Densities of Dilute Adenosine Solutions to 50 MPa and 373.15 K

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Adenosine is a nucleoside formed from the attachment of ribose to the nucleobase adenine. It plays an important role in cellular metabolism as a structural component of ATP (the molecular unit of currency for energy transfer in cells). Determining its thermodynamic properties is essential for understanding the potential for its formation and reaction properties in high P-T environments that host extremophiles and may have hosted the emergence of life.

The volumetric properties of dilute aqueous solutions of adenosine (0.00284 m, 0.00486 m & 0.007924 m) were obtained using an Anton Paar DMA HP vibrating tube densimeter. Reproducibility of density measurements was <±0.0001 g·cm⁻³, exceeding propagated errors associated with uncertainty in the measurement of temperature, pressure, and fluid concentration.

Comparison of densities for dilute adenosine solutions at 0.1 MPa and 288.15-333.15 K from this study and [1] shows excellent agreement. Experimentally determined volumetric properties for adenosine solutions at elevated pressure and/or temperature are not available in the literature; this study extends the database to 373.15 K and 50.0 MPa.

Figure 1. Experimentally determined densities for 0.00792m adenosine solutions to 50 MPa and 373.15 K from this study. Lines represent simple linear regression fits to the data.