

Precipitation of Ultrafine Particles of API using Supercritical Fluid Technology

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Supercritical fluid processes are an attractive alternative to conventional particle formation processes because of the ability of SCF to facilitate formation of extremely small uniform particles by generation of unusually high and rapid supersaturation for solute in its solution. The processes involving depressurization crystallization and antisolvent crystallization are widely used in the pharmaceutical industries but scope for crystallization by reaction using SCF is very limited. The different processes under depressurization crystallization techniques such as Rapid Expansion of Supercritical Solutions (RESS), Particles from Gas Saturated Solution (PGSS) and Depressurization of Expanded Liquid Organic Solutions (DELOS) etc. are being widely investigated.

Rapid expansion of supercritical solutions into liquid solvent (RESOLV) does not use any organic solvent and hence is being investigated by many researchers to produce fine particles. This novel approach is based on expanding the supercritical solution of the Active Pharmaceutical Ingredient (API) into water to form a suspension of very fine particles. While this approach is more amenable to continuous operations, it also suffers from several limitations, poor solubility of materials in supercritical fluids. These limitations have been overcome to some extent by Gupta group employing solid co-solvents to increase solubility by several folds.