

Ultrasound Assisted Cooling Crystallization of Lactose Monohydrate

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Abstract : α -lactose monohydrate is widely used in the pharmaceutical industries as an inactive substance that acts as a vehicle or a medium for a drug or other active substance. It is a byproduct of dairy industries, and the recovery of lactose from whey not only boosts the improvement of the economics of whey utilization but also causes a reduction in pollution as lactose recovery can reduce the BOD of whey by more than 80%. In the present study, levels of process parameters were kept as initial lactose concentration (30-50% w/w), sonication amplitude (20-40%), sonication time (2-6 hours), and crystallization temperature (10-20 ^oC) for the recovery of lactose in ultrasound assisted cooling crystallization. In comparison with cooling crystallization, the use of ultrasound enhanced the lactose recovery by 39.17% (w/w). The parameters were optimized for the lactose recovery using Taguchi Method. The optimum conditions found were initial lactose concentration at level 3 (50% w/w), amplitude of sonication at level 2 (40%), the sonication time at level 3 (6 hours), and crystallization temperature at level 1 (10 ^oC). The maximum recovery was found to be 85.85% at the optimum conditions. Sonication time and the initial lactose concentration were found to be significant parameters for the lactose recovery.

Keywords : crystallization, lactose, Taguchi method, ultrasound

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