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Chemical Engineering Thermodynamics

Experimental measurement and thermodynamic modeling of binary and ternary solid-liquid phase equilibrium for the systems formed by L-Arabinose, D-Xylose and water☆

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ABSTRACT

Solid-liquid phase equilibrium data for binary (L-arabinose - water) and (D-xylose - water) systems at temperatures from (269.85-298.05) K and ternary (L-arabinose - D-xylose - water) system at temperatures of 273.85 K, 278.85 K and 284.45 K were measured at atmospheric pressure. The ternary phase diagrams of the systems were constructed on the base of the measured solubility. Two pure solid phases were formed at given temperatures, including pure L-arabinose and pure D-xylose, which were confirmed and determined by the method of Schreine makers' wet residue. At the same temperature, the crystallization region of L-arabinose was larger than D-xylose's. The acquired solubility data were then correlated using the NRTL model, Wilson model and Xu model. The calculated solubility with the three models agreed well with the experimental values.

KEYWORDS

D-xylose; L-arabinose; Solid-liquid equilibrium; Solubility; Thermodynamics; model

1. Introduction

Research of hemicellulose is significant subject concerning the exploitation and the utilization of biomass resources. The hemicellulose can be used to produce several kinds of monosaccharide by dilute acid hydrolysis, enzymatic hydrolysis or other methods[1-3]. Duo to the huge quantity and wide distribution, agricultural straw has

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