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EFFECT OF TEMPERATURE AND CONCENTRATION OF WOOD SAWDUST ON THE RHEOLOGICAL PROPRIETY OF WOOD-PLASTIC COMPOSITE

M. TAZI [1], F. ERCHIQUI [1], F. GODARD[1], A.KADDAMI[2]

1 Université du Québec en Abitibi-Témiscamingue, Département des sciences appliquées, Rouyn-Noranda (QC), Canada and 2 Université Cadi Ayyad, Laboratoire de chimie bio-organique et macromoléculaire, Faculté de sciences et techniques – Guéliz, Morroco.

The main objective of this work, one hand is to study the influence of temperature on the rheological and thermo-physical properties of a composite formed by high density polyethylene (HDPE) reinforced with sawdust. Elaboration of these composites is made with an internal mixer. Six mass concentrations of sawdust have been studied (0, 20, 30, 40, 50 and 60%) mixed with (3%) of coupling agent (maleic anhydride grafted polyethylene, PE-g-MA). The addition of sawdust in the polymer matrix is found to modify significantly the viscoelastic behavior of polymer / wood composite: the dynamic viscosity, the storage and loss modulus are found to increase with the sawdust concentration. In addition, results shown that the rheological properties depend strongly on temperature. The time-temperature superposition was used to construct master curves for each concentration. To do so, we have normalized the dynamic viscosity and shear rate by a slipping factor. The magnitude of this factor is found to depend strongly on temperature and follows the Arrhenius law. The master curves fit well with Cross's model. So, we can construct universal models that can predict the behavior of the composites over a wide range of frequencies and temperature. The results of thermal characterization of composites made with the DSC have shown that the heat capacity (Cp) is a decreasing function of sawdust content; this behavior is in good agreement with mixture rule