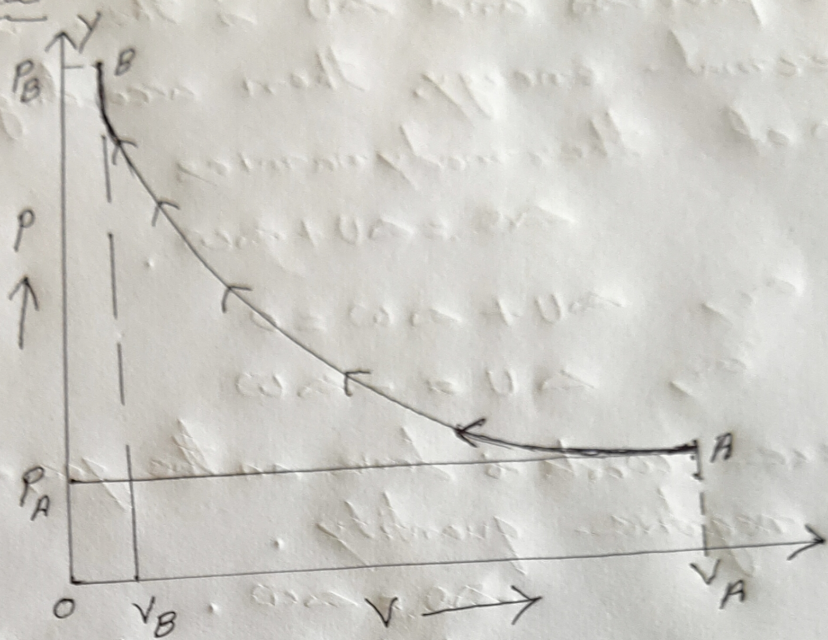


Conversion of work into Heat

Work can be completely converted into heat.



Fig(1)

Considering an ideal gas enclosed in a cylinder fitted with a frictionless piston and completely isolated from its surroundings. Let T be the temperature of the gas. If the gas is compressed quasi-statically from a state A to a state B under adiabatic conditions as shown in above fig no (1) so that its volume decreases from V_A to V_B and pressure increases from P_A to P_B .
In this process work is done on the gas. but as the compression is adiabatic, so no heat is allowed to enter or leave the cylinder.

$$\Delta Q = 0$$

If ΔW is the work done on the gas in this process and ΔU is the increase in thermal energy, then according to first law of thermodynamics

$$\Delta Q = \Delta U + \Delta W$$

$$\text{or, } \Delta U + \Delta W = 0$$

$$\text{or, } \Delta U = -\Delta W$$

Here work is done on the gas, ΔW is itself a negative quantity.

$$\Delta Q = \Delta W$$

This eqn shows that the internal energy of the gas increases by an amount equal to the work done on it. But internal energy is only a form of heat energy.





































Thus work done on the gas is wholly converted into heat.

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