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INVESTIGATION OF THE FFECT OF PARAMETERS ON PREPARATION OF NANOCOMPOSITE PARTICLES WITH CORE-SHELL MORPHOLOGY BASED ON Fe_3O_4-POLY(BUTYL ACRYLATE-STYRENE) PARTICLES BY MINIEMULSION POLYMERIZATION

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The encapsulation of inorganic particles with polymers is desirable for many applications in order to improve the stability of the encapsulated products and disperse ability in different media. Colloidal particles with magnetic properties have become increasingly important both technologically and for fundamental studies. This is due to their tunable anisotropic. In the absence of an applied magnetic field, the particles have isotropic sphere dispersion, whereas in an external magnetic field the particles form anisotropic structures. Here, latexes containing nanocomposite particles of styrene- butyl acrylate/ Fe_3O_4 with core-shell structure were prepared through miniemulsion polymerization technique. Magnetic composite nanospheres with high magnetic content were synthesized through miniemulsion polymerization using a new process based on a three- steps preparation route including two miniemulsion processes: 1) Preparing a dispersion of oleic acid coated magnetite particles in water. 2) Mixing of modified magnetite particles with styrene/butyl acrylate in the presence of sodium dodecyl sulfate (SDS), sorbitane mono oleate (Span80), hexadecane (HD) and 3) Miniemulsification of the modified Fe_3O_4 into the monomer droplets to reach to complete encapsulation. Subsequent polymerization generated magnetic nanocomposite spheres. Hence, the copolymerization reaction was performed on the surface of such particles in order to obtain core- shell morphology for these nanoparticles, which were characterized by several techniques such as TEM, SEM, DLS, TGA, VSM and FT- IR. The magnetic copolymer particles with diameter of 120-170 nm were obtained. The effect of several parameters such as magnetite, surfactants and hydrophobe amounts on the stability, particle size and magnetization were investigated and also optimized.