The effect of Couette-taylor and Batch reactor on the polymorphs of L-histidine

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Polymorphism is the ability of a solid material to exist in more than one form or crystal structure. The organic substance with the different shape has the different physical properties, thermodynamic properties, kinetic properties and mechanical properties. Because these properties affect bioavailability of drugs, polymorphism is particularly important in the development of pharmaceutical ingredients. Accordingly, it is essential to identify and control the polymorphs. L-histidine used for an essential amino acid in human infants has both polymorphs of stable A (orthorhombic, $P2_12_12_1$) and metastable B (monoclinic, $P2_1$). In this study, the solvent-mediated phase transformation of L-histidine was experimentally investigated in a couette-taylor reactor, comparing the existing experiments in a batch reactor. The effect of the operating conditions such as the seed concentration, temperature and the feeding rate of ethanol as anti-solvent for L-histidine were studied. To compare the couette-taylor and the general batch reactor under these operation conditions, induction time, conversion and crystal size distribution were analyzed and then the optimal control strategy was found.