

Continuous Spectroscopy Characterization of Emulsions

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ABSTRACT

In emulsion polymerization, the formation of particles has an important effect on the rate of reaction and on the final properties of the latex. To investigate particle nucleation mechanisms in emulsion polymerization it is necessary to establish the initial conditions of the emulsified system before the reaction takes place. This research reports on a technique to continuously monitor the droplet size distribution of liquid–liquid emulsions using spectroscopy. The on-line particle characterization methodology is based on an integrated sampling and dilution strategy combined with spectroscopy methods. It is shown that the sampling system integrated with a multiwavelength turbidity detector provides reliable estimates of droplet populations as function of the dispersed phase concentration in emulsions of saturated hydrocarbons. The results provide not only the groundwork necessary for the elucidation of particle nucleation during emulsion polymerization process but also suggests the potential of this combined technology to further our understanding of liquid–liquid emulsions.

Key Words: *Emulsions; Droplet size; Multiwavelength spectroscopy; Particle characterization; Emulsion polymerization; On line continuous monitoring*

Abbreviations: *UV-vis, ultraviolet-visible; CMC, critical micellar concentration; Au, absorbance units; D_n, number average diameter; DSD, droplet size distribution; C_o, oil phase concentration*

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