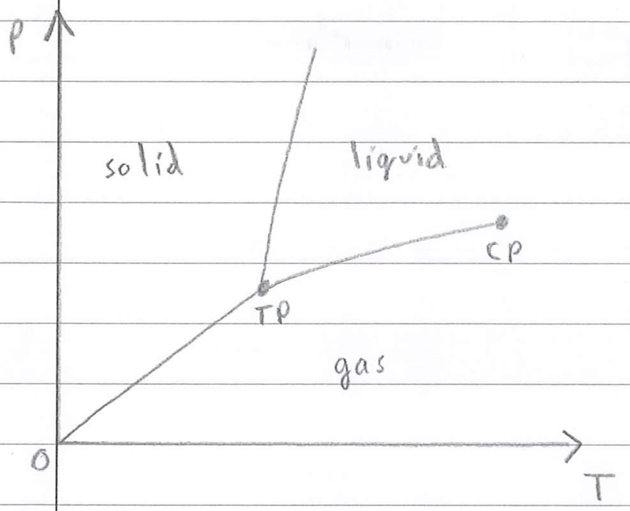
SoM

$PV = nRT = NkT$

$\frac{1}{2}kT$ of energy per degree of freedom



$C = \frac{dQ}{dT}$

$dU = đQ + đW$

$PV^{\gamma} = \text{constant} \qquad (\gamma \approx 5/3)$

- adiabats are steeper than isotherms

Boltzmann's Law: $p(E) \propto e^{-E/kT}$

mean free path, $\lambda = \frac{1}{\sqrt{2} n \pi d^2}$

$V_{mp} = \sqrt{\frac{2kT}{m}}, \quad \langle v \rangle = \sqrt{\frac{8kT}{\pi m}}, \quad \sqrt{\langle v^2 \rangle} = \sqrt{\frac{3kT}{m}}$

12-6 Potential: $U = \varepsilon \left(\frac{r_0}{r}\right)^{12} - 2\varepsilon \left(\frac{r_0}{r}\right)^{6}$

$\Delta L = \alpha L_0 \Delta T$

$P = \frac{NkT}{V - bN} - a\left(\frac{N}{V}\right)^2$ (van der Waals equation)

$V - bN \rightarrow V_{eff} = 4V_m$

$a\left(\frac{N}{V}\right)^2 \rightarrow \Delta p \propto n^2$

- hard spheres
- attractive forces

Continuity Equation: $v_1 A_1 = v_2 A_2$

Bernouilli's Equation: $P_1 + \frac{1}{2}\rho v_1^2 + \rho g h_1 = P_2 + \frac{1}{2}\rho v_2^2 + \rho g h_2$