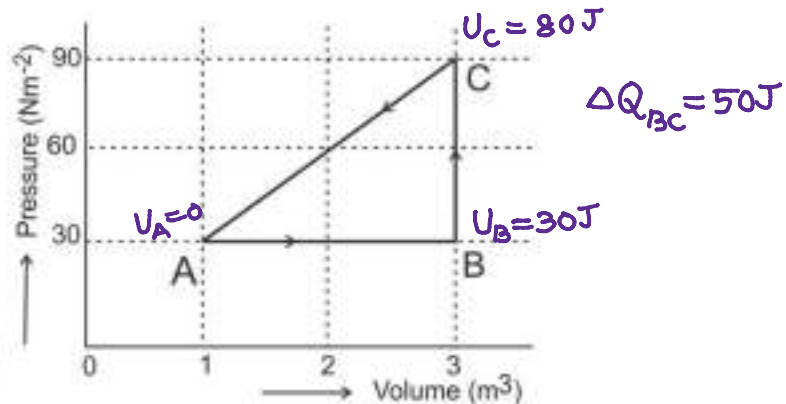


EXAMPLE: The adjacent figure shows the changes in the thermodynamic system in going from an initial state A to a state B

and C and returning to the state A. If $U_A = 0$, $U_B = 30\text{J}$ and the heat given to the system in the process $B \rightarrow C = 50\text{J}$, then

determine: (i) internal energy of the system in the state C

(ii) heat given to the system in the process $A \rightarrow B$, (iii) heat given to the system or taken out from the system in the process $C \rightarrow A$, (iv) net work done in the complete cycle.



(I) $U_C = ?$ $B \rightarrow C$ is isochoric process $\Rightarrow \Delta W_{BC} = 0$

1st Law $\Delta Q_{BC} = \Delta U_{BC} + \Delta W_{BC}$

$$50\text{J} = U_C - U_B + 0$$

$$50\text{J} = U_C - 30\text{J} \Rightarrow U_C = 80\text{J}$$

(II) $\Delta Q_{AB} = ? \Rightarrow \Delta Q_{AB} = \Delta U_{AB} + \Delta W_{AB}$
 $\Delta Q_{AB} = (U_B - U_A) + \Delta W_{AB} \text{ — ①}$

$$\Delta W_{AB} = \text{area under the line AB} \\ = 30 \times 2 = 60\text{J}$$