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Data Article

Transport, mechanical and global migration data of multilayer copolyamide nanocomposite films with different layouts

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ABSTRACT

Transport, mechanical and global migration data concern multilayer food packaging films with different layouts, all incorporating a layered silicate/polyamide nanocomposite as oxygen barrier layer, and a low-density polyethylene (LDPE) as moisture resistant layer in direct contact with food. The data are related to "Tuning of co-extrusion processing conditions and film layout to optimize the performances of PA/PE multilayer nanocomposite films for food packaging" by Garofalo et al. (2017) [1]. Nanocomposite multilayer films, with different relative layer thicknesses and clay types, were produced using a laboratory scale co-extrusion blown-film equipment and were analyzed in terms of transport to oxygen and water vapor, mechanical properties and overall migration. The results have shown that all the multilayer hybrid films, based on the copolyamide layer filled with Cloisite 30B, displayed the most significant oxygen barrier improvements and the best mechanical properties compared to the unfilled films. No significant alteration of the overall migration values was observed, as expectable [2–4]. The performance improvement was more relevant in the case of the film with the thinner nanocomposite layer.

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Specifications Table

Subject area	*Engineering*
More specific subject area	*Material Technology*
Type of data	Supplementary material
How data was acquired	*GPC-D Gas Permeability Tester (Brugger, Germany), Water Vapor Permeation Analyzer Model 7002 (Systech Illinois, UK) and CMT4000 SANS Series dynamometer (by MTS, China).*
Data format	*Excel 2010*
Experimental factors	*Nanocomposite multilayer packaging films with different layer composition and relative layer thicknesses were produced using a laboratory scale co-extrusion blown-film equipment. The multilayer films incorporate a polyamide/clay nanocomposite layer, acting as oxygen barrier, and a low-density polyethylene layer, acting as moisture barrier, coupled together by an adhesive tie-layer. The polyamide/clay nanocomposite layer was composed of a copolyamide 6,66 (CS40LXW, Radici Groups) melt compounded with two different commercial organomodified layered silicates, Cloisite 30B or Dellite 43B, at 4 wt% loading.*
Experimental features	*The performances of the nanocomposite multilayer films were related to the system layout.*
Data source location	*Department of Industrial Engineering, University of Salerno, Fisciano (SA), Italy*
Data accessibility	*Data are available with this article*

Value of the data

- In the literature few experimental data on transport and mechanical properties of multilayer nanocomposite films are available.
- The experimental data demonstrate the key role of the multilayer film layout in the film performances.
- The data allow to identify film configurations able to maximize O_2 and water vapor barrier and stiffness.
- The provided data can be used as input properties for validation or calibration of analytical models.

1. Data

Experimental details are described in Ref. [1]. The data presented here are related to three-layer films (PA/tie/PE) with different layouts and composition, as specified in Table 1. In these data, the effects of relative layer thickness and clay type on transport and mechanical properties of the films were investigated.

The oxygen transmission rates (OTR) of the neat and nanocomposite multilayer structures with different film layouts are reported in the Excel file denoted as “oxygen permeability data”.

With respect to the corresponding unfilled systems produced, all the C30B and D43B-based nanocomposite multilayer films show a significant decrease in their OTR values, i.e. a significant increment of their oxygen barrier properties, ranging in the 50–60% interval. Moreover, in the case of the unfilled systems, the OTR values increase with decreasing the thickness of the oxygen barrier PA layer and with increasing the film stretching conditions from type S1 to type S3 structure. Instead, for the hybrid multilayer films the OTR values remain essentially unchanged passing from type S1 to type S2 structures and increase passing from type S2 to S3 structures.

The water vapor transmission rates (WVTR) of the multilayer films as a function of film layout are reported in the Excel file denoted as “water vapor permeability data”. The WVTR values resulted on

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