Phase behavior for the vinyl benzoate and vinyl laurate in supercritical CO_2 at various temperatures and pressures

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The (CO2 + vinyl benzoate) and (CO2 + vinyl laurate) systems at five temperatures (313.2, 333.2, 353.2, 373.2 and 393.2 K) and pressures up to 16 MPa have been investigated using variable-volume high pressure view cell by static-type. The solubility curve of vinyl benzoate and vinyl laurate in the (CO2 + vinyl benzoate) and (CO2 + vinyl laurate) systems increases as the temperature increases at a fixed pressure. The (CO2 + vinyl benzoate) and (CO2 + vinyl laurate) and (CO2 + vinyl propionate) systems correlate with the Peng-Robinson equation of state using a van der Waals one-fluid mixing rule including two (kij, ηij) adjustable parameters. The critical properties of vinyl benzoate and vinyl laurate were predicted with the Joback - Lyderson group contribution and Lee-Kesler method. RMSD for the (CO2 + vinyl benzoate) [kij=0.030, ηij=-0.060] and (CO2 + vinyl laurate) [kij=0.063, ηij=-0.032] systems using two parameters determined at 353.2 K were 9.63 % and 3.84 %, respectively. RMSD for the (CO2 + vinyl benzoate) system by two adjustable parameters determined at each temperature was 3.11 %.