

Miscible transparent polymethylmethacrylate/cellulose acetate propionate blend: optical, morphological, and thermomechanical properties

ABSTRACT

To obtain a high transmittance blend within ultraviolet and visible regions, various transparent samples of ascending percentages of polymethylmethacrylate (PMMA)/cellulose acetate propionate (CAP) were prepared by melt blending using a twin screw extruder. These blends were characterised by ultraviolet-visible spectroscopy, and the curves illustrated that the blending ratio of 10% CAP in PMMA meets the required purpose. The morphological, mechanical, and thermal properties for pure PMMA and the PMMA/CAP 10% blend were investigated using X-ray diffraction, scanning electron microscopy, dynamic mechanical analysis, and thermogravimetric analysis. The results showed that the PMMA/CAP 10% blend has an amorphous structure and low stiffness than pure PMMA. The miscible PMMA/CAP 10% blend exhibited mechanical stability below the glass transition temperature (T_g), with a slight increase in T_g value relative to that of pure PMMA. The study also demonstrated that the intermolecular interaction between blend elements has an effective influence on the physical properties of the blend.

Keyword: Cellulose acetate propionate; Poly (methylmethacrylate); Miscible; Ultraviolet; Blend