

415f Synthesis of Water-Based Polystyrene-Nanoclay Hybrid Via Mini-Emulsion Polymerization

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The stable water-based polystyrene nano-saponite hybrid was successfully synthesized via mini-emulsion polymerization. To synthesize stable and exfoliated clay, the saponite-Ca was modified by OTAB (Octadecyltrimethyl-ammonium bromide) at 70°C for 48hr. This modification process not only exfoliated the clay layers, but it also converted exfoliated clay from hydrophilic (water like) to hydrophobic (monomer like). The organophilic clay obtained by above treatment can be successfully dispersed in the monomer phase by sonification at low concentration (<5%), but form gel-like solution in organic monomer when the concentration of saponite was increased. The stability of mini-emulsion prepared by modified saponite in different conditions, including the clay treatment and its content, costabilizer (hexadecane), ultra-sonification, and surfactant addition was studied.

After the most stable emulsion was selected, the mini-emulsion polymerization was conducted at different conditions. The latexes resulting from the subsequent polymerization were characterized in terms of TEM and its stability was also studied. It was found that the particle size of styrene latex such prepared is in the range of 120nm-180nm, and the final latex of nano-saponite hybrid can be kept stable for months. The clay particles in the suspension are very stable and even could not be centrifuged out by centrifugation for 1hr under 10,000rpm.