The Radius of Gyration for Thermophysical Properties and a Correlation for the Critical Volume Prediction

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From the general definition, the radius of gyration can be calculated as the root mean square distance of the objects' parts from either a given axis or its center of gravity. In particular, it can be referred to as the radial distance from a given axis at which the mass of a body could be concentrated without altering the rotational inertia of the body about that axis. It plays an important role in polymer chemistry and in thermodynamics [1,2]. In the recent past, we investigated this matter, in order to provide a more thorough explanation as to how the thermophysical properties, i.e. surface tension, thermal conductivity, and dynamic viscosity, are related to the radius of gyration. During the thermophysical properties prediction/correlation, the corresponding states principle was applied. New equations for the surface tension, the dynamic viscosity, and the thermal conductivity description adopting the radius of gyration as a main parameter were presented [3-5]. Here, the radius of gyration was correlated to the critical volume for the most part of the organic fluids. The obtained correlation was finally compared with the commonly adopted methods for critical volume prediction based on the group contribution method.

References:

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