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## Density, Speed of Sound, Viscosity, and Conductivity of Lactic Acid in the Aqueous Solutions of Polyethylene Glycol at Different Temperatures

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### Abstract

In order to provide information about the nature of interaction Lactic acid in aqueous solutions of polyethylene glycol, density, speed of sound, viscosity, and conductivity of lactic acid in aqueous solutions of polyethylene glycol were investigated in the temperature range from 288.15 K to 318.15 K. The measured density, speed of sound, viscosity, and electrical conductivity were used to determine apparent molar volumes, apparent molar isentropic compressibility, viscosity  $B$ -coefficient, and limiting molar conductivity of lactic acid. The obtained results indicate that the apparent molar volumes, apparent molar isentropic compressibility and viscosity  $B$ -coefficient increase with increasing polyethylene glycol concentration; whereas limiting molar conductivity decreases with increasing polyethylene glycol concentration. Also, the apparent molar volumes, apparent molar isentropic compressibility and limiting molar conductivity increase with increasing temperature; whereas viscosity  $B$ -coefficient decreases with increasing temperature. These results reveal that the solute-solvent interactions decrease with increasing concentration of polyethylene glycol and temperature. By comparison the activation energy for viscous flow and activation enthalpy of charge transfer, it can be concluded that in addition of ion transfer the formation and breaking hydrogen has a portion in charge transfer.

**Keywords:** Lactic acid; Polyethylene glycol; Viscosity; Density; Speed of sound; Electrical conductance

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