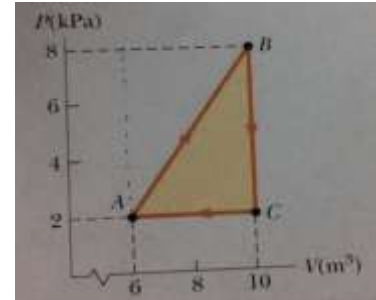


Q- A gas is taken through the cycle as shown in the figure. Find

- (a) Change in internal energy of the gas during one cycle
- (b) Work done on the gas during one cycle
- (c) Net heat transferred to the gas during one cycle



(a) As the gas returns to the same thermodynamic state after one complete cycle, thus the thermodynamic state of the gas (pressure, volume and temperature) does not change and hence the change in internal energy of the gas is zero.

(b) Work is done **on** the gas is only during compression from state C to state A which is isobaric process. The work done by a gas in an isobaric process is given by

$$P\Delta V = 2\text{kPa} \cdot (6 - 10)\text{m}^3 = -8\text{kJ}$$

(Negative sign shows that the work is done on the gas)

(c) As in one complete cycle there is no change in the internal energy of the gas, heat transferred to the gas is equal to the work done by the gas in one cycle.

Net work done during the cycle is given by the area of the loop on P-V diagram and thus given by (area of the triangle)

$$W = \frac{1}{2} \cdot AC \cdot BC = 0.5 \cdot (4\text{m}^3) \cdot (8 - 2)\text{kPa} = 12\text{kJ}$$

Thus the energy transferred to the gas will be 12 kJ.

