Balancing Reactions Summary Notes

1) Oxidation Number Method
2) Using half-reactions
3) In Acidic solutions
4) In Basic solutions

1) Oxidation number method

1) Assign Oxidation numbers to all atoms in the equation

2) Identify the atoms that are oxidized and the atoms that are reduced

3) Look for Lowest Common Multiple

4) Make the change of LCM by adjusting coefficients in the equation

5) If necessary, use the conventional method to balance the remainder of the equation.

2) Basic setup using half-reactions

1) Assign oxidation numbers.

2) Identify the substances oxidized and reduce then write the oxidation and reduction half-reactions.

3) Balance all elements except hydrogen and oxygen.

4) Balance oxygen atoms by using H2O.

5) Balance hydrogen atoms using H+ ions.

6) Balance the number of electrons lost and gained LCM.

7) Add the two half-reactions.

3) Balancing with Half-Reactions in an Acidic Solution

       1) Split the reaction into half reactions and assign oxidation numbers.

$$MnO_4^- + I^- \rightarrow MnO_2 + I_2$$
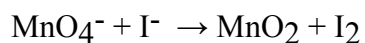
       2) Balance all atoms <u>except</u> for H's and O's.

       3) Add electrons to balance the change in oxidation number. (You must take into account the balancing

       you just did)

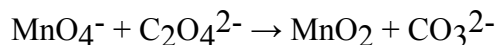   4) Balance the O's by adding H_2O

       5) Balance H`s by adding H^+ ions.

       6) Balance the number of electrons lost and gained (hint: find the LCM)

       7) Add the two half reactions. Cancel anything that appears on both sides of the arrows.

4) Balancing with Half-Reactions in a Basic Solution

1) Follow the first 5 steps of acidic solutions for the following:

$$MnO_4^- + C_2O_4^{2-} \rightarrow MnO_2 + CO_3^{2-}$$

2) Add OH^- ions to neutralize the H^+ ions on both sides of the equation. (when you do this, the side that has the

H^+ will make water which you can re-write)

3) Cancel out the waters from each side of the equation

4) Balance the number of electrons lost and gained (hint: find the LCM)

5) Add the two half-reactions. Cancel anything that appears on both sides of the arrow.