Carbamazepine-Fumaric Acid and Carbamazepine-Succinic Acid Co-crystal Screening Using Solution Based Method

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***Abstract*—Co-crystal plays a critical role in the pharmaceutical industry and becoming as an alternative approach to improve the bioavailability of poor water soluble drugs especially for a weakly ionisable groups or neutral compounds. In this study the co-crystal screening was carried out for carbamazepine (CBZ) and co-crystal former (CCF) of fumaric acid (FUM) and succinic acid (SA) using non-stoichiometric method (addition of CBZ to CCF saturated solution) and stoichiometric method (evaporation of 1:1 molar ratio of CBZ to CCF) in acetonitrile, ethyl acetate, propanol, ethanol and formic acid solvent systems. The crystals produced from the screening were characterized using Powder X-ray Diffraction (PXRD), Differential Scanning Calorimetry (DSC) and Fourier Transform Infrared (FT-IR). The PXRD analysis had confirmed that the co-crystal was successfully formed in both methods for all of the solvent system studied with an exception to formic acid in the stoichiometric method for CBZ-FUM system and in all methods for CBZ-SA system. The findings from this analysis revealed that Form A and Form B of CBZ-FUM co-crystal had been successfully formed from different solvents systems. DSC analysis had shown that the melting point of CBZ-FUM and CBZ-SA co-crystals were in the range similar to the previous study. The characterization using FT-IR indicated that the functional groups which include amides and carboxylic acids were presented in the co-crystal produced. Further study on the co-crystal solubility and dissolution rate is needed in order to access the efficacy of the co-crystal since the screening methods have been successfully confirmed the formation of the co-crystal.**

***Index Terms*—Carbamazepine, co-crystal, stoichiometry, non-stoichiometry.**

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