The first law state that when a system undergoes a cyclic change , the net heat to or from (the system is equal to the net work from or to the system(i.e

$$\sum Q = \int dQ \ \& \ \sum W = \int dW$$

Then

$$\oint dQ = \oint dW \qquad (1)$$

- one important consequence of the first law is that the energy of a system is a property
- applies to the system undergoing cycle and the algebraic summation 1 Expression . of all energy transfer across the system boundaries is zero
- But if the system undergoes change of state during which both heat transfer and work are involved , the net energy transfer will be stored within the system, or the (net energy Q-W will be stored in the system named as internal energy(i.e

$$Q - W = \Delta U$$

Where ΔU is the increase on the energy of the system

Also a derivation of same increase in the energy of the system for different paths shows that the change in energy between two state of the system is the same . so the energy has definite value for every state of the system , hence it is a point function . and a property of the system

(5 Application of 1st law of thermodynamics

(5.1 closed system

(5.1.1 Constant pressure process (isobaric

W=pdV

W=pdv

But

q-w=du

q-pdv=du

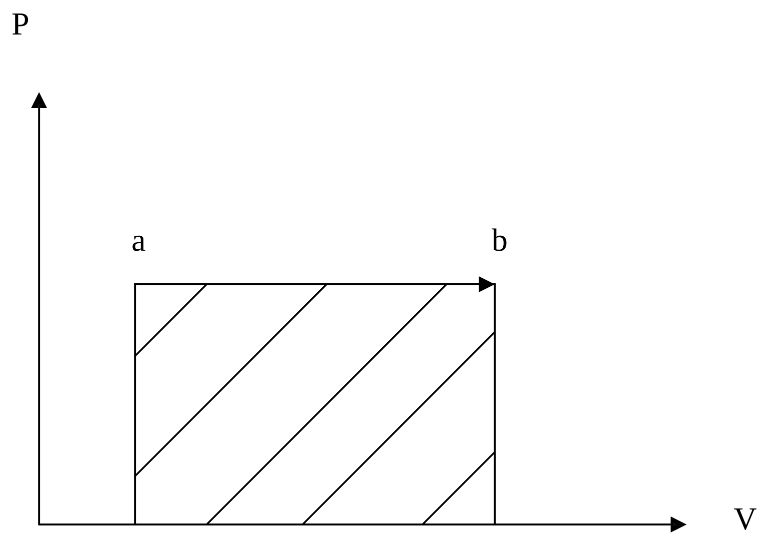
q=du+pdv

q=d(u+pv)

q=dh=h2-h1

where V-volume, v-spesific volume,u –spesific internal energy,h- enthalpy

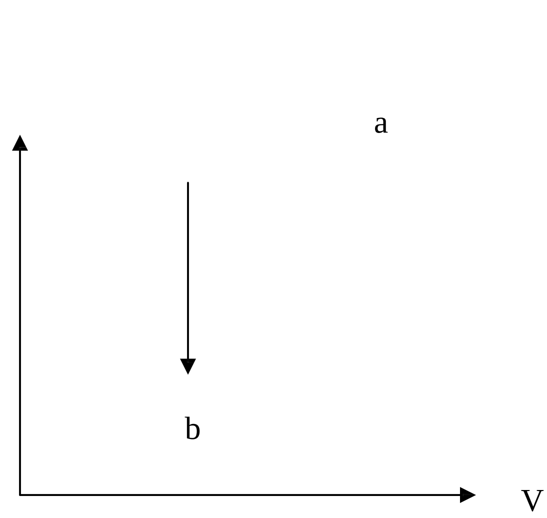
But Work= $\int_a^b pdV = p(V_b - V_a)$ see fig below



. Figure shows P-V relation in constant pressure process

(Constant volume process(isochoric5.1.2

Since differnce in volume is zero then there is no work done



st law yield 1then applyiong 0 W=

q=du

polytropic process 5.2.3

this process obey