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"KEY ELEMENTS FOR A SUSTAINABLE WORLD: ENERGY, WATER AND CLIMATE CHANGE"

Substitution of Non-Biodegradable Surfactants Used in Emulsion Polymerizations - A Study of the Polymerization Process and Performance of Products Obtained

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Abstract

Emulsion polymerization is considered a safe, economic, versatile, and consequently of interest as an environmentally friendly process. However, surfactants utilized need to be biodegradable, and still guarantee a good film quality, with an adequate performance according to its end use. We investigated the substitution of an alkyl phenol ethoxylated (APE) surfactant, commonly for a sulfosuccinate surfactant, which degrades in a week in contact with soil. Replacement was conducted keeping in mind the properties obtained in the final latex, in addition to the biodegradability of the surfactant. To adequately understand the behavior resulting from the replacement, it was necessary to study the surfactant kinetic effect, as well as the effect on particle size distribution, considering that water soluble and water insoluble monomers are utilized, as needed for paint formulations. Different copolymerization and terpolymerizations were conducted, with combinations of the monomers styrene, n-butyl acrylate, acrylic acid, methacrylic acid, and acrylamide, which are of very significant industrial interest for the film performance of paint formulations. Particle sizes were measured and related to the dual mechanism of polymerization, with the contribution of the aqueous phase polymerization, and which also affects to the final emulsion viscosity.

Keywords: polymerization, emulsion, surfactants, biodegradability.
