

FTIR Studies of Blends of Styrene/ Acrylic Acid Copolymer with Polymethacrylate

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Fourier transform infrared(FTIR) spectroscopy was used to examine the interactions in miscible blends of a styrene(92%)/acrylic acid(8%) copolymer (SAA8) with poly(methyl methacrylate)(PMMA). For polymer blends, interaction spectra obtained by appropriate digital subtraction of component spectra show evidence of a specific interaction between the carbonyl groups of PMMA and the carboxylic acid group of SAA8. It is also observed that the carboxylic acid stretching band shifts from 3000 cm^{-1} for pure SAA8 to 3295 cm^{-1} for SAA8/PMMA(1/4). In addition, neutralized SAA8 is not miscible with PMMA due to the absence of a hydrogen atom. In view of these facts, it is reasonable to conclude that the specific interaction responsible for miscibility in this system is hydrogen bonding between the carbonyl group of PMMA and the carboxylic acid of SAA8.

On the other hand, corresponding analog mixtures do not show any significant shifts in the carbonyl stretching band, indicating that the specific interaction is much less prevalent in these analog compounds. In fact, the heat of mixing of these analog compounds is endothermic which now seems reasonable in light of these FTIR observations.