

Summary

This application note describes how to determine the oxygen content and oxygen volume in packaging.

Background

Manufacturers of medical devices and food products will often use packaging with a reduced oxygen level in the region of the product to minimize oxidation of the product and increase shelf-life. Inert gas, such as nitrogen or argon, may be flushed through the packaging, or vacuum may be pulled on the packaging.



Alternatively, an iron-based oxygen scavenger can be placed in the packaging. The packaging often uses a barrier film to inhibit the diffusion of oxygen through the packaging. This film is often a composite structure of multiple layers of plastics and metals.

Determination of the oxygen level in the packaging is a useful way to determine the efficacy of the packaging process, and to monitor the packaging integrity over time.

Procedure and Results

Oxygen content in packaging is readily determined with commercial oxygen head space analyzers. These systems use solid state zirconium oxide to measure the oxygen in a gas aliquot withdrawn from the packaging. The challenge is in getting the gas from the packaging without contamination from the external environment. We developed a system whereby the packaging is opened in a tank containing degassed water. The packaging is positioned underwater beneath a gas capturing apparatus filled with water prior to opening the packaging. When opened, any retained gas in the packaging is captured by the apparatus, which contains a graduated measuring system to quantify the volume of gas released. A syringe needle is inserted into a septum on top of the apparatus to withdraw the collected gas, which is then measured with an oxygen headspace analyzer. With this technique, oxygen levels can be measured in the parts per million range.

