

ABSTRACT

Most of the polymers, which are very much in use in day-to-day life, as such are brittle in nature and are having poor mechanical properties like toughness, elongation to fracture etc. Among them the most important polymer is poly(vinyl chloride) (PVC).

PVC itself is a rigid polymer. In commercial practice, it is either blended with a semi compatible rubbery impact modifiers to make a tough rigid plastic, or with a compatible liquid low molecular weight plasticizer to make a soft flexible plastics.

In this study, the impact modification of PVC by semi-compatible rubbery impact modifiers has been chosen. The rubbery polymer ethylene-propylene-diene rubber (EPDM) being highly weather and environment resistant has been taken as the base polymer to make impact modifiers for PVC. The systems studied are as follows:

- (i) EPDM-gp-(styrene-co-acrylonitrile)
- (ii) EPDM-gp-(styrene-co-ethylacrylate)
- (iii) EPDM-gp-ethylacrylate.

The above systems are chosen in view of the fact that acrylic grafts onto rubbery backbone systems are expected to be good impact modifiers for PVC, i.e., they improve impact strength without major sacrifice of rigidity, tensile strength etc. by means of dispersion of semi-compatible microscopic rubbery domains throughout the rigid PVC matrix.

All the three systems mentioned above have been synthesized by solution precipitation polymerization method. Then these graft copolymers are characterized for its graft efficiency and for the nature of the graft by means of chemical methods like IR, NMR etc.

The above EPDM graft blends were melt mixed with PVC using Brabender Plasticorder starting from 0 wt% to 20 wt% of EPDM graft blends. Then these blends has been made into sheet form by using hot compression method with the use of two-roll rubber mill and hydraulic press. Then the samples were cut according to ASTM standards and the mechanical properties like Tensile strength, Impact strength and Flexural modulus were carried out. Also the thermal characterization and morphology of the systems are carried out for knowing the compatibilities of the systems by means of DSC and SEM methods.

It was observed that in all the systems studied, the mechanical properties, particularly impact strength, were improved over that of the unmodified PVC. Also the compatibilities of the systems were improved over that of the PVC/EPDM polyblend system.