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Continuous Microfluidic Antisolvent Crystallization of Lactose: Effect of Process Parameters †

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Abstract: Lactose, an important dairy by-product, can be recovered from whey rather than directly disposal to the environment. Industrially, the crystallization process is used to recover lactose from the whey. Maximum recovery of lactose is of major concern for dairy industries. A continuous microfluidic antisolvent crystallization of lactose has been studied to investigate the effect of various parameters on lactose yield. A T-shaped micromixer was used to study the mixing effect. Acetone was used as an antisolvent. The effect process parameters such as microchannel length, microchannel diameter, antisolvent ratio, solvent-to-antisolvent flow rate, lactose crystallization, and crystallization temperature on lactose yield have been studied. An increase in lactose concentration increases the yield of lactose. The maximum lactose yield obtained was 94.58 at channel length of 200 cm, channel diameter of 1mm, antisolvent ratio of 2.5, solvent-to-antisolvent flow rate at 50:125ml/hr, and crystallization temperature of 20˚C. The lactose recovered using continuous microfluidic antisolvent crystallization was higher compared to conventional and simple antisolvent techniques. Thus, the current process can be used to recover the maximum amount of lactose.

Keywords: microfluidics; lactose; antisolvent crystallization.

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Conflicts of Interest

The authors declare no conflict of interest.