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Synthesis, characterization and swelling properties of guar gum-*g*-poly(sodiu acrylate-*co*-styrene)/muscovite superabsorbent composites

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Abstract A series of novel guar gum-*g*-poly(sodium acrylate-*co*-styrene)/muscovite (GG-*g*-P(NaA-*co*-St)/MVT) superabsorbent composites were prepared by free-radical grafting copolymerization of natural guar gum (GG), partially neutralized acrylic acid (NaA), styrene (St) and muscovite (MVT) using ammonium persulfate (APS) as the initiator and *N,N*-methylene-*bis*-acrylamide (MBA) as the crosslinker. Optical absorption spectra confirmed that NaA and St had been grafted onto the GG main chain and MVT participated in the polymerization reaction. The simultaneous introduction of St and MVT into the GG-*g*-PNaA matrix could clearly improve the surface morphologies of the composites, and MVT led to better dispersion in the polymeric matrix without agglomeration, as revealed by electron microscopy. The effects of St and MVT on the water absorption and swelling behavior in various saline solutions, aqueous solutions of hydrophilic organic solvents and surfactant solutions were investigated. Results indicated that the swelling rate and capabilities of the composites were markedly enhanced by the incorporation of the hydrophobic monomer S and inorganic MVT clay mineral. The superabsorbent composite showed a clearer deswelling characteristic in solutions of multivalent saline, acetone and ethanol, and cationic surfactant than that in the solutions of multivalent saline, methanol and anionic surfactant.

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