

POLYMERIC SURFACTANTS in EMULSION POLYMERISATION

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In emulsion polymerisation surfactants are mainly used to control polymer particle size and distribution, and to provide stability (mechanical, electrolyte, storage stability) of the latex product at high solids load (up to 70%). The effectiveness of a surface active agent depends on the level of interaction between its amphiphatic groups and the dispersed phase and the continuous medium. In the classical chemistry of surface active agents, ionic or nonionic groups and hydrophobes up to C18 chain length are combined to produce molecules having one single interaction point with each of the immiscible phases of which the system is composed. These molecules have an adequate level of surface activity for aqueous systems and for application in non-demanding conditions. The situation becomes quite different when more severe conditions are involved, for example, because of non-aqueous environments, dispersed phase volume ratios, polarity of the oil component, high solids load, or when the presence of surfactant induces drawbacks in the emulsion product. In these instances it is essential to strengthen the interaction, one most practical and effective possibility being to increase the number of interacting sites per molecule i.e. to use polymeric surfactants.

In the emulsion polymer products (e.g. coatings), a major problem caused by the presence of surfactants is related to the migration of surfactant from the polymer particle surface to the air/film or film/substrate interface upon coalescence of the polymer particles during the drying process. Proper use of Hypermers results in polymer latex films that show an excellent wet resistance and a significant reduction in water uptake compared to systems stabilised by means of conventional surfactant.

In the inverse emulsion polymerisation process, high molecular weight polymers are produced from water soluble monomers such as acrylamide, acrylic acid, dimethyl diallyl ammonium chloride, dimethyl aminoethyl methacrylate. The use of polymeric surfactants in combination with low HLB emulsifiers (e.g. sorbitan esters) allows to reduce the surfactant level on polymer or to produce high solids polyacrylamide copolymer. For polymerisation in vegetable oil Hypermers turned out to be essential to ensure proper stabilisation throughout the polymerisation reaction.