Coffee Break Training - Fire Protection Series

Hazardous Materials: Finding Oxygen-Enriched Environments

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Learning Objective: *The student will be able to identify locations where oxygen-enriched atmospheres occur.*

Oxygen-enriched environments exist in a variety of places, sometimes where they may not seem obvious. Oxygen enrichment is often the result of leaks from damaged or poorly maintained equipment; leaks from poor connections; opening valves deliberately or accidentally using an excess of oxygen in welding, flame cutting or a similar process; or poor ventilation where oxygen is being used.

This photograph illustrates the interior of a recompression or hyperbaric chamber found in a community hospital. Hyperbaric chambers are vessels in which a high-pressure environment is used primarily to treat decompression sickness, gas embolism, carbon monoxide poisoning, gas gangrene resulting from infection by anaerobic bacteria, tissue injury arising from radiation therapy for cancer, and wounds that are difficult to heal.

The oxygen-rich environment in this recompression or hyperbaric chamber is protected by a high-pressure, water-mist fire protection system.

Air, another breathing mixture, or oxygen is pumped in by a compressor or allowed to enter from pressurized tanks. Pressures used for medical treatment are usually 1.5 to 3 times ordinary atmospheric pressure and can reach concentrations of 100 percent oxygen.

Other locations where oxygen-enriched atmospheres can occur include:

- Anywhere that gas or liquid oxygen is used to aid people with breathing difficulties, including compartments and containers on ambulances.
- Areas used for food preservation and packaging.
- In steelworks and chemical plants.
- Confined spaces, where free oxygen from leaks can accumulate.

Areas where oxygen may enrich the atmosphere should be identified as part of preincident planning or protective inspections. The plan should consider human safety factors, such as training, education and warning signs, and engineering solutions, such as ignition control, fire and explosion suppression, and ventilation equipment to prevent excess accumulations of oxygen.

Additional considerations should be given to controlling high temperatures and pressures in the area, maintaining cleanliness, eliminating particulate matter, and controlling fuel packages in the vicinity of oxygen-enriched spaces.

For more information, take the NFA Online course "Foundational Concepts of Chemistry" (Q0228) at http://www.usfa.fema.gov/nfa/nfaonline/browse/index.shtm.