Thermal Conductivity of Aqueous K_2CO_3 Solutions at High Temperatures

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Thermal conductivity of aqueous K_2CO_3 solutions of wt % (5, 10, 15, 20, and 25) has been measured with a concentric-cylinder (steady) technique. The measurements were carried out at saturation in a temperature range from 293 K to 573 K. The total experimental uncertainty of thermal conductivity, pressure, temperature, and mass fraction measurements were estimated to be less than 2 %, 0.05 %, 30 mK, and 0.02 %, respectively. The measured values of thermal conductivity were compared with data and correlations reported in the literature. The validation and accuracy of the experimental method and the instrument's performance were carried out by means of measurements on pure water with well known thermal conductivity values. The experimental and calculated values of thermal conductivity for pure water from IAPWS formulation show excellent agreement within their experimental uncertainties (AAD within 0.44 %) in the temperature range from (308 to 704) K and at pressures up to 60 MPa. Correlation equations for thermal conductivity of the solutions studied were obtained as a function of temperature, pressure, and composition by a least-squares method from the experimental data. The AAD between measured and calculated values from this correlation equation for the thermal conductivity was (0.5 to 0.7) %.