“Nano-scale binding agents formation through miniemulsion polymerization and their application in textile coloration”

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Abstract

Miniemulsion polymerization was used to prepare nano-scale emulsion latexes based on Butyl acrylate (BA) and Methyl methacrylate (MMA) monomers to be applied as binding agents for pigment coloration of different textile fabrics. Sodium dodecyl sulphate (SDS) is used as anionic surfactant, while Hexadecane and Cetyl alcohol are used as solvent and stabilizer in the miniemulsion. The miniemulsification is done by the use of ultrasonic devices or by low energy techniques such as the Phase Inversion Concentration (PIC) method. The particle size and polydispersity of the obtained products have been investigated by Dynamic Light Scattering (DLS) and Small-angle x-ray and Neutron Scattering (SAXS, SANS). In addition, the structure of the latex particles was verified by Transmission Electron Microscopy (TEM). The parameters which may affect the latex particle formation and size such as surfactants, hydrophobe, sonication time, monomers composition and solid content have been varied in a systematic way in order to have optimized formulations for the desired particle size and shape. The monomer conversion has been calculated and the average molecular weights of the polymers contained in the latex were measured by Gel-Permeation Chromatography (GPC). The applicability of the prepared latexes as binding agents for textile applications will be examined by Thermogravimetric analysis (TGA), Differential Scanning Calorimetry (DSC), mechanical as well as rheological studies. From these results we can conclude for which conditions miniemulsion derived latexes have a advantages over conventional processes for the textile pigment coloration.

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