ABSTRACT

In this study, we used a high-pressure vibrating tube densitometer to measure the densities of ionic liquid solutions at temperatures from 298.15 K to 348.15 K and pressures from 0.1 to 50 MPa. The mixture solutions included four binary systems, which contained two solvents: anisole and acetophenone, and two ionic liquids: [C₃mpip][NTf₂] and [C₃mpyr][NTf₂]. The Tait equation and a semi empirical model could correlate well the experimental density data over the entire pressure range.

The excess volumes were calculated from the experimental density data. It was found that the excess volumes are negative for anisole + [C₃mpip][NTf₂], anisole + [C₃mpyr][NTf₂] and acetophenone + [C₃mpip][NTf₂] over the entire composition range. Those of acetophenone + [C₃mpyr][NTf₂] are also negative, except at \( x_1 = 0.1, \) \( T = 298.15 \) K and pressures from (30 to 50) MPa. The modified Redlich-Kister model represented well the excess volumes varying with composition at specific temperature and pressure. The FOV (Flory-Orwoll-Vrij) and the Schotte equations of state were also employed to correlate the \( PVT \) data. The binary interaction parameter for each binary system was determined by fitting the binary \( PVT \) data to the equations of state.

Keywords: acetophenone, anisole, density, equation of state, ionic liquid