CHEM 281(01) SPRING 2003. Chapter 9. HOMEWORK 8.

1) Which of the following reactions are redox?
   a) $NaCl + AgNO_3 \rightarrow AgCl + NaNO_3$
   b) $NaOH + HCl \rightarrow NaCl + H_2O$
   c) $Zn + 2HCl \rightarrow ZnCl_2 + H_2$
   d) $2Cr + 6HCl \rightarrow 2CrCl_3 + 3H_2$
   e) $MnO_2 + 4HBr \rightarrow Br_2 + MnBr_2 + 2H_2O$

2) Separate the reduction and oxidation half reactions in following chemical equations.
   a) $Zn + 2HCl \rightarrow ZnCl_2 + H_2$
   b) $MnO_2 + 4HBr \rightarrow Br_2 + MnBr_2 + 2H_2O$
   c) $10K + 2KNO_3 \rightarrow N_2 + 6K_2O$

3) Balance following reactions that take place and give the sum of stoichiometric coefficients.
   a) $Cr_2O_7^{2-}(aq) + Cl^-(aq)$ ----- $Cr^{3+}(aq) + Cl_2(g)$ (acid solution)
   b) $Br^-(aq) + MnO_4(aq)$ ----- $Br_2(g) + Mn^{2+}(aq)$ (acid solution)
   c) $Al(s) + MnO_4^-(aq)$ ----- $MnO_2(s) + Al(OH)_4^-(aq)$ (basic solution)

4) Construct a Galvanic cellemploying following reations:
   a) $Ni(s) + Cu^{2+}(aq) \rightarrow Ni^{2+}(aq) + Cu(s)$
   b) $Zn(s) + 2H^+(aq) \rightarrow Zn^{2+}(aq) + H_2(g)$

5) Using the E^0 values given in the table calculate the E^o_{cell} for reactions in problem 4 and identify following:
   a) two half reactions; b) anode; c) cathode; d) direction of electron flow through the external wire.

6) Calculate the ΔG^0 value for reactions in problem 4.
7) Using Ellingham diagram find out the minimum temperature required for the reduction of SiO_2 by C. Please write the redox reactions involved.
8) Estimate the potential difference required to reduce TiO_2 to metal at 1000^0C.
9) Using Lattimer diagram(Appendix 2) calculate the E^0 for the reduction of $HClO_3$ to HClO in aqueous acidic solution.