Response Fuctions

$\Delta Q \rightarrow$ [ ] $T \rightarrow T+\Delta T$

$\frac{\Delta Q}{\Delta T} \longrightarrow \frac{dQ}{dT}$ depends on path

fix path ΔV ; $dE = TdS - PdV$

$$\left(\frac{dQ}{\partial T}\right)_V = \left(\frac{\partial E}{\partial T}\right)_V = T\left(\frac{\partial S}{\partial T}\right)_V \equiv C_V$$

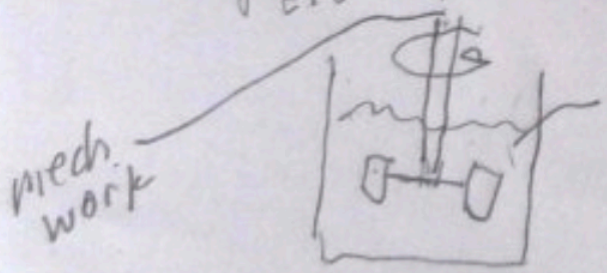
$$\left(\frac{dQ}{\partial T}\right)_P \Rightarrow C_P$$

How to measure dQ

calibrate ΔQ by $\alpha \Delta T$ in standard material like water

ΔQ def amt of heat to take 1 cc of H_2O to $\Delta T = 1^\circ$ cent.

Caloric. What is its relation to Mech.

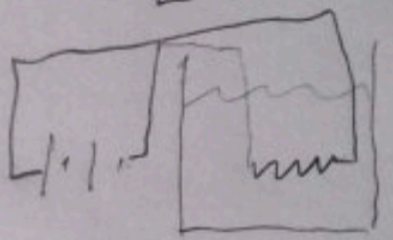


1 calorie = 4.204 Joule = Mech. equiv. of heat

easier way

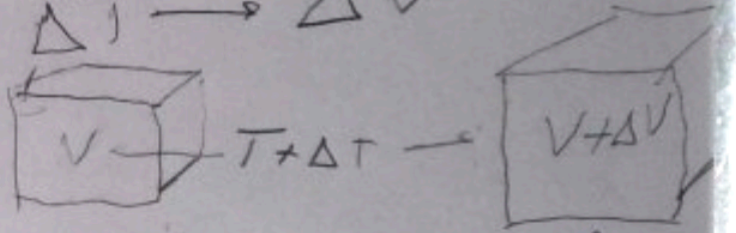
$P = V \cdot I$

$E = P \times t$



$P = I^2 R$

$\Delta T \rightarrow \Delta V$



$\alpha = \frac{1}{V}\frac{\Delta V}{\Delta T}$ thermal exp

$\alpha_P = \frac{1}{V}\left(\frac{\partial V}{\partial T}\right)_P$ isobaric thermal exp.

$\alpha_S = \frac{1}{V}\left(\frac{\partial V}{\partial T}\right)_S$