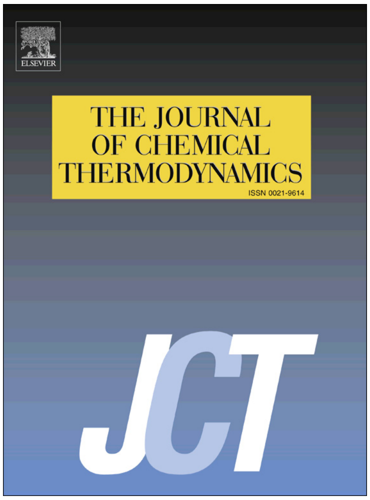

Phase diagram of the vapor-liquid-liquid-solid equilibrium of the water + NaCl + 1-propanol system at 101.3 kPa

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Highlights

-Vapor-liquid-liquid equilibrium data are determined
-Vapor-liquid-solid and vapor-liquid-liquid-solid equilibrium data are determined
-Results are compared with literature data
-The influence of salt on water + 1-propanol equilibria is studied
-The influence of temperature is also studied.

Keywords

Water; 1-Propanol; NaCl; Isobaric; Vapor-liquid-liquid-solid; Phase diagram

Abstract

Isobaric vapor-liquid-liquid-solid equilibria for the ternary system water + sodium chloride + 1-propanol have been determined at 101.3 kPa by means of a modified recirculating still. The addition of sodium chloride to the solvent mixture results in the appearance of different equilibrium regions. A detailed quantitative analysis of the evolution with temperature of the phase diagram has been carried out.

The experimental data obtained in this way have been compared, on the one hand, with previously published data containing important inconsistencies and, on the other hand, with data calculated by the extended UNIQUAC model.

1. Introduction

A mixed solvent electrolyte system consists of an electrolyte such as a salt dissolved in a solvent, which is a mixture of two or more nonelectrolyte species such as alcohol and water. Knowledge of the experimental equilibrium data of such systems is important because they are ubiquitous in many processes, for example, in the liquid-liquid extraction of mixtures containing salts, extractive distillation and crystallization or regeneration of solvents.

However, there is scant literature available on these systems. There are also no comprehensive studies examining the shapes of the various equilibrium surfaces and regions that arise in them. Finally, they are not even mentioned among all the phase equilibria types in the well-known book by John E. Ricci [1]. Moreover, the different regions in the equilibrium diagrams of these systems are not well understood and, consequently, the relatively small

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