ABSTRACT

Ionomeric polyblends, based on (a) zinc salt of maleated EPDM rubber and zinc salt of maleated HDPE, (b) zinc salt of maleated EPDM rubber and zinc salt of poy(ethylene-co-acrylic acid), (c) zinc salt of maleated EPDM rubber and zinc salt of maleated polypropylene, (d) zinc salt of carboxylated nitrile rubber and zinc salt of maleated HDPE, and (e) zinc salt of carboxylated nitrile rubber and zinc salt of poly(ethylene-co-methacrylic acid), were prepared in the compositions ranging from 90/10 to 50/50, parts by weight, by melt blending. The ionomeric polyblends behave as thermoplastic elastomers with synergism in tensile strength, tear strength, hardness and storage modulus in the composition range studied. The synergism in physical properties of the ionomeric polyblends is believed to be due to the presence of interfacial ionic interactions, which enhance the compatibility by improving the interfacial adhesion between the polymer components in the blends. The ionomeric polyblends show superior physical properties and better solvent and oil resistance than the corresponding non-ionomeric polyblends. Dynamic mechanical thermal analyses reveal the existence of ionic clusters in the neat ionomers and the ionomeric polyblends, which show a high temperature transition owing to the relaxation of the polymer chains of restricted mobility in the ionic cluster region. The processability studies show that the ionomeric polyblends exhibit higher melt viscosity than the corresponding non-ionomeric polyblends. The addition of a polar plasticizer like zinc stearate into the ionomeric polyblends, based on zinc salt of maleated EPDM rubber, decreases their melt viscosity and enable the melt processability. However, at ambient temperature, zinc stearate plays the role of a reinforcing filler and thereby enhances the tensile strength of the ionomeric polyblends. Infrared spectroscopy was used to study the formation of metal carboxylate groups, due to the neutralization of the carboxylic acid groups present in the polymers, and the intermolecular interactions in the ionomeric polyblends. The morphology of the ionomeric polyblends was studied by using a scanning electron microscope. The reprocessability studies of the ionomeric polyblends indicate that these blends are reprocessable like thermoplastics without deterioration in properties.

Key words: zinc salt of maleated EPDM rubber; zinc salt of maleated HDPE; zinc salt of poy(ethylene-co-acrylic acid); zinc salt of maleated polypropylene; zinc salt of carboxylated nitrile rubber; zinc salt of poly(ethylene-co-methacrylic acid); ionomers; ionomeric polyblends; synergism in properties; reprocessability; thermoplastic elastomers.