

## CHM 222 Assignment 3

1. State the Clausius and Kelvin-Planck statements of Second law. Show that they are equivalent.
2. Prove that all Reversible Engines working between same temperature limits have same efficiency.
3. Prove that for a Reversible process total entropy change is zero.
4. Define a spontaneous process and an equilibrium process. Write down the conditions.
5. Entropy change is a measure of unavailable work- Justify.
6. Chelation is entropy controlled- justify.
7. For a reversible process at constant temperature and pressure decrease of free energy gives amount of non-mechanical work-show- prove.
8. Let for a substance chemical potentials in two phases are  $m_1$  and  $m_2$ . Write down the condition and direction of flow. What is the condition of equilibrium?
9. Given  $dA = -PdV - SdT$  and  $dH = TdS - VdP$ , derive the corresponding Maxwell's relations.
10. Prove that the total work one by a system (mechanical plus non-mechanical) is equal to loss of work function ( $-dA$ ) for a reversible process or less than ( $-dA$ ) in an irreversible process. Does it indicate reversible work greater than irreversible work.