

Pilot scale polymerization using supercritical carbon dioxide as a reaction medium

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Recently, the supercritical fluid technology is being widely used in many fields of polymer industries, including its use as a polymerization medium. CO₂, especially, has been under a spotlight and studied as an alternative polymerization medium, since its critical conditions are relatively mild, and it is also nontoxic, inflammable, and inexpensive.

In this research, Pilot scale (5 L for solution polymerization and 10 L for dispersion polymerization) reactors were designed and constructed for supercritical polymerization. Using these reactors, polymerizations were performed to reproduce the lab results. By optimizing the conditions of pilot scale reactors, discrete spherical polymeric particles could be obtained. In the case of PMMA, discrete spherical particle having the number average particle size of 5.72 μm , PSD of 1.06, and average molecular weight of 110,000 g/mol was successfully synthesized.