Antisolvent Crystallization of Carbamazepine from Organic Solutions

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Carbamazepine was crystallized from organic solutions by using antisolvent crystallization technique. Ethanol, methanol, acetone and ethyl acetate were used as solvents for carbamazepine and distilled water was used as an antisolvent. Carbamazepine was dissolved in a selected solvent, and the drug solution was injected into the antisolvent causing the particle precipitation. During the crystallization experiments, the effects of process parameters such as temperature, solution concentration, injection rate of solution, type of organic solvents, and the presence of ultrasound were investigated. Analysis of the produced particle showed that external characteristics such as particle size and morphology was a strong function of the process parameters, while the internal structure such as crystallinity and thermal stability was nearly unaffected. Smaller particles were obtained when the solutions with high drug concentrations were used, and the higher temperature resulted in larger crystals. Particle size was also influenced by injection rates of drug solutions. The effect of solvent type was correlated using the solubility parameter concept. Particle size of crystals significantly reduced when the ultrasonic wave was selectively applied.