

ABSTRACT

CHARACTERIZATION OF CARBAMAZEPINE CRYSTALLIZED WITH ETHANOL (Rapid Cooling and Solvent Evaporation Method)

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Carbamazepine is used as an anticonvulsant in the treatment of seizure, epilepsy, and trigeminal neuralgia. Carbamazepine is the drug substance that has a polymorph. There are four anhydrous polymorphs of these molecules and the dihydrate as well as other solvat (monoasetonat). Carbamazepine is classified as class II in Biopharmaceutical Classification System (BCS), which means that carbamazepine has a high membrane permeability and low solubility in water. So that dissolution rate is the rate limiting step of drug absorption process. Crystal modification is one way that can be used in an attempt to change the solubility and dissolution rate of drugs. Crystallization is the easiest way to modify the drug crystal material. Crystallization can alter crystal characteristics such as habit, polymorphism and size. The nature and extent of these changes depend on the crystallization conditions including type of solvent and cooling rate as well as the presence of impurities. The purpose of this study was to determine whether carbamazepine crystallization technique with ethanol in different conditions and methods capable of providing a change of crystal characteristics such as habit, polymorphism and size. The method used is rapid cooling of saturated solution in freezer and evaporation of the solvent of saturated solution at room temperature. The results of the characterization of the DTA and X-ray did not show any change of polymorphs and FT-IR show identical spectra between the crystallization crystals CBZ and original CBZ. SEM study exhibited that there are different habit of the sample crystallized by evaporation, by rapid cooling and original CBZ. Dissolution studies were carried for original CBZ, crystal by evaporation and by rapid cooling using basket type dissolution apparatus. The result showed crystal by evaporation has the highest dissolution rate. This study demonstrated that the change of shape and external structure of crystal can give different dissolution rate.

Keywords: Carbamazepine, Crystallization, Ethanol, Characterization, Dissolution Rate