Vapour-Liquid Equilibrium Measurements Using a Novel Static Total Pressure Apparatus

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The separation of components in a chemical stream constitutes a major portion of all processes in the chemical and petroleum industries. Although considerable experimental VLE data are available in the literature, additional information is desirable for better understanding of phase behavior [1]. There is a constant need to develop experimental methods that make it possible to rapidly accumulate reliable VLE data. Experimental VLE data on binary systems serve as the basis for the prediction of VLE data for multicomponent systems.

The measurement of vapour pressures for pure components and binary mixtures has been accomplished with a new total pressure static apparatus. The apparatus of Fischer and Gmehling [2] was used as a basis for the current design. The continuous-dilution technique [3] for sample introduction has been incorporated in our apparatus, so that the composition range of a mixture can be covered in two runs. Accurate injection of the two components is accomplished with a patented dual-action pump, which, in the micromode, can accurately dispense submicrolitre volumes. This also facilitates measurement of infinite dilution activity coefficient. A procedure was developed for degassing pure liquids. The static assembly and experimental procedure has been tested via pure component vapour pressure and binary vapour-liquid equilibria measurements for a range of test systems. The equipment and systems measured will be presented.

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[3] R.E. Gibbs, and H.C. Van Ness, *Ind. Eng. Chem. Fundam.* **11**, 410 (1972).