

TYPES AND HAZARDS OF MEDICAL GASES



In a typical medical facility, there are a variety of gases used for life support, therapy, medical analysis, and mechanical power. These include oxygen, medical air, nitrous oxide, nitrogen, carbon dioxide, blood gas mixtures, helium, and mixtures of these gases. In addition, two vacuum systems are usually present—medical vacuum and waste anesthetic gas disposal (WAGD). The presence of these gas supplies and vacuum systems, combined with the fact that patients may depend on their uninterrupted supply or operation for life support, complicates the fire picture inside any medical facility.

Hazards of Medical Gases

Medical gases can present several specific hazards. The first and most significant hazard is the fact that the supply of one or more of these gases may be the only thing keeping a patient alive or ensuring that a treatment or procedure can be successfully completed.

The second hazard is that some of these gases are oxidizers and others are asphyxiants. Oxygen is the most important of these, as a little pure oxygen will increase the intensity of any fire and cause items that are normally considered noncombustible in air to burn very well indeed. Nitrous oxide has a similar character when heated to disassociation—that is, when the nitrogen and oxygen atoms in the N₂O molecule separate, pure oxygen becomes available and the reaction is exothermic, increasing the temperature. Even when not heated to disassociation, nitrous oxide will act as an asphyxiant. Medical air is simply a purified compressed air and will support fire as well as any air, but it is also under pressure. In contrast, nitrogen, helium, and carbon dioxide will slow or stop a fire but at the price of making an anoxic environment, where there is not enough oxygen for breathing and anyone nearby risks asphyxiation.

The third hazard is that these gases are present in cylinders and containers, which, if subjected to overheating from a fire, will vent their contents and, in extreme circumstances, may explode.

There are also the simple mechanical hazards of having cylinders fall over, possibly complicating evacuation or presenting the risk of knocking off the cylinder valve and creating a high speed torpedo.

The first way to reduce these hazards is to remove cylinders and containers from the occupied space. This is done simply by locating all the sources remotely and piping the gases and vacuum to the bedside. Centrally piped medical gas systems are found in most hospitals and larger medical facilities. Only in small facilities or facilities that do not use medical gases routinely are there likely to be cylinders at the bedside. An example frequently encountered is nursing homes. However, even in the largest and best-equipped hospital, cylinders for specialized gases will be encountered, most notably in laboratories.

Reference:

Allen, Mark. Medical Gases. Fire Protection Handbook 20th Edition. Massachusetts: NFPA. (2008)

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