

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

E.N. Engku Mat Nasir¹, F. Ab Rahman¹, S. Abd Rahim¹, R.Z. Edros² and N. Anuar³

¹ Faculty of Chemical & Natural Resources Engineering, Universiti Malaysia Pahang, Lebuhraya Tun Razak, 26300 Kuantan, Pahang, Malaysia

² Faculty of Engineering Technology, Universiti Malaysia Pahang, Lebuhraya Tun Razak, 26300 Kuantan, Pahang, Malaysia

³ Faculty of Chemical Engineering, Universiti Teknologi MARA, Jalan Ilmu 1/1, 40450 Shah Alam, Selangor, Malaysia

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.

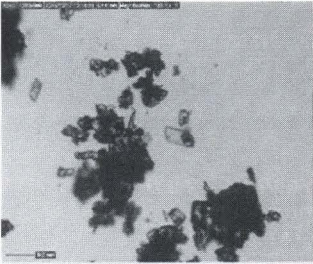


The MSZW decreasing with increasing of SAC/CBZ mol ratio and for the lowest concentration of CBZ, the MSZW shows the lowest value applied for all of the SAC/CBZ mol ratio. Table 1 shows the morphology of co-crystal produced which is plate-like morphology. The morphology of resulted CBZ-SAC co-crystal 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			

The authors would like to express their gratitude to University Malaysia Pahang, UMP for supported this work with sufficient grants (GRS 1503113, RDU 140339) and Chemical Engineering and Pharmaceutical Engineering laboratories, UMP for equipments and facilities available.