Poster LSH2

Modeling of Supersaturation Profile in Supercritical Antisolvent Process

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Supercritical fluid-based micronization processes have received wide attention due to the fact that powders produced from these processes have micron size particles with narrow size distribution. This is a desirable characteristic to powders for applications such as drug delivery. In this work, a mathematical model has been developed to calculate the supersaturation profile for a droplet moving in a precipitator used in the supercritical antisolvent process using the classical theory of nucleation and power law for growth kinetics. The system considered for this work is carbon dioxide (anti-solvent) - dimethyl sulfoxide (solvent) - rifampicin (solute). Two film theory is used to calculate the molar flow rate of solvent into supercritical environment and of carbon dioxide into droplet. The solubility of solute in solvent decreases with dissolution of carbon dioxide. The equilibrium solubility is calculated using partial molar volume fraction method. The effect of important process parameters such as solute concentration (40-60 mg/mL), solution flow rate (1-3 mL/min) and nozzle diameter (80-120 μm) on the supersaturation profile have been studied.

Keywords Supersaturation, Antisolvent, Rifampicin, Nucleation, Growth, Supercritical carbon dioxide