

Oxygen Transmission Rate

Oxygen transmission rates were tested using an Oxtran 2/21 made by Modern Controls Inc. (MOCON). The tests were performed in accordance with ASTM D 3985-02 and F 1927-98e1. Prior to testing the sample, a reference material with known transmission rate was tested to verify that the instrument was working properly. The testing conditions consist of: nitrogen stream plus two percent hydrogen which is routed through the inner half of the test cell. Oxygen is supplied into the outer half. Oxygen permeates the test material and is picked up by the nitrogen gas plus two percent hydrogen (carrier gas) flowing through the inner half.

The amount of oxygen carried by the carrier gas is measured using a coulox sensor, to determine the oxygen transmission rate. The temperature and relative humidity of the test conditions were 23°C and 0% RH respectively. The samples were conditioned for four hours prior to testing. The testing was performed until 10 values of constant transmission rate (small fluctuation without upward/downward pattern) were obtained. The final transmission rate was calculated by averaging the last ten constant values for duplicate samples. These results are shown in Table 2.

Table 2. Oxygen Transmission rate results @ 23°C and 0% relative humidity

Sample	Thickness, mil	OTR Cc/(m ² .day)	Permeability KG.m / m ² .s.Pa)
PET 20	18	9.44 ± 0.06	6.95E-19 ± 1.90E-
OPS 19	18	531.58 ± 0.67	3.91E-17 ± 8.72E-
OPLA 1.00E-19	20	56.33 ± 0.12	4.33E-18 ±

In terms of barrier properties, PET shows the highest Oxygen Barrier followed by OPLA. OPS showed very poor Oxygen Barrier.