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Optimization of Process Parameters for Reactive Lactic Acid Extraction

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Abstract: The reactive extraction method was used to separate lactic acid from its aqueous solutions. In this method, the amine in the solvent phase reacts with the lactic acid in the aqueous phase, resulting in the extraction of acid into the organic phase. In this study, Alamine 336 diluted with oleyl alcohol was used as the solvent. The effects of initial lactic acid concentration, pH, temperature, extraction time, stirring rate, the amount of Alamine 336 in oleyl alcohol and the ratio of organic phase volume to aqueous phase volume, V_{org}/V_{aq} , on the distribution coefficient of the lactic acid, K_D , were investigated. K_D increased with increasing stirring rate, extraction time and amount of Alamine 336 and V_{org}/V_{aq} , and decreased with increasing temperature and initial lactic acid concentration. Optimum conditions for reactive extraction of the lactic acid were determined by using the Linear Box-Wilson experimental design method. The optimum conditions were found as follows: initial lactic acid concentration: 21 g/L, pH: 2.0, temperature: 32 ° C, stirring rate: 120 rpm, amount of Alamine 336 in oleyl alcohol: 41% and V_{org}/V_{aq} :1/1.

Key Words: Reactive extraction, lactic acid, separation of lactic acid, amine extraction, two-phase system, Box-Wilson method

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