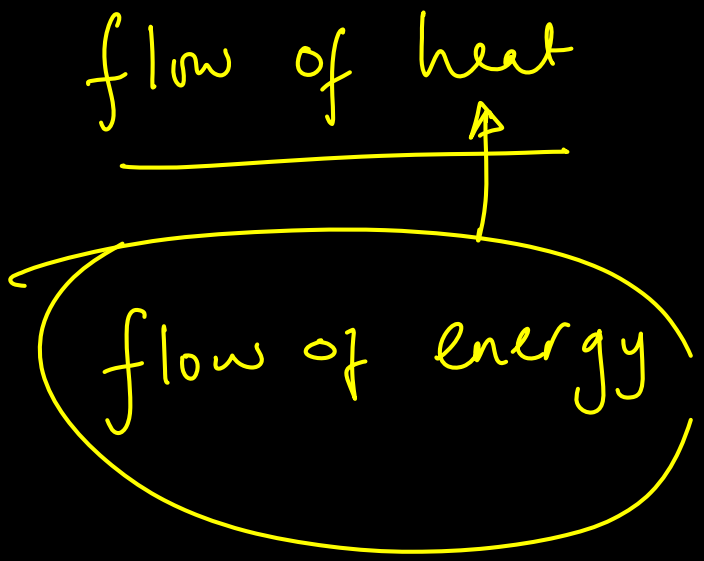
Thermodynamics

heat motion

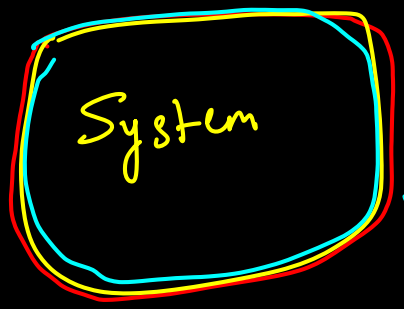


0^{th} Law: defines T

1^{st} law: Conservation of U

2^{nd} Law: Defines S

3^{rd} Law: Numerical value of S



Surrounding

Boundary

diathermic

adiabatic

Open Closed Isolated

$A + B \rightleftharpoons C + D$

p, T : Intensive variables

V : Extensive variables

V/n V_m or $\overline{V}$

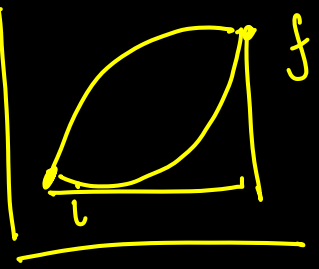
$2\,H_2(g, 1\,bar, 100\,^\circ C)$

Standard Ambient Temperature & Pressure

SATP 273.15 K, 1 bar $24.789\ dm^3\ mol^{-1}$

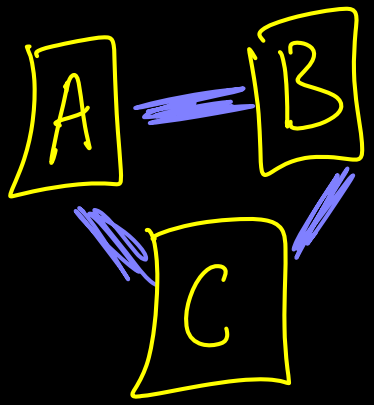
STP $0\,^\circ C$, 1 atm $22.414\ dm^3\ mol^{-1}$

Path :



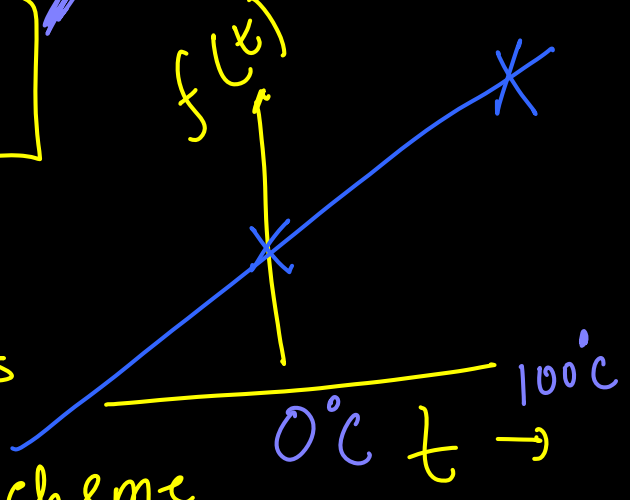
reversible
irreversible
isotherm
adiabat

0th Law.



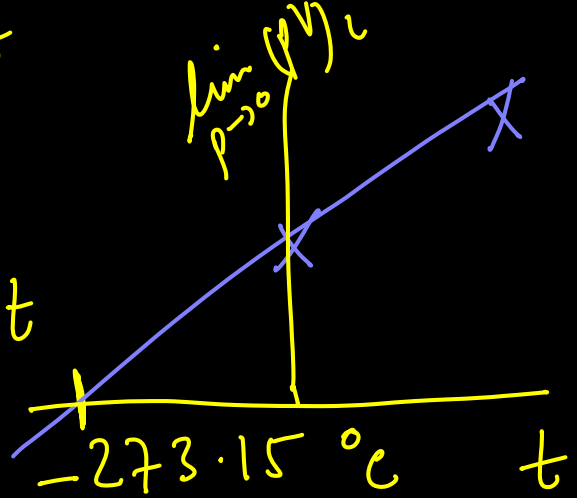
thermometer

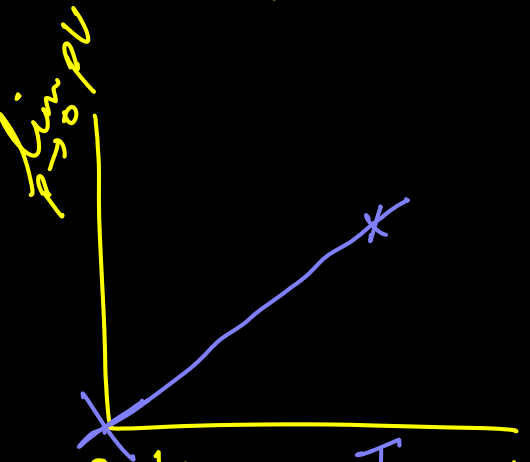
1) f (t)
2) Reference points
3) Interpolation scheme
4) Material



$$\lim_{p\to 0}(pV)_t = \text{constant}$$

$$f(t) = \lim_{p\to 0}(pV)_t$$





$$t/^\circ C + 273.15 = T(K)$$

273.16 K

6.1×10^{-3} bar

1. Gr. scale

$$\lim_{p\to 0}(pV) = \left[\frac{\lim_{p\to 0}(pV)_{tp}}{273.16}\right] T = nRT$$

$pV = nRT$ Ideal Gas Eqn.

$p = f(n, V, T)$ $V = f(p, n, T)$

Equation of State $T = f(n, V, p)$

$pV_m = RT$ $\frac{pV_m}{RT} = Z$

$Z > 1$ repulsions dominate

$Z < 1$ attractions

$\frac{pV_{m,real}}{pV_{m,id}} = \frac{RTZ}{RT}$

$\frac{V_{m,real}}{V_{m,id}} = Z$ compressibility