Refined description of momentum transfer in real liquid mixtures

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Abstract

To calculate heat-mass exchange processes, values of molecular coefficients of mass, pulse, energy transfer are necessary. Such data on the continuous change of these parameters for different concentrations of components of mixtures and temperatures should be included in the calculation programs of devices in the form of functional dependencies. This is possible only if the transfer factors can be calculated on the basis of fundamental theories. The kinetic theory of the solid sphere model, on the basis of which expressions are obtained for calculating transfer coefficients, is sufficiently developed and reflects the behavior of ideal dense gas and liquid mixtures, i.e. mixtures with monatomic molecules and with a spherical symmetric interaction potential. When describing energy transfer, it is necessary to take into account the presence of internal degrees of freedom, asymmetry of the interaction potential, the formation of groups of molecules, the complexity of the forms of molecules, which is characteristic when considering the behavior of non-ideal solutions.

Solving these problems within strict theories in order to obtain reliable methods for predicting transfer coefficients is difficult.

This paper is a continuation of previously published studies in which the kinetic equations of dense media of the solid sphere model reflecting the behavior of ideal media are summarized to describe the behavior of non-ideal solutions using thermodynamics methods of irreversible processes for the ideal associated solution model. The formalism of constructing such an approach is based on a model representation of the real interaction in non-ideal solutions when obtaining indirect information about the behavior of real molecules through the magnitude of the chemical potentials of the components within the thermodynamic model of an ideal associated

solution. The difference between the real interaction of molecules, compared with the ideal one, is taken into account through the activity of the components. This article clarifies a portable energy transfer mechanism that reflects the behavior of non-ideal solutions.

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