

A NEW GROUP CONTRIBUTION METHOD FOR THE ESTIMATION OF THERMAL CONDUCTIVITY FOR NON-ELECTROLYTE ORGANIC COMPOUNDS

O. Govender,^a J. Rarey,^{a, b, c} B. C. Moller^a and D. Ramjugernath^{a,*}

^a Thermodynamics Research Unit, School of Chemical Engineering, University of Kwa-Zulu Natal, Durban, South Africa

^b DDBST GmbH, Marie-Curie-Str. 10, 26129 Oldenburg, FRG

^c Industrial Chemistry (FK 5), Carl von Ossietzky University Oldenburg, 26111, Oldenburg, FRG

* E-mail: Ramjuger@ukzn.ac.za

Optimum design of heat and mass transfer equipment form an integral part of cost-effective plant design in the current economic day and age. For this purpose reasonably accurate data on thermal conductivity of liquids and gases are required. Physical measurement of this property is extremely difficult due to the development of convective currents and heat losses during the course of the experiment. There are many predictive and correlated models, available for prediction or determination of thermal conductivity [1-7]. Prediction of thermal conductivity based only on a theoretical basis does not give good results as the theories used to describe the liquid or vapour state are seldom satisfactory [4]. Thus the current trend for prediction of thermophysical properties has been the use of the group contribution methods. Here the thermophysical property is calculated using contributions by different functional groups within the compound. Results yielded using the group contribution methods are frequently much better as compared to other methods.

Current work to date on the group contribution method includes the estimation of the normal boiling point [9, 10], critical property data [11], and vapour pressures [12, 13]. Thus based on methods developed for the above properties, a method with a better temperature dependency term would be developed for thermal conductivity prediction. The data used to formulate the method will be obtained from the extensive Dortmund Data Bank (DDB) [8], which contains about 97000 thermal conductivity points for almost 900 different compounds. Thus the model would have a wider range of applicability than previous correlations and models.

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