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Preparation and Properties of Triethoxyvinylsilane-Modified Styrene - Butyl Acrylate Emulsion Copolymers

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Abstract: The copolymers of triethoxyvinylsilane (TEVS) with styrene (St), butyl acrylate (BA), and methacrylic acid (MAA) were prepared by emulsion polymerization. The copolymerization was carried out by using auxiliary agents at 90 °C in the presence of potassium peroxydisulfate (KPS) as the initiator. Nonylphenol ethylene oxide -- 40 units (NP-40) and sodium lauryl sulfoacetate (SLSA) were used as nonionic and anionic emulsifiers, respectively. The resulting copolymers were characterized by Fourier transform infrared spectroscopy (FTIR). Thermal properties of the copolymers were studied by thermogravimetric analysis (TGA) and differential scanning calorimetry (DSC). The morphology of copolymers was also investigated by optical microscopy (OM) and then the effects of temperature, agitation speed, initiator and silicone concentrations on the properties of the silicone-containing St/BA/MAA emulsion copolymers were discussed. The obtained copolymers have high solid content (50%) and can be used in emulsion paints as a binder. The monomer conversion and monomer conversion versus time histories indicate that by increasing the TEVS concentration the polymerization rate decreases.

Key Words: Triethoxyvinylsilane, emulsion copolymerization, poly (styrene-co- butylacrylate)

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