Assignment 1

1. Define corrosion. Corrosion is a process of reverse extractive metallurgy: Explain with an example of extraction of iron.
2. Explain the effect of corrosion and importance of studying corrosion.
3. Can corrosion be advantageous? Explain with an example.
4. Write all the important components of a corrosion cell with proper illustration.
5. What are important types of corrosion on the basis of appearance? Explain briefly with proper illustration.
6. Define free energy? What is its significance for a spontaneous process?
7. Find relationship between free energy and electrochemical potential with reference to following reaction: $Cu^{++} + Zn = Cu + Zn^{++}$.
8. What are half cell reaction and redox reaction? Define standard reduction potential. What is its significance?
9. Standard reduction potential series does not relate to practical corrosion problem. Galvanic series is more useful in predicting corrosion tendency of a metal or alloy. Explain.
10. Find out whether a metal would corrode in deaerated water of pH = 9 at 25^0C.

    Corrosion products: $M(OH)_2$ and H_2.

    Solubility product: $2.0x10^{-16}$

    $E^0_{M++/M} = -0.25$ v
11. Prove $E_{Ag/AgCl} = 0.224 – 0.059pH$ for a silver-silver chloride reference electrode.
12. What is Pourbaix diagram? Show different parts of Pourbaix diagram with proper illustration.
13. Show the significance and limitation of Pourbaix diagram.
14. Use the thermodynamics data as shown in Lectures, draw Pourbaix diagram for Ni and Al and also show different regions with proper reasons.
15. Show that: $O_2 + 2H_2O + 4e = 4OH^-$ and $O_2 + 4H^+ + 4e = 2H_2O$ fall on the same line in a Pourbaix diagram. Indicate significance of water stability zone.