

## **The use of Styrene Maleic Anhydride copolymers as polymeric surfactant in emulsion systems.**

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There is a great drive to remove volatiles out of coatings as they pollute the atmosphere, are hazardous in the factory, and in some cases are known to have some toxicity. One of the better ways to minimise volatiles in paints, is the use of polymeric surfactants. Nowadays polymeric surfactants are increasingly being used in many technological applications where stability is needed at high dispersed phase volume fraction and high electrolyte concentrations, as well as under extreme conditions of temperature and flow.

One of the least expensive materials of this type is the styrene maleic anhydride copolymers.

The research done can be divided into two projects. Project one concerns seeing if complete soap replacement would be possible by the use of these polymeric surfactants. Project two concerns the use of the polymeric surfactants as curing agents.

A standard, well characterised emulsion system of methyl methacrylate and potassium persulfate with St/MA polymer as surfactant was investigated in terms of particle size, particle size distribution and conversion.

To develop a model for the emulsion system a  $2^4$  factorial design was employed. The variables in the design are the temperature and the monomer, initiator and surfactant concentrations. The accompanying responses are the particle size and conversion. Using the factorial design, a model was proposed as well as a simplified model, using only the two most important variables, according to the Pareto charts. A comparison between the observed and predicted values showed a good fit of the model to the emulsion system. With the proposed model, an emulsion system can be developed for a specific particle size and/or conversion.

Project two concerns the use of a modified St/MA surfactant as curing agent. The project involves the use of a modified St/MA as a surfactant for low  $T_g$  particles, where epoxides were introduced into the particles. During film formation the modified surfactant is to penetrate into its neighbouring particles and then act as curing agents for the incorporated epoxides. Thus creating a crosslinked film.