

CHARACTERIZATION, DISSOLUTION OF TBP-ORGANIC ACIDS COMPLEXES AND THEIR EXTRACTIONS USING SUPERCRITICAL CARBON DIOXIDE--RECOVERY OF ORGANIC ACIDS

Joanna Shaofen Wang ^a, and KongHwa Chiu ^{b,*}

^a Department of Chemistry, University of Idaho, Moscow, ID, 83844, USA

^b Department of Applied Science, National Dong Hwa University, Hualien, Taiwan, 970 ROC

Abstract

The recovery and purification procedures are quite important steps in the preparation of organic acids. Traditional methods are neither efficient nor environmental friendly, especially for commercial scale. In this study, we present the behaviors and optimal compositions of $\text{TBP}(\text{acid})_x(\text{H}_2\text{O})_y$ complex which can be extracted by supercritical fluid CO_2 , green solvent, with the most satisfactory efficiencies. The compositions of $\text{TBP}(\text{CitA})_x(\text{H}_2\text{O})_y$ complexes were checked by titration and proton NMR spectra of $\text{TBP}(\text{CitA})_x(\text{H}_2\text{O})_y$ complexes at room temperature. Citric acid (solid) and lactic acid (liquid) were selected to investigate the hydrogen bonding among an organic acid, water and TBP in the $\text{TBP}(\text{acid})_x(\text{H}_2\text{O})_y$ complex.. The ratio of $\text{H}_2\text{O}/\text{acid}$ in the $\text{TBP}(\text{acid})_x(\text{H}_2\text{O})_y$ complex appears increases when the acid is more dilute. Water plays an important role in this TBP-acid dissolution through cooperative $\text{P}=\text{O}\cdots\text{H}$ hydrogen bonding. The fraction of acid and water in TBP may have different effects on the dissolution of organic acids. Solvation strength is associated with the number of carboxylic groups in the acid molecule.