Equation of State of Real Gases

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The thermal equation of state for rarefied and dense gas was obtained with combined spherically symmetric potential of intermolecular interactions[1] and ideas given in [2-4]. The new equation has 8 empirical constants as Benedict-Webb-Rubin equation and it describes experimental data in a wide range of substances in the experimental uncertainty up to densities equal to 1.5 critical density, temperatures up to 1000 K, and pressures up to 100 MPa (except near the critical point). This equation surpasses the Benedict-Webb-Rubin equation in the accuracy of the experimental data describing argon, nitrogen, oxygen, carbon dioxide, methane, water, etc. The calculated values of enthalpy and entropy in the new equation agreed well with experimental data in the experimental uncertainty. These calculations do not use any data about the caloric properties of dense gas.

Literature

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