Chemistry Module 16 Homework

Assignment #1 **Read the first half of Module 16.**

1. What is an oxidation number?
2. What must the oxidation numbers of all atoms in a molecule add up to?
3. Define oxidation.
4. Define reduction.
5. Is it possible for oxidation to occur without reduction?
6. List the seven rules for determining oxidation numbers.
7. What are the oxidation numbers for each atom in the following molecules:
   a. Sn
   b. Sn^{2+}
   c. F_2
   d. O_3
   e. P^{3-}
8. Use the rules to determine the oxidation numbers for **EACH ATOM** in the following molecules:
   a. MnO_2
   b. H_2SO_4
   c. CO_3^{2-}
   d. $CaCl_2$
   e. KNO_3
   f. SF_6
   g. $IrCl_6^{3-}$
   h. S_2O_3
   i. $Al_2(SO_4)_3$
9. An atom changes its oxidation number from +3 to -1. Was it oxidized or reduced? How many electrons did it take to do this?
10. An atom changes its oxidation number from 0 to +2. Was it oxidized or reduced? How many electrons did it take to do this?
11. An atom changes its oxidation number from -3 to 0. Was it oxidized or reduced? How many electrons did it take to do this?
12. An atom changes its oxidation number from -1 to -3. Was it oxidized or reduced? How many electrons did it take to do this?
13. Determine whether or not each of the following is a redox reaction. If it is, identify which atom is being oxidized and which is being reduced.
    a. $2Na(s) + Cl_2(g) \rightarrow 2NaCl(s)$
    b. $H_2SO_4(aq) + 2NH_3(aq) \rightarrow 2NH_4^+(aq) + SO_4^{2-}(aq)$
    c. $Zn(s) + 2MnO_2(s) + 2NH_4Cl(aq) \rightarrow ZnCl_2(aq) + Mn_2O_3(s) + 2NH_3(g) + H_2O(l)$
    d. $2PbSO_4(s) + 2H_2O(l) \rightarrow Pb(s) + PbO_2(s) + 2H_2SO_4(aq)$
    e. $Mg(NO_3)_2(aq) + 2NaOH(aq) \rightarrow Mg(OH)_2(s) + 2NaNO_3(aq)$

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Assignment #2 **Finish reading Module 16.**

1. What is the positive terminal of the battery called?
2. What is the negative terminal called?
3. What are the three reactants in a lead-acid battery?
4. Why are some batteries rechargeable and others not?
5. Name two differences between and alkaline dry cell and a lead-acid battery?
6. A Galvanic cell runs on the following reaction:

$$Ni\ (s) + Cu^{2+}\ (aq) \rightarrow Ni^{2+}\ (aq) + \ Cu\ (s)$$

   a. Draw a diagram for this Galvanic cell.
   b. Label the electron flow, the anode, the cathode, the chemicals used, the salt bridge, and the positive and negative sides of the cell.
   c. Honors – Calculate the reduction potential for the reaction.

7. A Galvanic cell runs on the following reaction:

$$Fe^{3+}\ (aq) + \ Al\ (s) \rightarrow Al^{3+}\ (aq) + \ Fe\ (s)$$

   a. Draw a diagram for this Galvanic cell.
   b. Label the electron flow, the anode, the cathode, the chemicals used, the salt bridge, and the positive and negative sides of the cell.
   c. Honors- Calculate the reduction potential for the reaction.