Slopes of Adiabatic and Isothermals:-

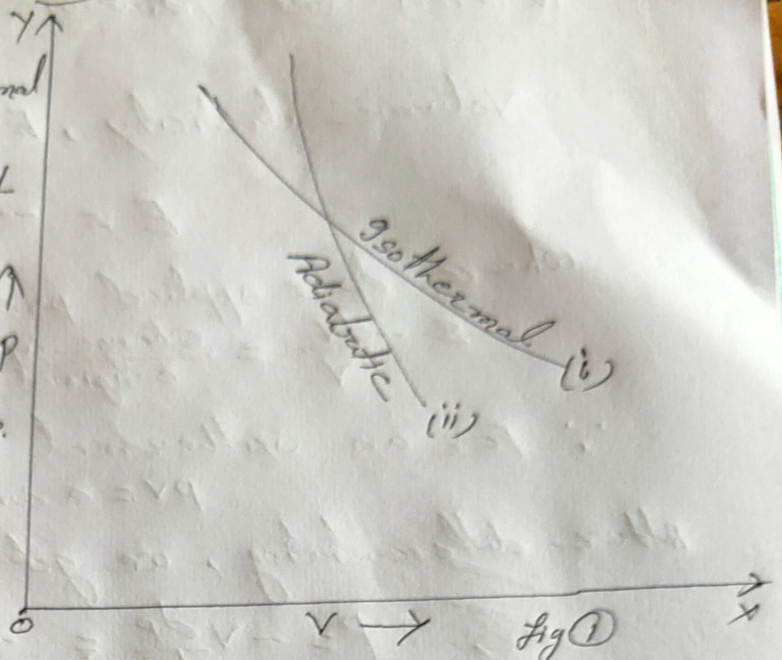

Fig ①

∵ for an isothermal process

$$PV = \text{a constant} \quad \text{——} (1)$$

where curve (i) is a graph bet^n P & V under isothermal conditions.

Differentiating equ^n (i) we have

$$P dV + V dP = 0$$

or, $$\frac{dP}{dV} = \frac{P}{V}$$

∴ slope of the isothermal $= -\frac{P}{V}$

& Since for an adiabatic process

$$PV^\gamma = \text{a constant.} \quad \text{——} (ii)$$

where curve (ii) is a graph bet^n P & V under adiabatic conditions

After differentiating equ^n (ii) we have

$$P\gamma V^{\gamma-1} dV + V^\gamma dP = 0$$

$$\frac{dP}{dV} = -\gamma \frac{P}{V}$$

∴ slop of the adiabatic curve $= -\gamma \frac{P}{V}$ (iii)

Thus the slope of an adiabatic is γ times (C_p/C_v fro
the slope of isothermal i.e the adiabatic cur
is steeper than the isothermal curve at a
point where the two curves intersect each other