Cyclic process

In cyclic process,

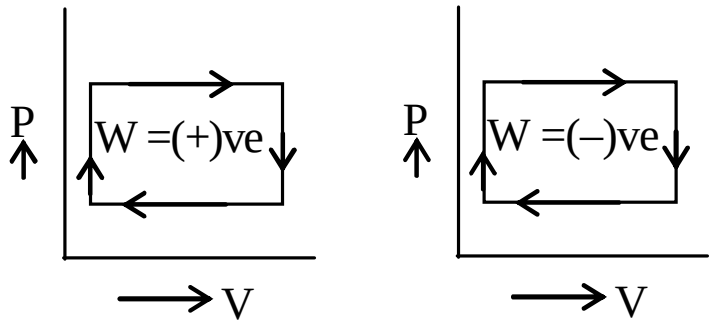
Final state of gas = Initial state of gas

For one complete cycle in cyclic process.

$$dU = 0$$

Work done by the gas is equal to the area enclosed by the curve on P–V chart If the cycle is clockwise net work done is positive and when the cycle is anti clockwise the net work done is negative.

Generally clockwise cycle represent heat engines and anti clockwise cycles represent refrigerators.



Here net heat in the process is given by,

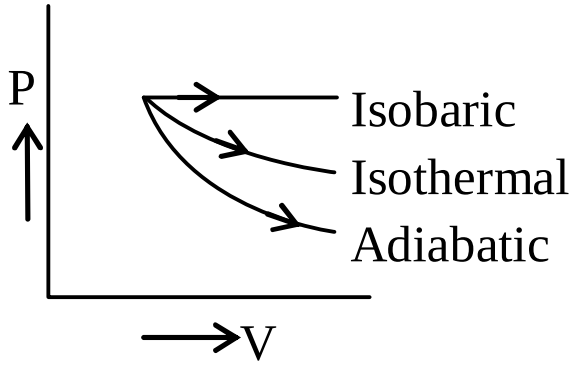
Net heat = Total heat supply + total heat rejected (with sign)

Efficiency of cyclic process

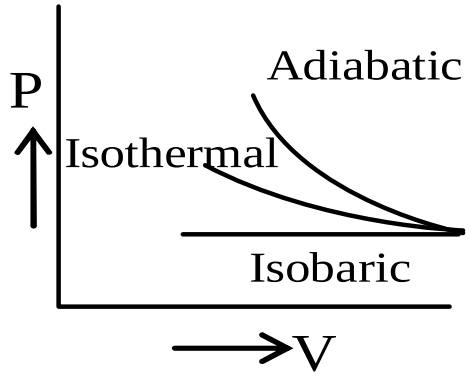
$$\eta = \frac{\text{Total work done in cycle}}{\text{Total heat supplied}} \times 100\%$$

GENERAL OBSERVATIONS IN THERMODYNAMIC PROESS

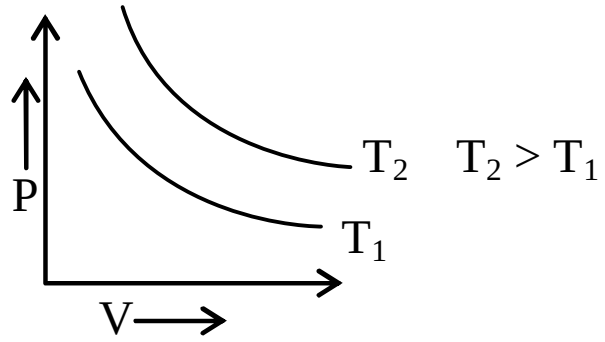
For same volume expansion, work done by the gas is maximum in isobaric process and least in adiabatic process i.e. isothermal process is in between both of them,



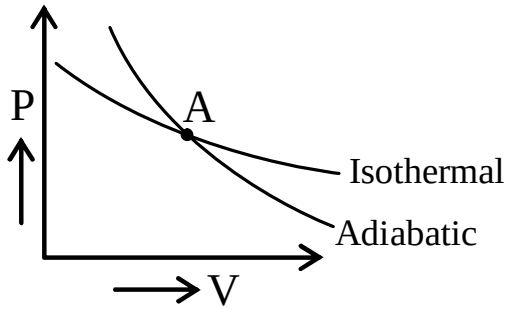
For same compression in volume, work done by the gas is maximum in adiabatic



Two isothermal curve for given mass never intersect each other.



For a given mass, isothermal curve and adiabatic curve intersect each other.



On a P-V Graph adiabatic curve is steeper than isothermal curve.

At A, Slope of adiabatic curve = γ(slope of isothermal curve)

$\therefore$ Slope of isothermal curve = $-\frac{P}{V}$

Slope of adiabatic curve = $-\frac{\gamma P}{V}$

**Adiabatic process is the fastest process