EFFECTS OF TETRAETHYL ORTHOSILICATE INTRODUCING ON THE RHEOLOGICAL PROPERTIES OF CELULOSE ACETATE SOLUTION

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Abstract

The rheological behavior of cellulose acetate (CA)/tetraethyl orthosilicate (TEOS) solution in N,N-dimetilacetamida (DMAc) has been investigated as a function of TEOS content for different shear rates and temperatures. The shear-thinning behavior or so called "pseudoplastic" behavior of the CA pure solution may be caused, on the one hand, by the destruction of the polymer chains as the shear rate increases, and on the other hand, by the increasing of the chains orientation in the flow direction during the rotational measurements. Also, for CA/TEOS blend solutions the curves shape varies from one content to another, a decrease in viscosity as the content of TEOS increases being observed. This tendency, of viscosity decreasing, is mainly due to the formation of hydrogen bonds between -OH groups and Si-OH, characteristic to TEOS, which means that increase in TEOS content tends to form a stable gel network. Furthermore, as temperature increases the viscosity varies irregularly, this being a consequence of the conformational transitions occurring in the system.

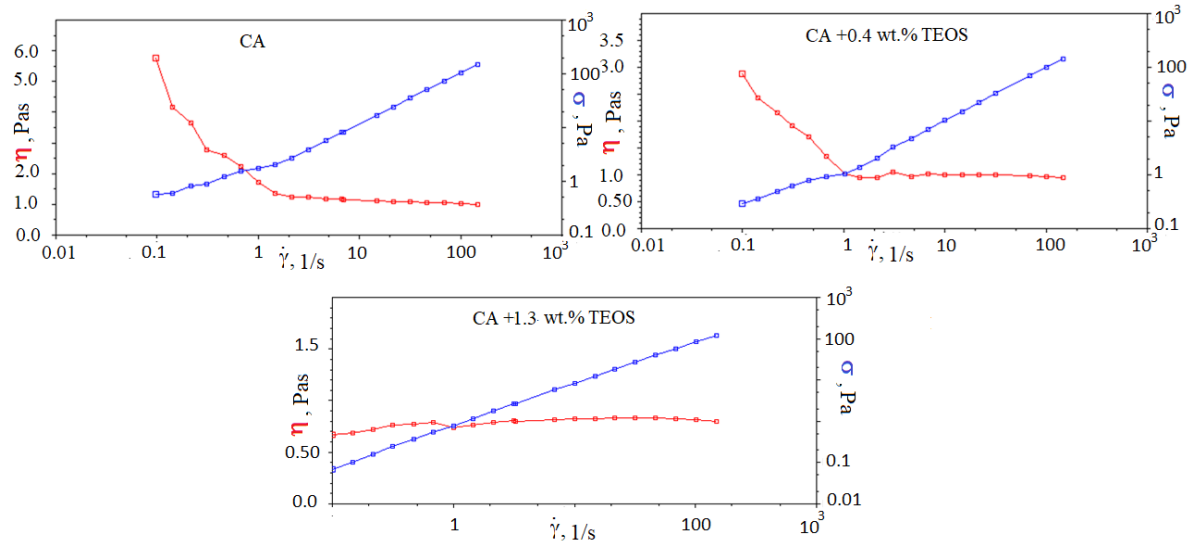

Figure 1. Plots of dynamic viscosity *versus* shear rate for CA/TEOS solutions at different content of TEOS.

The incorporation of TEOS in CA solution was described from rheological point view with the aim to produce chemically and mechanically resistant hybrid films with highly degree of dispersed metal particles. Consequently, the present study represents the basis for obtaining hybrid membranes with specific properties, which will find application both in industrial and bioengineering field.