IMPROVING THE PERFORMANCE OF THE POLYSULFONE MEMBRANES INDUCED BY THE PRESENCE OF IONIC LIQUIDS: RHEOLOGICAL INVESTIGATIONS

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Abstract

The various environmental problems of air or water pollution recently are trying to be solved by membrane technology. For this reason, finding the right compounds to obtain reverse osmosis, nanofiltration, and ultrafiltration membrane with improved properties is always a challenge for the researchers. In this context, the polysulfones containing quaternary ammonium side groups (PSFQ) are considered to be suitable for a wide range of applications from environmental field as result of their specific properties, such as hydrophylicity, flexibility and film forming capability. However, experience in the operation of polysulfonic membrane shows that there are some problems caused by membrane fouling. Thus, the aim is to improve their performance by mixing them with ionic liquids. In the obtaining process of ionic liquids-based membranes these could act as carrier of the final product which leads to the increasing of the membrane functionality and selectivity. For the present study two types of ionic liquids were chosen to be mixed in various rations (0.03 – 0.25wt.) with PSFQ: trihexyltetradecylphosphonium chloride (Cyphos) (ILp) and methyltrialkylammonium chloride, Aliquat 336 (ILq). The flow behavior of these mixtures was analyzed by rheology, in order to obtain information concerning the flexibility, conformation and also, to identify the specific interactions (Figure 1). Based on these parameters were established the compatibility of compounds and implicitly, the optimal composition of the used ionic liquids, aspects which will allow the obtaining of membranes suitable for treatment or water purification.

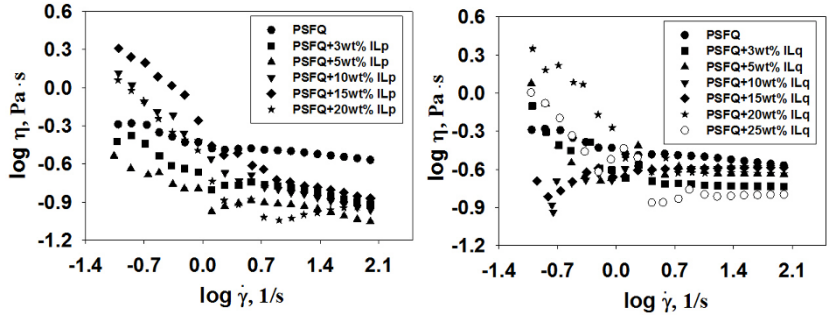

Figure 1. Log–log plots of dynamic viscosity *vs.* shear rate for PSFQ/ILp and PSFQ/ILq at different mixing ratio

As is observed from Figure 1, the two ionic liquids act like as plasticizers, manifesting a thinning behavior, visualized by a decrease of the dynamic viscosity of blends compared with pure solution of PSFQ. The obtained results are useful in identifying of the most suitable mixing ratio of PSFQ/ILp and PSFQ/ILq blends that will have an impact on membranes obtaining with the performance required by water purification technology.

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