

KINETICS AND REACTION MECHANISM FOR RADICAL DEGRADATION OF HYDROXYETHYLCELLULOSE USING SODIUM PERSULFATE.

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Before the 1980s most of the interest concerning industrial chemistry, and in particular polymer chemistry, research was mainly focused on improvements in processing technology and in developing new materials having enhanced properties. These new types of materials were commonly produced using oil-based organic materials. However, as a result of legislation and improved environmental consciousness during recent decades, both academic and industrial researchers have focused on converting from oil-based synthetic organic materials to more environmentally-friendly raw materials, and materials from renewable resources have also been explored.

Latex particles produced by emulsion polymerization have traditionally been stabilized by synthetic surfactants. Since there exist some drawbacks in using monomeric surfactants, for example migration of surfactants in the final product, industry has tried to replace conventional surfactants with other types of stabilizers like polymeric surfactants or polymerizable surfactants. The aim of the present investigation is to partly or fully replace the synthetic conventional surfactants in emulsion polymerization with amphiphilic polymers from renewable resources. One interesting candidate as a renewable amphiphilic polymer that can act as a stabilizer is hydroxyethyl cellulose (HEC). However, in order to produce latex dispersions in a controlled manner, using HEC as the stabilizer, the degradation kinetics and mechanisms for HEC in combination with persulfate initiator radicals have to be understood. In this study we will show how the molecular weight of HEC as well as the viscosity of HEC solutions changes with time, depending on reaction temperature, the amount of HEC and the HEC/persulfate ratio. Thereby a processing window can be obtained wherein the HEC degradation is optimized for stabilization of latex dispersions.