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# Liquid Phase Equilibrium of the Ternary Systems, Water + Propionic or Butyric Acid + Mesityl Oxide, at (298.2 and 323.2) K

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**ABSTRACT:** In this work, liquid-liquid equilibrium (LLE) data for the water + propionic acid or butyric acid+ mesityl oxide ternary systems were measured at (298.2 and 323.2) K under atmospheric pressure. The reliability of the experimental tie-line data was verified by the Othmer-Tobias and Hand equations. The distribution coefficient and selectivity, calculated from the LLE data, showed high efficiency for mesityl oxide extracting propionic or butyric acid from the aqueous solution. A comprehensive comparison with various other extractants not only confirmed the high extraction efficiency of mesityl oxide, but also revealed some general guide lines for further screening extractants for carboxylic acids. The experimental data were successfully correlated by both UNIQUAC and NRTL models, yielding binary interaction parameters for relevant process simulations.

**KEYWORDS:** Liquid-liquid equilibrium (LLE), Extraction, Mesityl Oxide, Propionic Acid, Butyric Acid

## Introduction

Carboxylic acids, such as propionic acid and butyric acid, are widely used in many industries, e.g. used as raw materials to synthesize value-added chemicals such as perfume, flavors, pharmaceuticals and bioplastics, just name a few; used to prevent mold or deterioration in the food industry; used as additives (sometimes their esters are used) in cosmetics, leather or paint, etc.<sup>1-3</sup> These carboxylic acids are produced either from biomass fermentation or chemical synthesis, and extracting them from the product aqueous solution (e.g. used as a pre-treatment for azeotropic distillation or alkaline wash) is critical for recovering the product

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