Part A: Chem 1A review

1) Determine the oxidation number of the elements in each of the following compounds:

a) H_2CO_3

b) N_2

c) $Zn(OH)_4^{2-}$

2) Identify the species being oxidized and reduced in each of the following reactions:

a) $Cr^{+}_{(aq)} + Sn^{4+}_{(aq)} \rightarrow Cr^{3+}_{(aq)} + Sn^{2+}_{(aq)}$

b) $3\ Hg^{2+}_{(aq)} + 2\ Fe_{(s)} \rightarrow 3\ Hg_{2\ (l)} + 2\ Fe^{3+}_{(aq)}$

c) $3CuS_{(s)} + 8H^{+}(aq) + 2NO_3^{-}{}_{(aq)} \rightarrow 3Cu^{2+}(aq) + 3S(s) + 4H_2O(l) + 2NO(g)$

Part B: Balancing Oxidation - Reductions under Acidic Conditions

3) Balance the redox reaction in acidic solution

$$Fe^{2+}_{(aq)} + MnO_4^-{}_{(aq)} \rightarrow Fe^{3+}_{(aq)} + Mn^{2+}_{(aq)}$$

Step 1) Assign oxidation numbers.

Step 2) Separate the overall reaction into two half-reactions: one for oxidation and one for reduction.

Oxidation:

Reduction:

Step 3) Balance each half-reaction with respect to mass (reminder: acidic conditions)

Step 4) Balance each half reaction with respect to charge by adding electrons.

Step 5, 6) Multiply the half reactions by a number to get the electrons to balance and add the two half reactions together

Step 7) Double check!

Part C: Balancing Oxidation - Reductions under Basic Conditions

4) What is the difference between balancing a Redox reaction in a basic solution than in an acidic solution? Is there a difference?

5) Balance the following reaction occurring in basic solution

$$ClO^-_{(aq)} + MnO_{2\,(s)} \rightarrow MnO_4^{2-}{}_{(aq)} + Cl^-_{(aq)}$$

Step 1) Assign oxidation numbers.

Step 2) Separate the overall reaction into two half-reactions: one for oxidation and one for reduction.

Oxidation:

Reduction:

Step 3) Balance each half-reaction with respect to mass (tip: balance in acidic then basic conditions)

Step 4) Balance each half reaction with respect to charge by adding electrons.

Step 5, 6) Multiply the half reactions by a number to get the electrons to balance and add the two half reactions together

Step 7) Double csheck!