

## Recovery of propionic acid by reactive extraction — 1. Equilibrium, effect of pH and temperature, water coextraction

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### ABSTRACT

Reactive extraction is a prominent technique for recovery of carboxylic acids for dilute aqueous stream and fermentation broth. In the present paper, the effect of acid concentration, extractant concentration and type of diluent on extraction of propionic acid using tri-*n*-butyl phosphate (TBP) in methyl isobutyl ketone and 1-decanol was studied. Physical and chemical extraction experiments were conducted to study the influence of TBP in the respective diluents. TBP + MIBK was found to be an effective system with more than 25% improvement in extraction in comparison to TBP + 1-decanol, where no significant effect was obtained. The difference in solvation of TBP:acid complexes in respective diluents was explained in terms of physical properties of the diluents. Effect of pH, temperature and water coextraction was also studied using TBP in MIBK. Higher acid extraction was found when solution pH was lower than 4. The effect of temperature was not so predominant at the ranges studied (305–333 K). This suggests that the TBP + MIBK system can advantageously be employed over wider temperature ranges found at different sources. Another advantage of the TBP + MIBK system was due to its lower water coextraction percentage values (<5).

*Keywords:* Reactive extraction; Propionic acid; TBP; Temperature; pH; Water coextraction

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