



## Shelf-life studies of Sealed Packages



### Shelf-life Studies Using the OxySense Non-Invasive Oxygen Measurement System and its Optical Oxygen Analyzers.

The measurement of oxygen ingress into sealed packages is a very important parameter for the Food, Beverage and Pharmaceutical industries.

The oxidation of the packaged product causes many problems such as decrease in shelf life, loss of flavor, discoloration and the effectiveness of the packaged product. Although most of the packages have oxygen barriers, oxygen can permeate into the package via micropores, holes, inconsistent sealing, etc.

There is clearly a need for the measurement of oxygen concentration within a package in the food industry so that leaky packages can be identified and rejected before they are shipped to the consumer.

The development of new packages and the materials used also requires the measurement of their respective oxygen permeation qualities so that a package with the correct properties is used for the right application. Most traditional techniques for measurement of oxygen within a package are invasive and hence result in damaging the package itself and are difficult and time consuming to use.

#### Oxygen -V- Packages

##### Oxygen causes:

- Decrease in Shelf Life
- Loss of Flavor
- Discoloration

##### Oxygen Ingress into Packages

Even with an oxygen barrier oxygen will enter via:

- Micropores (pin holes)
- Holes
- Seal channels
- Permeation





### DIFFICULTIES INVOLVED IN LONG TERM SHELF-LIFE STUDIES

For long-term measurements, such as shelf-life studies over weeks or months, hundreds of packages are required as only one data point per package can be obtained.

### ALL PACKAGES MAY NOT BE THE SAME

This data (from the large number of packages) is then averaged to show the oxygen ingress over the test period. It is assumed that all the packages in the study are the same which may not be the case.

Using traditional technology, it is very difficult and costly to optimize the packaging process to reduce the number of leaking packages being sent to consumers.

The OxySense optical oxygen analyzers use non-invasive oxygen measurement technology to determine oxygen within a package.

### ADVANTAGES OF THIS METHOD

As this technology is nondestructive, oxygen in an individual package can be measured repeatedly over weeks and months.

- Sensor is non-consuming (The action of taking a reading does not consume oxygen)
- Reading obtained is the actual concentration in the individual packages
- By reading the concentration in the same package(s) you are obtaining a true shelf-life result
- The changes in each package can be measured over a long period of time
- Packages can contain product or just be filled with modified atmosphere
- Reduces the number of packages used for the study
- One instrument can be used in an unlimited number of packages or studies

### EQUIPMENT REQUIRED:

- OxyDot (O<sup>2</sup>xyDot®)
- OxySense oxygen analyzer 5250i or OxySense oxygen analyzer 325i

### METHOD:

- Attach OxyDots to the inside wall of each test package
- Fill the packages with product and/or modified atmosphere
- Seal Packages

### MEASUREMENT SETUP:

- To make measurements, align the fibre optic pen with the OxyDot (from the outside of the package) making sure that the tip of the pen is almost making contact with the package
- Press the capture button to obtain a reading of the oxy concentration within the package. The oxygen concentration can be measured repeatedly in the same package over a time
- Record the result using the logging function in the software
- Repeat as required over the length of the study



OxySense 5250i



OxySense 325i

OxySense  
**An Industrial Physics Product Integrity Brand**  
 68 Barnum Road, Devens, MA 01434. USA  
 Phone: (978) 772-0970  
 Website: [oxysense.com](http://oxysense.com)  
 Email: [PiSales@industrialphysics.com](mailto:PiSales@industrialphysics.com)

