



COMPRESSED GAS ASSOCIATION, INC.

SAFETY BULLETIN

SB-31—2013

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HAZARDS OF OXYGEN IN THE HEALTH CARE ENVIRONMENT

For many applications in the medical field, gaseous and liquid oxygen are used or administered in equipment such as liquid oxygen base and portable units, oxygen concentrators, oxygen tents, incubators, and hyperbaric chambers. To avoid accidents involving oxygen, oxygen-rich mixtures, and oxygen-enriched atmospheres (mixtures or atmospheres containing above 23.5% oxygen), it is important to understand the associated risks. This safety bulletin has been written for the health care professional that may handle these gases and associated equipment.

Although oxygen itself does not burn, it does support and enhance combustion. Some materials that do not normally burn in air, such as the metal in oxygen regulators, or plastic tubing used to supply oxygen, or fire resistant drapes and gowns, can burn in oxygen concentrations higher than in air.

Materials that can be ignited in air require less energy to ignite in the presence of an oxygen-rich gas. Many of these materials can be ignited by different sources of ignition such as friction or expansion when oxygen at high pressure is rapidly introduced into a system that is initially at low pressure. Operating rooms contain many possible sources of ignition such as electrosurgical units and lasers.

For equipment containing or using liquid oxygen there needs to be an additional awareness of its low temperature properties. To avoid accidents involving frostbite and cold burns, always use extreme caution and use appropriate personal protective equipment (PPE) when transferring liquid oxygen between oxygen containers and follow the equipment manufacturers' instructions and [CGA P-2.6, Transfilling of Liquid Oxygen for Respiration](#) [1].

Some general guidelines when using oxygen and oxygen-rich gases follow:

- All equipment coming into contact with the oxygen-rich gas shall be specially cleaned as if it were being used for oxygen service. Either the supplier shall provide properly cleaned equipment for such use or the health care facility shall follow cleaning guidelines provided by the manufacturers of such equipment and be performed by qualified, properly trained personnel in accordance with [CGA G-4.1, Cleaning Equipment for Oxygen Service](#) [2];
- Once equipment is cleaned for oxygen service, it shall be kept clean;
- Do not allow equipment such as valves, regulators, gauges, or fittings to come in contact with oils including skin oils, hand lotions (including alcohol-based hand cleansers), make-up, greases, or lubricants;
- Do not allow equipment that comes in contact with oxygen or oxygen gas to become contaminated with organic materials (e.g., chemicals, drugs, human products, insects, and animal products), dirt, dust, rubber, latex, any combustible substance, or any other equipment not cleaned for oxygen service;
- Use clean plugs, caps, and plastic bags to protect off-duty equipment from contamination;
- Open oxygen valves slowly and completely to lessen the heat produced and to achieve the desired flow conditions within the equipment;
- Qualified personnel should check routinely for proper equipment function. Replace or send for cleaning/repair any contaminated, broken, malfunctioning, or leaking equipment; and
- Ensure personnel using oxygen equipment are adequately trained in its operation. Ensure personnel using oxygen and oxygen-enriched mixtures are familiar with the warnings, cautions, and precautions to be taken as specified on the container labels and labeling, including any provided safety data sheets (SDS). Per-

sonnel shall be knowledgeable in oxygen safety and have knowledge of the manufacturer's instructions, limitations, cautions, and warnings for using such equipment. At a minimum, personnel shall:

- Not allow smoking or flames in the vicinity of oxygen use
- Inform conscious patients of the hazards and do's and don'ts of oxygen use and
- Check for leaks and releases of gaseous or liquid oxygen during its use and transfilling.

This bulletin is intended to give a broad overview of a potentially dangerous situation. For more detailed discussion on the hazards and handling of oxygen-rich gases and atmospheres, see [CGA P-39, Oxygen-Rich Atmospheres](#), or NFPA 53, *Recommended Practice on Materials, Equipment, and Systems Used in Oxygen-Enriched Atmospheres* [3, 4]. Also see [CGA P-2, Characteristics and Safe Handling of Medical Gases](#), [CGA P-2.5, Transfilling of High Pressure Gaseous Oxygen Used for Respiration](#), [CGA P-2.6](#), [CGA P-2.7, Guide for the Safe Storage, Handling, and Use of Small Portable Liquid Oxygen Systems in Health Care Facilities](#) [5, 6, 1, 7].

References

Unless otherwise specified, the latest edition shall apply.

[1] [CGA P-2.6, Transfilling of Liquid Oxygen Used for Respiration](#), Compressed Gas Association, Inc., 14501 George Carter Way, Suite 103, Chantilly, VA 20151. www.cganet.com

[2] [CGA G-4.1, Cleaning Equipment for Oxygen Service](#), Compressed Gas Association, Inc., 14501 George Carter Way, Suite 103, Chantilly, VA 20151. www.cganet.com

[3] [CGA P-39 Oxygen-Rich Atmospheres](#), Compressed Gas Association, Inc., 14501 George Carter Way, Suite 103, Chantilly, VA 20151. www.cganet.com

[4] NFPA 53, *Recommended Practice on Materials, Equipment, and Systems Used in Oxygen-Enriched Atmospheres*, National Fire Protection Association, 1 Batterymarch Park, Quincy, MA 02269. www.nfpa.org

[5] [CGA P-2, Characteristics and Safe Handling of Medical Gases](#), Compressed Gas Association, Inc., 14501 George Carter Way, Suite 103, Chantilly, VA 20151. www.cganet.com

[6] [CGA P-2.5, Transfilling of High Pressure Gaseous Oxygen Used for Respiration](#), Compressed Gas Association, Inc., 14501 George Carter Way, Suite 103, Chantilly, VA 20151. www.cganet.com

[7] [CGA P-2.7, Guide for the Safe Storage, Handling, and Use of Small Portable Liquid Oxygen Systems in Health Care Facilities](#), Compressed Gas Association, Inc., 14501 George Carter Way, Suite 103, Chantilly, VA 20151. www.cganet.com