

$$Q_2 = W_{CD} = \mu R T_2 \left(-\log_e \frac{V_3}{V_4} \right)$$

$$Q_2 = W_{CD} = -\mu R T_2 \log_e \frac{V_3}{V_4} \quad \text{--- (3)}$$

—ive value of heat (Q_2) indicate
that heat is released by the system to
the sink.

$V_4 < V_3$
 $\log(a/b)$
 $= \log a - \log b$
 $= -(\log b - \log a)$
 $= -\log(b/a)$

Process IV: Adiabatic compression:

$$W_{DA} = \frac{\mu R}{(\gamma-1)} (T_2 - T_1)$$

$$W_{DA} = -\frac{\mu R}{(\gamma-1)} (T_1 - T_2) \quad \text{--- (4)}$$

—ive sign indicates that work is done on the
system.

$$\eta = \frac{W}{Q_1}$$

Total work done by the working substance
in the whole cycle

$$W = W_{AB} + W_{BC} + W_{CD} + W_{DA}$$