Density, Viscosity and Speed of Sound of Binary Mixtures of Acetonitrile + Diethylene Glycol at Different Temperatures and Atmospheric Pressure

Mariana Mille and Ricardo Tôrres C. S

Centro Universitário da FEI, Departamento de Engenharia Química, São Bernardo do Campo, São Paulo, Brazil
belchior@fei.edu.br

The knowledge of thermophysical properties such as density, viscosity and speed of sound of pure chemicals and their mixtures are required in many chemical engineering calculations involving fluid flow, heat and mass transfer. Moreover, excess thermodynamics functions have used to provide information about molecular structure and intermolecular forces in liquid mixtures. In the present work, density, viscosity and speed of sound of the solutions of acetonitrile + diethylene glycol have been measured over the entire composition range at (288.15, 293.15, 298.15, and 303.15) K and atmospheric pressure. Both pure liquid and mixture viscosity were measured using a Stabinger viscosimeter (Anton Paar SVM 3000M). Density and speed of sound were measured using a commercial density and speed of sound measurement apparatus (Anton Paar DSA 5000 densimeter and speed of sound analyzer). Excess molar volume, deviation in viscosity and deviation in isentropic compressibility have been calculated from the data and fitted to the Redlich-Kister polynomial. For all properties, the values are negative over the entire composition range. Excess molar volume and deviation in isentropic compressibility decrease whereas deviation in viscosity increases with increasing in temperature. The results obtained are discussed in terms of intermolecular interactions, particularly hydrogen-bonding interactions between like and unlike molecules.