EPA. Release: [40 CFR 355.40](#); Waste: [40 CFR 261.21-261.24](#)
- *California Fire Code*, Chapters 27 through 41 ([24 CCR Part 9](#))

Other References

- Matheson Tri-Gas. [Safe Handling of Compressed Gases in the Laboratory and the Plant](#)
- NFPA 51, "Standard for the Design and Installation of Oxygen-Fuel Gas Systems for Welding, Cutting, and Allied Process" ([NFPA 51](#))
- NFPA 55, "Standard for the Storage, Use, and Handling of Compressed Gases and Cryogenic Fluids in Portable and Stationary Containers, Cylinders, and Tanks" ([NFPA 55](#))