

Scientific Paper:

Polymer Testing 63 (2017), 126 - 132

Comparison of test methods for oxygen permeability: Optical method versus carrier gas method

Kajetan Müller^{a,b}, Zuzana Scheuerer^a, Veronika Florian^a, Tina Skutschik^a, Sven Sänglerlaub^{a,c}

^aFraunhofer Institute for Process Engineering and Packaging IWV, Freising, Germany

^bUniversity of Applied Science Kempten, Kempten Germany

^cTechnical University of Munich, TUM School of Life Sciences Weihenstephan, Chair of Food Packaging Technology, Freising, Germany

Abstract:

The oxygen permeability of films is relevant for packaging related and technical applications. An increasingly used test method for the measurement of oxygen permeability is the optical test method, because it allows a simple and cost-efficient measurement setup. This method is based on optical chemical sensors. However, not much is known about its validity. Therefore, method validation is necessary which is subject of this study. The optical method is compared with the carrier gas method for a variety of film samples. In the tested permeability range of $0.5 - 2500 \text{ cm}^3 \text{ (STP)} \cdot (\text{m}^2 \text{ d bar})^{-1}$ both methods deviated less than 20 % for zero and 50 % relative humidity.

Keywords: oxygen permeation, permeation cell, optical sensor, optical chemical sensor, dynamic accumulation method, ISO 15105-2, DIN 53380-3, ASTM D3985