

WORK DONE IN DIFFERENT THERMODYNAMIC PROCESSES

ln

$$W = \int_{V_i}^{V_f} p \cdot dV \quad \text{--- (1)} \quad \begin{array}{l} V_i = \text{Initial volume} \\ V_f = \text{Final volume} \end{array}$$

Isothermal Process: $T = \text{const.} \rightarrow PV = \text{const}$

$$PV = \mu RT \quad \text{--- (2)}$$

$\hookrightarrow$ no. of moles of gas

by Eq (2) $p = \frac{\mu RT}{V}$

by Eq (1) $W_{\text{iso}} = \int_{V_i}^{V_f} \frac{\mu RT}{V} \cdot dV$

$$= \mu RT \int_{V_i}^{V_f} \frac{1}{V} \cdot dV$$

$$W_{\text{iso}} = \mu RT \left[\log_e V \right]_{V_i}^{V_f}$$

$$\left\{ \begin{array}{l} \int_a^b \frac{1}{x} dx \\ = [\log_e x]_a^b \\ = \log_e b - \log_e a \\ = \log_e (b/a) \end{array} \right.$$