TRANSPORT PROPERTIES OF DILUTE GASES AND GAS MIXTURES. DIFFUSION

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Mixtures of dilute gases are widely spread in nature and are often used in many technological processes. To calculate and generalize the transport properties of dilute gases and their mixtures, methods of kinetic theories and semiempirical methods based on them are used [1]. These methods allow calculating viscosity in a sufficiently wide temperature range within the experimental error.

Calculation of the binary diffusion coefficients (BDCs) usually gives a deviation of 3–10%, with a tendency to increase in the areas of high and low temperatures. In [2], we proposed a method for calculating BDCs in moderately dense gases at different temperatures. The error in calculation according to this method depends on BDCs of dilute gases significantly.

In [3], we proposed a method for calculating the viscosity and BDCs for binary gas mixtures basing on the data on the pure gases viscosity. We calculated the viscosity and BDCs for three gas systems and obtained a coincidence with experimental values within the experimental error.

This work presents the results of calculating BDCs for four gas systems: H_2–N_2, H_2–CO_2, H_2–Ar, CO_2–Ar, using the proposed method. Experimental data and calculation methods, proposed by various authors, are available for these systems in a wide range of temperatures.

As our calculations show, the proposed method of calculating BDCs, basing on viscosity of pure gases, is simpler and more reliable and does not require a large amount of computation for most natural gases.

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