Specific Partial Molar Volumes at Infinite Dilution and Volumes of Mixing for Athabasca Bitumen and Bitumen Vacuum Resid + Solvent Mixtures

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Partial molar volumes at infinite dilution and volumes of mixing are sensitive measures of molecular interactions in mixtures that have direct application in process development and can also be used to establish or validate parameters in solution or phase behaviour models, or to test the theories which underlie them. For example, solutes undergoing phase change on dissolution are readily discriminated from those which do not. In this contribution, partial molar volumes at infinite dilution for Athabasca bitumen and Athabasca vacuum resid in dodecane, decane, 1-methyl naphthalene, quinolin, and toluene-dodecane mixtures, are reported for the 20 ^{o}C to 80 ^{o}C temperature range, along with volume of mixing data for the same solutes in decane. The impact of the thermal history of samples on the results obtained is highlighted. Implications for production, extraction and refining process development and operation are discussed.