Phase Transitions Notes

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1 Phase Transitions

1.1 Latent Heat

$$C_x = T\left(\frac{\partial S}{\partial T}\right)_x$$

To change from phase 1 to phase 2 at a constant temperature T_c, you need to latent heat L.

$$L = \Delta Q_{rev} = T_c(S_2 - S_1)$$

where S_1 is the entropy of phase 1 and S_2 is the entropt of phase 2.
Consider the entropy discontinuity at a vapour-liquid transition. The number of microstates Ω fora single gas molecule is prportional to its volume. So we can write,

$$\frac{\Omega_{vapour}}{\Omega_{liquid}} = \left(\frac{V_{vapour}}{V_{liquid}}\right)^{N_A}$$

Considering that the density of vapour is roughly 10^3 times smaller than the density of the vapour, we can roughly see,

$$L \approx 10RRT_b$$