

Free radical copolymerization of *N*-vinyl-2-pyrrolidone and 2-methylene-1,3-dioxepane in supercritical carbon dioxide: Synthesis and Characterization

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Supercritical carbon dioxide is considered as a useful alternative of toxic or volatile organic solvents for polymer synthesis and processing. It has been possible to use both to radical chain polymerization and to step polymerization. Main advantages to use scCO₂ as a polymerization medium are that it is less-toxic, non-flammable, chemically inert and naturally abundant than many other organic solvents. And scCO₂ is removed by simple depressurization and the density of the solvent can be tuned by varying pressure. Using these advantages in the dispersion polymerization method we directly obtained copolymer powders without any precipitations in organic solvents.

Free radical copolymerization experiments were conducted with *N*-vinyl-2-pyrrolidone and 2-methylene-1,3-dioxepane in supercritical carbon dioxide (scCO₂). We carried out copolymerization with changing ratios of 2-methylene-1,3-dioxepane using precipitation and dispersion polymerization methods with AIBN as the initiator. The resulting polymer was characterized by SEM, GPC, DSC, ¹H-NMR etc.