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Investigation on the mechanism of inverse emulsion polymerization of acrylamide using redox initiators by working at Critical Micelle Concentration (CMC) of emulsifier

Zohreh Abdollahi and Vincent G Gomes
The University of Sydney, Australia

Manufacture of water soluble polymers is major global industry. Such polymers find various industrial applications, such as in flocculants, dispersants, retention aids in as diverse areas as municipal and industrial wastewater treatment, paper making, enhanced oil recovery (EOR) among others. Polyacylamide (PAM), a water soluble polymer, is an important and widely-used product in a range of industrial processes that is produced mainly by solution or inverse emulsion polymerization.

Considering the wide applications of this polymer and its derivatives in industry, the literature information on mechanism of inverse emulsion polymerization is sparse and in contradiction together. The idea of this work is to work in critical level of emulsifier (CMC) to have the droplets with the same sizes of inverse emulsion polymerization but no micelles present in the system to investigate the initiation locus and mechanism of polymerization using redox initiation systems of various solubilities in aqueous and oil phases. Redeox initiation systems of N,N,N',N'-tetramethylethylenediamine (TMEDA)-potassium persulfate (KPS) and TMEDA-ammonium persulfate (APS) were examined.

The results of experiments confirmed droplet nucleation fails for explanation of inverse emulsion polymerization mechanism as it is claimed by some authors and polymerization is more conducted in the continuous phase following homogeneous nucleation. On the other hand, investigation on the effect of temperature and monomer concentration followed by particle size monitoring ended in the mechanism in which the droplets become covered with polymer layer by the time that makes the diffusion of the monomer from the droplets to the nuclei in continuous phase more difficult.

Biography

Zohreh Abdollahi is a Ph.D student at the age of 28 from the University of Sydney has been working in the field of polymer synthesis from 2006. Her major focus of studies is synthesis of water soluble polymers. She has 4 papers on this field.

zabd4450@uni.sydney.edu.au