Tutorial 3 – Batch B

1. 1 kmole of O2 (can be assumed as ideal gas with Cp = 3.5 R and Cv = 2.5 R) is 1 atms and T = 273.15 (termed as state 1)
2. If this gas in state 1 is compressed along a straight line path in the P-V diagram to state 2 with P = 5.2780 atm and V = 5.6049
3. From state 2, it is isothermally expanded to state 3 with P = 2.639 and V = 11.2091
4. then from state 3 it is brought back to state 1 adiabatically.

Please note all paths are reversible paths. R = 8.314 J mol-1 K-1, 1 atm = 1.013x105 Pa

Calculate the q, w, ΔH along each of these paths

1. 18.02 g of liquid water is enclosed under a frictionless, weightless piston at 373K and 1 atm. Pressure. The pressure above the piston is lowered infinitesimally below 1 atm. And the water allowed to evaporate isothermally until no liquid is left. For this process, q = 40671 J.

Calculate w, ΔE and ΔH for the process.

Data : At 373 K and 1 atm , Specific volume of water - 1.043x10-3 m3/kg

And that of steam - 1.677 m3/kg

If in the above process, instead of the reversible expansion, the piston is allowed to move against vacuum on the outside, and still reach the same state finally, calculate q, w, ΔE and ΔH for the process.