

Isobaric Vapour-Liquid Equilibria for the Systems of 2,3-Pentanedione with Ethanol, Cyclohexane, n-Hexane and Crotonaldehyde at 20 kPa

P. Moodley^S, K.I. Ireland, D. Ramjugernath^C, P. Naidoo and J.D. Raal

Thermodynamics Research Unit, School of Chemical Engineering, University of KwaZulu-Natal, Durban, South Africa

ramjuger@ukzn.ac.za

The greatest costs incurred in the design of unit operations in the chemical and petrochemical industries invariably lies in the separation processes, of which distillation is the most traditional and accounts for more applications than all others combined [1]. The experimental acquisition of highly accurate vapor liquid equilibrium (VLE) data is invaluable for the accurate design of such processes as it allows for efficiency, profit margins and energy savings to be maximized in the operation of the plant.

A local sugar manufacturer's by-products plant wishes to model a distillation column in which 2,3-pentanedione is concentrated from a upstream containing impurities; ethanol, cyclohexane, n-hexane and crotonaldehyde. This ketone is a by-product of the sugar industry, specifically the manufacture of furfural. Its uses include a flavourant in butter, a polymerization inhibitor and a starting material for pharmaceutical intermediates.

A low-pressure dynamic vapour-liquid equilibria still [2] was used to investigate these systems. The equipment, as modified by Joseph [3], with a computer aided control strategy and proven operating procedure, constituted a very versatile and useful facility for the VLE measurements.

All systems measured will be presented along with appropriate modeling and thermodynamic consistency testing.

- [1] Sabarathinam, P.L. *Energy and Energy Savings in Distillation*, <http://www.svce.ac.in/~parthi/DrPLS.htm> [2005, March 18].
- [2] Raal, J. D and Mühlbauer, A. L, *Phase Equilibria: Measurement and Computation*, Taylor and Francis, Bristol PA, (1998).
- [3] Joseph, M.A., J.D. Raal and D. Ramjugernath, *Fluid Phase Equilibria*, **182**, 157 (2001).