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EXPERIMENTAL AND NUMERICAL MASS TRANSFER STUDIES IN CASE OF CONVECTIVE FLOWS OCCURRENCE IN ISOTHERMAL TERNARY GAS MIXTURES

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Isothermal multicomponent diffusion in three-component gas mixtures He + Ar – N_2 and CH_4 + Ar – N_2 at different pressures and certain concentrations of components in the binary mixtures is experimentally studied. It is shown that convective instability, which significantly intensifies the multicomponent mass transfer, occurs due to the pressure increase in systems where diffusion coefficients are significantly different from each other. Parameters characterizing the transition of diffusion mixing into the convective one can be determined by the numerical simulation methods. Modelling of the multi-component mixing process is carried out by means of the joint solution of the Navier-Stokes equations, diffusion equations and continuity equation. It is shown that essentially non-linear distributions of the component concentrations that lead to non-linear distribution of the density of the gas mixture, which is responsible for the formation of convective structures, arises at a certain pressure in the system.