

## **Application Note:**

# **Shelf-life Studies Using OxySense Non-Invasive Oxygen Measurement Instrumentation**

### **Introduction**

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 micro-pores, 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.

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. 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 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 instruments use non-invasive oxygen measurement technology to determine oxygen within a package. As this technology is non-destructive oxygen in an individual package can be measured repeatedly over weeks and months. These instruments can be used with unlimited number of packages to determine the oxygen permeation in them. The oxygen concentration measured in the packages represents actual conditions for the packages on the shelf. The change in the oxygen concentration in the individual packages can be measured over time. These packages can be empty (just filled with modified atmosphere) or filled with product. Hence true shelf-life studies can be performed as the oxygen concentration in the same package can be measured repeatedly over time. This method reduces the number of packages used for shelf-life studies and provides data that represents what is truly happening when the packages are left on the shelf.

## Oxygen Measurements using the OxySense Instruments

### Equipment required:

OxyDots and an OxySense Instrument 4000B or 210T

### Method:

- Attach OxyDots to the inside wall of each test package
  - Fill the packages with product and/or modified atmosphere
- The packages are now ready for measurements

### Measurement Setup:

- To make measurements align the fiber 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.
- Adjust the signal level on the OxySense software by using the up/down arrows (bottom left corner) so that the green bar is at the 0 level.
- Then press the capture button to obtain the oxygen concentration in the package. The oxygen concentration can be measured repeatedly in the same package over time.