Some thermodynamic properties at the saturation line of SF$_6$: Experimental and new modeling of data

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In the present work, we have set a number of tasks including, firstly, an analyses of experimental (ρ_l, ρ_g, T) data for SF$_6$ in a temperature interval $2 \times 10^{-6} < \tau < 0.3$, here $\tau = (T - T_c)/T_c$. The second task is related to a search for scaling models, which describe a number of thermodynamic properties of matter, including the order parameter, f_s, and the mean diameter, f_d, of the coexistence line. Within frameworks of the third task, some criteria are considered with a goal to choose the structure and some parameters of these models. In accordance with this task, a number of combined models [$f_s(\tau)$, $f_d(\tau)$, $\rho_l(\tau)$, $\rho_g(\tau)$] are proposed. These equations follow to the scale theory for critical phenomena. Parameters of these models have been calculated on the basis of input (ρ_l, ρ_g, T) data of SF$_6$ and of a nonlinear least squares method [1]. Our analysis has shown that new models [$\rho_l(\tau)$, $\rho_g(\tau)$] represent experimental results of Garrabos *et al* (2018) and Funke *et al* (2001) with an acceptable accuracy in the interval ($2 \times 10^{-6} < \tau < 0.3$).

[1] Vorob'ev V S, Ustyuzhanin E E, Ochkov V F, Shishakov V V, Tun A T R, Rykov V A and Rykov S V 2020 *High Temp.* **58** 333–41