Physics 112 Discussion 1

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1.1 Definitions

Write about system, env; potentials; state vars etc. later

Example: Van der Waal's gas

When does Van der Waal's equation

$$\left(P + a\left(\frac{N}{V}\right)^2\right)(V - nb) = Nk_BT$$

approximately describe an ideal gas in terms of $\frac{V}{N}$?

The Ideal Gas Law reads as

$$PV = Nk_BT$$

So, in order for the Van der Waal's equation to be approximately the same,

- We expect $V/N >>$ something
- In particular, we want $V - Nb \approx V$, so

$$V >> Nb \implies \boxed{\frac{V}{N} >> b}$$

- We also require

$$P >> a\left(\frac{N}{V}\right)^2 \implies \frac{V}{N} >> \sqrt{\frac{a}{p}}$$

1.2 Coefficients of Thermal Expansion