عنوان مقاله:

Online Turbidimetric Monitoring of the Polymerization Process: Early Stages of VDF Polymerizations in Supercritical CO2

محل انتشار:

دوازدهمین کنگره ملی مهندسی شیمی ایران (سال: 1387)

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خلاصه مقاله:

Supercritical CO2 (sc-CO2) offers a promising alternative medium for current methods of poly(vinylidene difluoride) (PVDF) production in organic solvents or emulsion polymerizations, eliminating wastewater generation and high energy cost for polymer drying. VDF polymerizations conducted in sc-CO2 are showing an induction period at the beginning of the reaction, which is not yet well understood. In this work, the early stages of VDF polymerizations in sc-CO2 were successfully investigated using online turbidimetric monitoring of the reaction medium. The onset time of turbidity was used to indicate the start of polymerization and to measure induction times. Different trends of turbidity change were observed for the reactions at different temperatures. Average values of 7, 5, 3.5 and 15.5 min were obtained for the onset times of turbidity for polymerizations at 40, 50, 75 and 115 °C, respectively. With increasing of the initiator concentration and reaction temperature at the otherwise the same conditions, the onset time of turbidity were decreased, implying that the higher concentration of the initiating radicals causes faster increase of the polymer particles, and hence faster increase of the reaction medium turbidity. Negligible values of conversions (< 0.05%) at the onset times of turbidity indicated the high sensitivity of the method.

کلمات کلیدی:

Supercritical CO2, PVDF, Turbidimetric measurements, Online turbidity monitoring, Green chemistry, precipitation polymerization, VDF polymerization, onset time of turbidity, fluoropolymer