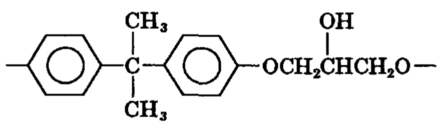
NOTE

Phase Behavior of PMMA–Phenoxy Blends

The polyhydroxy ether of bisphenol-A



has been reported to form miscible blends with both aliphatic[1,2] and aromatic[3,4] polyesters and with polyethers[5] having the ether unit in the main chain and as a pendant group. There is strong evidence for exothermic interaction with the aliphatic polyesters based on direct calorimetric measurements of heats of mixing for low molecular weight liquids with analogous structures.[2] Hydrogen bond formation between the hydroxyl group and either carbonyl or ether oxygens in the added molecule is certainly a significant factor among the interactions involved. We recently found that the polyhydroxy ether of bisphenol-A is also miscible with poly(methyl methacrylate) and the evidence for this is briefly described here.

The polyhydroxy ether of bisphenol-A, obtained from the Union Carbide Corporation, was a commercial product designated as Phenoxy PKHH. The poly(methyl methacrylate) was also a commercial product supplied by the Rohm and Haas Company and designated as V(811)100. Blends were prepared by melt mixing in a Brabender Plasti-Corder for 5 to 10 min at temperatures that did not exceed 250°C.

The samples were examined for glass transition behavior using a Perkin-Elmer DSC-7 at a heating rate of 20°C/min. Even though the glass transition temperatures of the pure components differ by only about 20°C, two T_gs should be resolvable if present using this instrument. A single T_g was found for each sample and the results are plotted versus blend composition in Figure 1. Each sample was clear as prepared; however, upon heating, the blends became cloudy indicating phase separation because of a lower critical solution temperature. The temperatures of the onset of cloudiness, measured by a technique described previously,[6] are shown in Figure 2. At these very high temperatures some chemical reaction may be possible; hence, more in-depth studies would be needed to learn any influence of this on the physical demixing behavior. However, the fact that LCST behavior occurs is evidence for miscibility of this pair at lower temperatures.

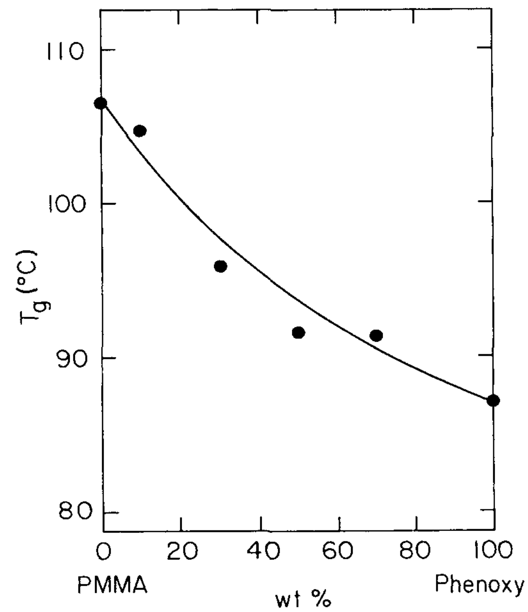


Figure 1 Glass transition temperatures for PMMA–Phenoxy blends.

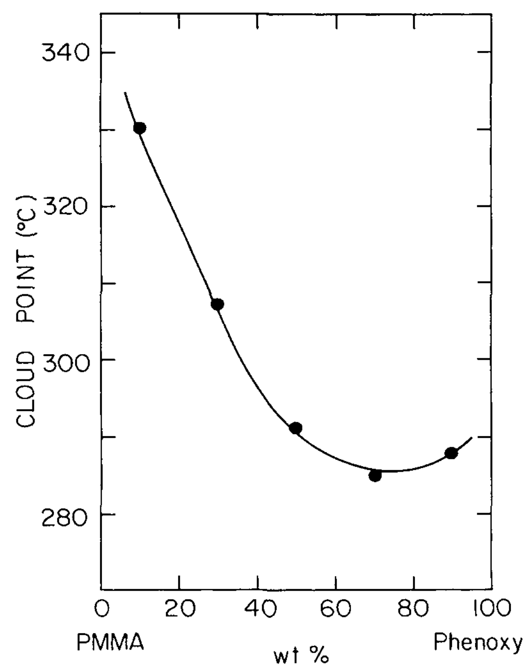


Figure 2 Cloud points for PMMA–Phenoxy blends.

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Based on the previously established examples of Phenoxy miscibility with ester containing polymers, it is not very surprising that it is also miscible with PMMA. It will be interesting to explore what other polymethacrylates or polyacrylates may be miscible with Phenoxy.

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