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Reza Haghbakhsh, Sona Raeissi

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A novel correlative approach for ionic liquid thermal conductivities

Reza Haghbakhsh and Sona Raeissi¹

School of Chemical and Petroleum Engineering,
Shiraz University,
Mollasadra Ave., Shiraz 71345, Iran.

Abstract

In this study, a new simple, general, accurate and easy-to-use correlation has been developed for estimating the thermal conductivities of pure ionic liquids (ILs) over a wide range of temperatures at atmospheric pressure. In addition to the abilities mentioned, a further goal of this work was to develop a thermal conductivity correlation which does not require, as input parameters, any other physical properties, once a single thermal conductivity data point is available. This can be a valuable advantage, especially in the field of ILs for which many physical properties are unavailable. The new correlation has been proposed based on 378 thermal conductivity temperature data points from 44 different IL types. The proposed correlation, in comparison to two well-known and commonly used group contribution models and one literature correlation, shows much higher accuracy with respect to experimental values. Calculations covering all of the investigated ILs in this work resulted in AARD% values of 1.0%, for the proposed model. It is also more widely applicable, as indeed, it can estimate IL thermal conductivities with a very simple formula and without the need for other physical properties, even molecular weight and molecular structure.

¹ Corresponding author at: School of Chemical and Petroleum Engineering, Shiraz University, 71345 Mollasadra Ave., Shiraz, Iran.
Tel.: +98 71 36133707; fax: +98 71 36474619
E-mail address: raeissi@shirazu.ac.ir (S. Raeissi).

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