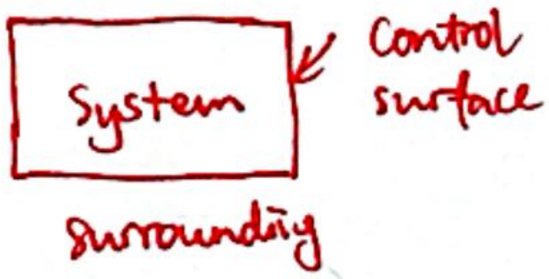
Thermodynamic Ideas.

1. Energy & Entropy.

- first law of thermodynamics: conservation of energy.
- the direction of a process is determined by entropy.
- the entropy of an isolated system can increase or remain constant over time but cannot decrease.

2. Concepts

- System



- closed system : no exchange of matter.
- Isolated system : no exchange of anything (Conserved energy. matter, volume).

- state
  - In thermodynamics. this is mainly the macroscopic properties
  - not perfectly-well-defined.
- state function (function of state)
  - state of system $\xrightarrow{\text{uniquely}}$ value of state function
  - a quantity F is a state function iff ΔF only depends on the initial and final states but not the path.

- Equation of state

  - gives a quantity as a function of other quantities

  eg. $\left(p + \frac{N^2 a}{V^2}\right)(V - Nb) = N k_B \cdot T$

  $$pV = N k_B \cdot T$$

- Extensive & Intensive.

  - Imagine a system 

  make N copies of that  x N.

  Intensive properties don't change. (p. T).

  extensive properties change (V. m. N).

- Indicator Diagram p-V graph

- Thermodynamic Equilibrium

  - the state which an undisturbed system tends to over time

  - no heat flow at equilibrium

  - 2 objects ~~are~~, in thermal contact. will be at the same temperature if in equilibrium. (temperative)