Accepted Manuscript

Rheological behaviour of cork-polymer composites for injection moulding

Sara P. Magalhães da Silva, Paulo Silva Lima, José Martinho Oliveira

PII: S1359-8368(15)00748-9

DOI: 10.1016/j.compositesb.2015.12.015

Reference: JCOMB 3935

To appear in: *Composites Part B*

Received Date: 17 April 2015

Accepted Date: 1 December 2015

Please cite this article as: Magalhães da Silva SP, Lima PS, Oliveira JM, Rheological behaviour of cork-polymer composites for injection moulding, *Composites Part B* (2016), doi: 10.1016/j.compositesb.2015.12.015.

Rheological behaviour of cork-polymer composites for injection moulding

Sara P. Magalhães da Silva[1*], Paulo Silva Lima[1], José Martinho Oliveira[1,2]

[1] School of Design, Management and Production Technologies, University of Aveiro, Estrada do Cercal, nº449, 3720-509 Santiago de Riba-Ul, Oliveira de Azeméis, Portugal
[2] Centre for Research in Ceramic and Composite Materials (CICECO), University of Aveiro, Campus Universitário de Santiago, 3810-193 Aveiro, Portugal
[*]corresponding author: sarapms@ua.pt

Abstract

The incorporation of cork in synthetic polymers has become an effective approach to develop new sustainable materials. Cork-polypropylene composites (CPC) filled with three different cork granulometries were studied. Rheological analyses were performed to assess the processability of these CPC and a set of experiments was conducted keeping the same matrix/cork weight ratio, varying the cork granulometric distribution. The effect of three different cork granulometries, temperature and the effect of a coupling agent, polypropylene graft maleic anhydride (PPgMA), were analysed. All composites exhibited non-Newtonian, pseudoplastic behaviour. Related to neat PP, cork incorporation led to a viscosity increase. This increase is more significant in the CPC with the lowest powder cork granulometry used. On the other side, the addition of PPgMA resulted on a decrease of CPC viscosity. The experimental results were fitted to Cross-WLF Model through a viscosity master curve obtained by the time-temperature superposition principle (TTSP). This study showed that cork can be considered on the development of sustainable materials for injection moulding technology.

Keywords

A. Polymer-matrix composites (PMCs)

A. Thermoplastic resin

B. Rheological properties

E. Injection moulding