# Correlation of the critical parameters of the gas-liquid phase transition and the density of the crystal at zero absolute temperature

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*The Laboratory of Modeling. Kutateladze Institute of Thermophysics of SB of RAS. Prospect Lavrenteva, 1.
Novosibirsk, 630090. Russia. Phone: +7 (383) 354-20-17. E-mail: tepliza@academ.org*

## Absract
The empirical Timmermann's formula connecting the density of the crystal at zero absolute temperature with the parameters of the critical point of the gas-liquid phase transition is derived theoretically from the Van der Waals equation of state using the conditions of phase equilibrium.

The equations of state $p(T,v) = kT/(v-b) - a/v^{\alpha}$ and $p(T,v) = kT/v + B/v^{\beta+1} - \tilde{N}/v^{\beta}$ with three parameters describing the critical point of any pure substance are considered. The Timmermann's formula is derived approximately from the first equation and exactly from the second one.