

Solubility of Carbamazepine-Saccharin (Cbz-Sac) Co-Crystals in Polyvinylpyrrolidone (PVP) Solution

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Abstract

Co-crystals as well as pharmaceutical co-crystals indicates crystalline molecular complexes of two or more neutral molecules which allows two or more crystal components to bind in a single crystalline lattice without making new covalent bonds or breaking them. Co-crystals play a critical role in the pharmaceutical industries as it can be used to improve the properties of active pharmaceutical ingredients (APIs) such as stability, dissolution rate, solubility and mechanical properties. There are several factors that affect the properties of APIs especially solubility as most of the drugs in pharmaceutical industries being consumed by human that need to be made with highly soluble. In this study, the effect of ratio of solvent (ethanol/water) was studied on carbamazepine (CBZ), saccharin (SAC), and carbamazepine-saccharin (CBZ-SAC) co-crystal solubility in polymer solution (polyvinylpyrrolidone-PVP). CBZ-SAC co-crystals were crystallized using cooling co-crystallization techniques and mixed based on selected molar ratio of 1:1 and based on stoichiometric coefficient of the theoretical co-crystals structure. The co-crystals produced were characterized using X-Ray powder diffraction (XRPD), differential scanning calorimetry (DSC), fourier transform infrared spectroscopy (FTIR), thermogravimetric analysis (TGA). Polymer solution was prepared by dissolving PVP different ratios of ethanol/water. It was found that as ratio of ethanol/water solvent decreased, the solubility of CBZ, SAC and CBZ-SAC co-crystals increased. Thus, the ratio of the solvent used (ethanol/water) does affect the solubility trends of the CBZ, SAC, and CBZ-SAC co-crystals in PVP solution.

Keywords: Co-crystal; Carbamazepine; Saccharin; Polyvinylpyrrolidone; Ethanol; Solubility.