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John Satherley, David L. Cooper, David J. Schiffrin



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# Surface Tension, Density and Composition in the Methane-Pentane System at High Pressure

John Satherley,\* David L. Cooper and David J. Schiffrin

Department of Chemistry, University of Liverpool, Liverpool, L69 7ZD, U.K.

**ABSTRACT:** A pressure system is described for measuring the pressure dependence of surface tension using digital image processing techniques on pendant drops in systems where the miscibility changes with both temperature and pressure. Measurements can be performed at pressures up to 40 MPa and temperatures up to 423 K. This high-pressure rig allows, additionally, the simultaneous measurement of both phase density and composition. The system is tested with the methane-pentane system at 313.15 K and pressures up to 15.6 MPa; the results compare well with literature data and with values calculated using the Peng-Robinson equation of state in conjunction with the gradient theory approach to computing surface tension, thus validating the experimental technique. Density profiles of the components through the interfacial layer have also been calculated using gradient theory. The Wegner extended scaling approach has been applied to all of the data sets to estimate the critical pressure for this system, which is found to be 16 MPa at 313.15 K.

**Keywords:** surface tension, density, critical pressure, Wegner extended critical scaling, gradient theory.

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