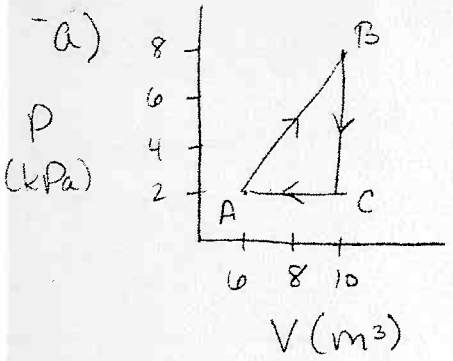
P #16

Ch 12 - pg 384

a)



ΔU for a cycle:

$\Delta T = 0$ so $\Delta U = 0$

W = -area under graph:

$W = -\frac{1}{2}(4\ m^3)(6000\ Pa)$

$W = -12{,}000\ J$

$\Delta U = Q + W$ so $0 = Q + (-12{,}000\ J)$

$$\boxed{Q = 12{,}000\ J}$$

b) W for the reverse process is positive: $W = +12{,}000\ J$

so $\Delta U = Q + W$

$0 = Q + (12{,}000\ J)$

$$\boxed{Q = -12{,}000\ J}$$