CHE 111 - Extra Practice - Ch 4e
Oxidation/Reduction Reactions

Name: _____ Date: _____

Tips for balancing REDOX reactions.

1. Determine the oxidation state of each element:
   (a) Elements in their natural state = 0
   (b) Hydrogen = +1 as a cation (99%) sometimes −1 (anion paired with a metal)
   (c) Oxygen = −2 (except in H_2O_2)
   (d) Halogens (ceF, Cl, Br, I) generally = +1
   (e) Elements written as monoatomic ions, oxidation number = charge
   (f) Polyatomics: $\sum$ of the oxidation numbers = charge
   (g) Molecules: $\sum$ of the oxidation numbers = 0 (molecules are neutral)
2. Determine which element is oxidized and which is reduced.
   (a) Oxidation - (LEO) Lose Electrons (Oxidation number increases)
   (b) Reduction - (GER) Gain Electrons (Oxidation number decreases)
3. Write the 1/2-reactions. Only write the atoms/molecules that change oxidation state.
4. Balance the 1/2 reactions:
   (a) Balance all atoms except H and O
   (b) Balance O by adding H_2O molecules
   (c) Balance H by adding H^+ ions
   (d) Balance charges by adding e^-
      i. Oxidation Reaction - Add e^- to the Products side
      ii. Reduction Reaction - Add e^- to the Reactant side
5. Multiply each 1/2-reactions by a number such that the electrons will cancel out when the 1/2-reactions are combined. Combine the two 1/2-reactions.
6. Cancel out Like Terms (compounds or ions that are the same on the Reactant and Products side. The electrons **MUST** cancel out.
7. In a **BASIC** reactions add OH^- to both sides of the reaction to cancel out H^+ ions. Take $H^+ + OH^- \longrightarrow H_2O$.
8. Cancel out any Like Terms.
9. Double check that the reactions is balanced (both atoms and charges).

Show work for the following problems on a separate sheet of paper. Record your final answer in the space provided.

1. Write the balanced net ion equation for the following reaction assuming it occurs in an acidic solution.
   $Mg(s) + VO_4^{-3}(aq) \longrightarrow Mg^{+2}(aq) + V^{+2}(aq)$