CE 213A
HOME ASSIGNMENT-1
ODD SEMESTER-2018

Q.1. A thermometer of mass 0.055 kg and heat capacity 46.1 J/K reads 15.0°C. It is then completely immersed in 0.300 kg of water and it comes to the same final temperature as the water. If the thermometer reads 44.4°C, what was the temperature of the water before insertion of the thermometer, neglecting other heat losses?

Q.2. A mixture of 1.78 kg of water and 262 g of ice at 0°C is, in a reversible process, brought to a final equilibrium state where the water / ice ratio, by mass 1:1 at 0°C. (a) Calculate the entropy change of the system during this process. (b) The system is then returned to the first equilibrium state, but in an irreversible way (by using a Bunsen burner, for instance). Calculate the entropy change of the system during this process. (c) Show that your answer is consistent with the second law of thermodynamics.

Q.3. A gas is contained in a cylinder with a moveable piston on which a heavy block is placed. Suppose the region outside the chamber is evacuated and the total mass of the block and the movable piston is 102 kg. When 2140 J of heat flows into the gas, the internal energy of the gas increases by 1580 J. What is the distance s through which the piston rises?

Q.4. Define Gibbs Free energy and hence Derive the Relationship between Equilibrium Constant and Gibbs free energy and hence Calculate ΔG^{o} for conversion of oxygen to ozone $3/2\ O_2\ (g) \rightarrow O_3\ (g)$ at 300 K, if K_p for this conversion is 9.4710^{-29}.

Q.5. 5 moles of an ideal gas of volume 2.5 m^3 and temperature 25 °C are expanded isothermally to 3.4 m3. The change in entropy during the process is calculated as 5.0 J/mol-K. Calculate the change in internal energy of the system.