

PHYS 351 #4

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1 Q1

Recall that the van der Waals equation of state is $(P + \frac{a}{v^2})(v - b) = RT$, where v is the molar volume and a and b depend only on the type of gas.

1.1 a

The coefficient of thermal expansion is defined as follows:

$$\beta \equiv \frac{1}{V} \left(\frac{\partial V}{\partial T} \right) \bigg|_P$$

Find β for a van der Waals gas. Show that this reduces to the ideal gas result, $\beta_{ideal} = \frac{1}{T}$, when $a = 0$ and $b = 0$.