Thermal Equation of State and Caloric Properties of One-Component Liquids and Gases

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For the first time using a new type of combined volumetric equation of state we carried out a unified description of thermal and caloric properties of one-component fluids. The efficiency of our method is tested on CO2 and SF6. The coefficients of the combined equations were found in the approximation p,V,T - data up to 30 MPa. The calculation heat capacity Cv performed in a wide range of parameters of single-phase state, including the critical region. As a result, we obtain a description p,V,T - the data in the single-phase region of the gas and liquid states from the triple point up to supercritical temperatures with an error at a pressure of ~ 0.6%. The curves of the specific heat Cv, calculated on the same isochores and isotherms, in which are available experimental data on Cv, show a good agreement with the experimental data within ± 8% in different areas of the state including the critical region. Thus, the proposed method allows us using only P, V, T-data of one-component liquids to predict the behavior of their caloric properties.