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Rapid hydrocarbon dew points by infrared spectroscopy: results and validation for binary mixtures of methane + {propane, isobutane and butane}

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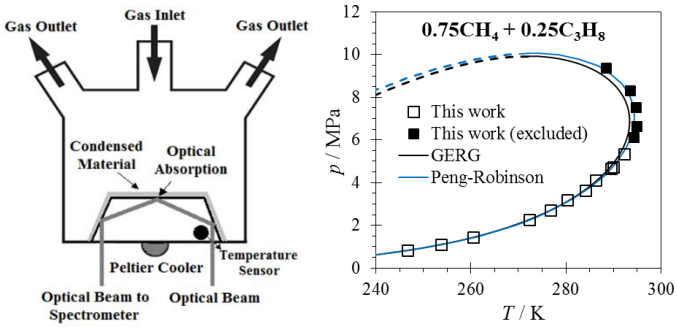
Graphical abstract



Abstract

An industrial hydrocarbon dew point detector based on infrared absorption spectroscopy was tested down to a temperature of 243 K and at pressures up to 10 MPa. Dew temperatures were measured isobarically for pure ethane and mixtures of methane + {propane, isobutane, or n-butane}. Ethane dew temperatures were within ±0.38 K of the reference equation of state prediction. Mixture dew temperatures below the cricondentherm were determined within 0.7 K. At higher pressures, dew temperatures were over-predicted due to the rapid changes in gas density with temperature. Improved performance could be achieved by isochoric operation, and by reducing temperature scan rates.