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About some consequences from the Van-der-Waals equation of state for critical point of liquid-gas phase transition

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Abstract

The relations to define critical parameters of gas-liquid phase transition of one-component substance is obtained from the Van-der-Waals equation of state. The relation to define the critical volume using the critical temperature is obtained. The relation to define the critical volume using ratio of the critical pressure and the critical temperature is obtained. The relation to define the critical volume using critical pressure is obtained. The consequences are obtained from the Van-der-Waals equation of state of one-component substance for which the formula of Timmermans relating critical parameters with the density of crystal at low temperatures is valid. It is shown that the Van-der-Waals equation of state gives relations between critical parameters and low temperature properties of liquid and also between critical parameters and Boyle temperature. The relation between critical parameters, Boyle temperature and Boyle volume is established. The relation between critical parameters and the value of the third virial coefficient at the critical temperature is also established. The relation between critical parameters and the substance dependent parameter of the rectilinear diameter law is established.