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ALKALY-SOLUBLE RESINS STABILIZED MINIEMULSION POLYMERIZATION

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Alkaly soluble resins (ASR) are relatively low molecular weight copolymers containing both hydrophobic (e.g., styrene and (meth)acrylate) monomers and acidic monomers that upon neutralization become soluble in water. They can be used as electrosteric polymeric surfactant in conventional emulsion polymerization. This offers several advantages such as a low water sensitivity, enhanced gloss, good pigment wetting and dispersability, and good freeze/thaw stability. However, a large concentration of ASR (> 30 wt%) should be used in conventional emulsion polymerization. On the other hand, this concentration could be substantially reduced in miniemulsion polymerization.

This work reports on a fundamental investigation aiming at elucidation the critical points of the high solids miniemulsion polymerization stabilized with ASR. The effect of the formulation and process conditions on the size and stability of the miniemulsion droplets formed by high pressure homogenization was studied. The mechanisms for radical entry in the presence of an electrosteric polymeric surfactant (ASR), which determine both particle nucleation and particle growth (polymerization rate), were investigated. It was found that the loci of radical formation, the charge of the radical and the pH played a key role in the process.