Thermal Conductivity and Density of 1-Butyl-3-methylimidazolium Tetrafluoroborate + Methanol Mixture

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Supercrtical CO_2 was shown to be a potential alternative solvent for extraction of organic compounds from ionic liquids, since CO_2 has a remarkably high solubility in ionic liquids. It has been demonstrated that the combination of ionic liquids and superctical CO_2 offers a highly attractive approach for the development of the environmentally benign and economically viable homogeneously and/or heterogeneously catalyzed processes. However, it is very difficult to extract highly polar organic compounds, for example 5-hydroxymethylfulfural in ionic liquids with supercritical CO_2. Therefore, a modifier to enhance the solubility of solute in supercritical CO_2 is needed. Methanol is often used as a modifier to enhance the solubility of highly polar solute in supercritical CO_2. In our previous studies, we measured the density, viscosity and thermal conductivity of 1-butyl-3-methylimidazolium tetrafluoroborate + CO_2 and 1-butyl-3-methylimidazolium hexafluorophosphate + CO_2 mixtures. In this study, the thermal conductivity and density of 1-butyl-3-methylimidazolium tetrafluoroborate ([BMIM][BF_4]) + methanol mixtures were measured with a transient short-hot-wire method and a vibrating tube densimeter. The experimental temperature range was 293 to 353 K, and pressure range was up to 20 MPa. The thermal conductivity of the [BMIM][BF_4] + methanol mixture increased approximately linearly with increasing methanol mole fraction in the [BMIM][BF_4]-rich region. The experimental values of density were correlated with a cubic equation of state with mixing rules. The thermal conductivities were fitted with the molar volume.