Effect on Operating Parameters towards Metastable Zone Width of Carbamazepine-Saccharin Co-crystal

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Co-crystal is believed can improved physicochemical properties of an Active Pharmaceutical Ingredients (APIs). Understanding in co-crystallization process is needed in order to have desirable crystal habits for materials. One of the studies that are important in designing co-crystallization process is kinetics study. In this research, carbamazepine (CBZ) and co-former saccharin (SAC) has been used to study the metastable zone width (MSZW) of the CBZ-SAC co-crystal in ethanol solution. The MSZW is studied by varying concentration of CBZ, mol ratio values of SAC to CBZ and cooling rates used by polythermal method. Crystallization temperature and dissolution temperature is used to determine the maximum temperature difference ΔT_{max} using Nývlt's equation.

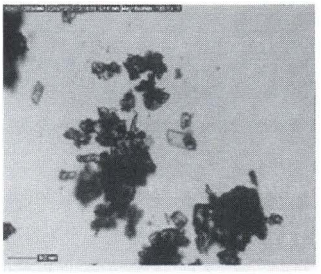
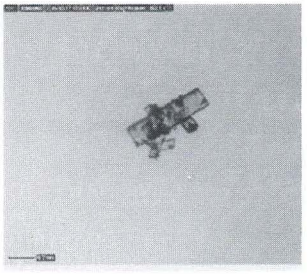
The MSZW decreasing with increasing of SAC/CBZ mol ratio and for the lowest concentration of CBZ, the MSZW shows the lowest value applied for all of the SAC/CBZ mol ratio. Table 1 shows the morphology of co-crystal produced which is plate-like morphology. The morphology of resulted CBZ-SAC co-crystal produced was similar to previously reported [1], [2]. With increasing of cooling rates, the size of co-crystal becomes smaller [3].

[1] S. Kudo and H. Takiyama, Journal of Crystal Growth 392, 87-91 (2014).

[2] S. Abd Rahim, PhD thesis, Leeds, UK (2012).

[3] C. Srinivasakannan, R. Vasanthakumar, K. Iyappan, and P. G. Rao. Chemical Biochemical Engineering Quarterly 16 (3), 125–129 (2002).

Table 1: Optical micrographs detailing the crystal morphology obtained from cooling crystallization method. The magnification used is 5 x

Conditions/Cooling rates (°C/min)	0.1	0.08	0.06
17.96 mg/ml Ratio 1.0:1.0			

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