



Medical gases

The 'Cinderella' gases

Steve Harrison puts the spotlight on the Cinderella gases that so often go unnoticed.

At the mention of medical gases, the first products which usually come to mind are the oxygen used for breathing therapy and the nitrous oxide used for conscious sedation. Granted, these gases are vital and are used extensively in the healthcare arena.

However, there is an essential group of 'Cinderella' specialty medical gases which are less recognised, but no less critical. These gases are supplied less frequently and in smaller quantities, but are just as vital to patient welfare. The tale of these specialty gases reveals that they are actually used every single day at hospitals, laboratories and other organisations servicing the healthcare industry.

The Cinderella specialty medical gases reviewed in this article are those which have a diversity of interesting and critical applications that harness their unique properties – and which are quality-critical.

Test gas mixtures

These gases are not used in a directly therapeutic way as with, for example, inhaled medical oxygen, but rather to understand the status of patient health.

The criteria used in their manufacture also differ from that of therapeutically used medical gases. The same extremely rigorous quality standards apply, but once produced, the content of specialty gases have to be accurately measured to ensure that all components are present and remain at precisely the right levels.

Within this group are the gases used to test or calibrate some of the principal instruments used in hospitals today. The efficient calibration of medical equipment, used either directly or indirectly in the treatment of patients, is imperative.

Blood gas analysers spring to mind. Blood transports oxygen around the body to the vital organs and collects carbon dioxide as a by-product. Blood gas analysis, also called arterial blood gas analysis, is a test which measures the amounts of oxygen and carbon dioxide in the blood, as well as the acidity (pH) of the blood. The equipment used to conduct this test requires frequent calibration in order to continue to give accurate and

reliable readings. Again, the calibration gases required for this purpose are in the Cinderella group of medical gases.

Incubators

Specialty gases and mixtures are also essential for the proper functioning of incubator equipment.

These important medical chambers create controlled environmental conditions with elements such as temperature, humidity and oxygen concentration, for the care of vulnerable infants. Incubators are

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also used to maintain the integrity of body parts and tissue destined for transplants and for growing certain cultures to create an aerobic or anaerobic cell growth environment. This is particularly important when identifying the presence of Methicillin-resistant *Staphylococcus aureus* (MRSA), the bacterium responsible for several difficult-to-treat infections in humans.

In vitro fertilisation (IVF) eggs and embryos are also stored in IVF incubators. These incubators must have very clean and constant environment, with IVF mixtures typically either 5% carbon dioxide in air or 5% carbon dioxide, 5% oxygen in nitrogen.

Anaesthetics

Anaesthetic delivery devices also rely heavily on the Cinderella specialty gases.

During operations carried out under gaseous anaesthesia it is critical to achieve and sustain the right gas mixture to be breathed by the patient. Although pure oxygen is generally used, this is often coupled with nitrous oxide for its pain relieving properties and which lowers the amount of actual anaesthetic used.

In addition to nitrous oxide, among

the most widely used gases in general anaesthesia are desflurane, sevoflurane and isoflurane.

Anaesthesiologists depend on the integrity of these highly sophisticated anaesthetic delivery devices and to be sure of this, these devices require testing and calibration with accurate calibration gas mixtures. Another example, the rare gas xenon, is an excellent anaesthetic medium, because it induces quick and stable anaesthesia and favours neuroprotection.

Sample storage

In the liquid phase, nitrogen is used by the healthcare sector for its properties of extreme cold and consequent ability to store biological samples indefinitely, without risk of degradation, at temperatures as low as -196°C.

This capability also has important implications in the realm of human fertility, where semen and eggs are stored for future use. Harrison says Linde's role is not only to provide liquid nitrogen to customers, but also to operate 'cryopreservation' facilities where samples such as medical evidence (biopsy samples) for litigation cases are stored cryogenically in the UK and the Netherlands.

Linde's BOC Cryobank in the UK, for example, is a state-of-the-art facility dedicated to cryogenic bio-storage of irreplaceable samples.

Read the full article online at www.gasworld.com/????



ABOUT THE AUTHOR

Steve Harrison is The Linde Group's Head of Specialty Gases and Specialty Equipment. Describing the Cinderella gases, he said, "Just like Cinderella in the famous children's story, this group of gases is small, beautiful and largely unnoticed."

"However, they are actually at the heart of specialty medical gas supplies."

* Photo courtesy of Linde/BOC