

Assignment # 2

1. For a particular gaseous system it has been determined that the energy is given by

$$U = 2.5 PV + \text{constant}$$

The system is initially in the state $P = 0.2 \text{ MPa}$ (mega Pascals)

$$V = 0.01 \text{ m}^3 \text{ designated as point A}$$

in the figure.

The system is taken through the cycle of

three processes

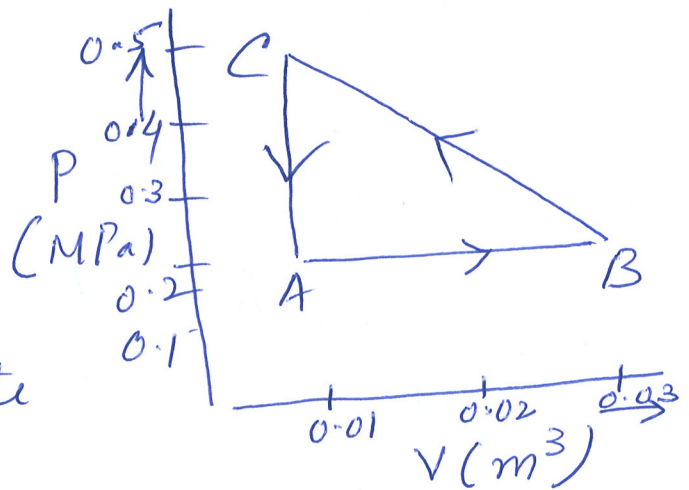
($A \rightarrow B$, $B \rightarrow C$ and $C \rightarrow A$) shown in the

figure.

- Calculate Q and W for each of the three processes.

- Calculate Q and W for a process from A to B along the parabola

$$P = 10^5 + 10^9 \times (V - 0.02)^2$$



2. Two particular systems have the following equations of state:

$$\frac{1}{T^{(1)}} = \frac{3}{2} R \frac{N^{(1)}}{U^{(1)}}$$

$$\frac{1}{T^{(2)}} = \frac{5}{2} R \frac{N^{(2)}}{U^{(2)}}$$

where R is the gas constant $\equiv N_A K_B$. the mole number of the first system is

$$N^{(1)} = 2$$

$$N^{(2)} = 3.$$

and that of the second is separated by a diathermal wall, and the total energy in the composite system is 2.5×10^3 J.

What is the internal energy of each system in equilibrium?

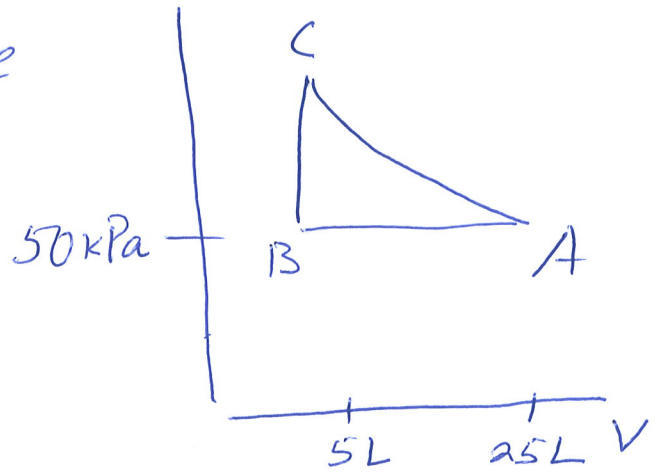
3. A gas goes over the cycle ABCA as shown in figure

AC \equiv isotherm

AB \equiv isobar

L stands for Liter

$$1L = 10^{-3} \text{ m}^3$$



- Find the (P, V) co-ordinates of C

- What is the work done in each part of the cycle and the heat absorbed or rejected in the full cycle?

4. One mole of a gas with $\gamma = 4/3$ goes over a cycle ABCA

where one of AB or AC is isotherm and the other adiabatic.

Write down the (P, V, T) coordinates of A, B, C.

What is the work done in each part of the cycle and the heat absorbed or rejected in the full cycle?

