**Honors Chemistry Assignment Sheet- Unit 7**

**Extra Learning Objectives (beyond regular chem.)**:

* **Assign #1:** Calculate % comp, Empirical Formula, & molecular formula
* **Assign #2 :** Review oxidation numbers, Identify oxidation/ reduction reactions, & label the oxidation state of each

**Assignments Due day of Unit 7 Test**

* Use your textbook & reliable internet resources to learn material
* Answer Keys are posted on the WHS chemistry website (see “important handouts”)

**Honors Assign #1-% Comp, Empirical Formulas, & Molecular Formulas**

* Read each section in your book (shown below), see sample problems, & use reliable internet resources

**Percent Composition** (Pages 226-227 in textbook)

1. Determine the percent composition of each element of the following compounds:
   1. NaCl b. AgNO3

1. Mg(OH)2
2. What is the mass of carbon present in 635.45 grams of glucose (C6H12O6)? Molar mass of C6H12O6 = 180.16 g/mol.

**Empirical Formula & Molecular Formulas** (Pages 229-233 in textbook)

*Write the empirical formula for each of the following molecular formulas:*

1. a. N2O4 b.  NO2 c. C2H6

d. C3H9 e. H2SO4 f. Hg2(NO3)2

1. Determine the **empirical formula** of a compound containing 63.50% silver, 8.25% nitrogen, and the remainder oxygen.
2. A sample is analyzed as containing 24.09 grams of potassium, 0.308 moles of manganese, & 7.42 x 1023 atoms of oxygen. What is the **empirical formula**?
3. a. What is the **molecular formula** of the molecule that has an empirical formula of CH2O and a molar mass of 120.12 g/mol?

b. (Almost same question as above) What is the **molecular formula** of the molecule that has an empirical formula of CH2O and a molar mass of 60.04 g/mol?

1. (Almost same question as above) What is the **molecular formula** of the molecule that has an empirical formula of CH2O and a molar mass of 30.02 g/mol?
2. A sample compound with a formula mass of 34.00 amu is found to consist of .44 g H and 6.92 g O. Find its **molecular formula**.   
   (Hint: even though it’s asking for the molecular formula, you will still need to find the empirical formula first. In the easier problems, like #5, they give you the empirical formula, but here, you’ll have to determine it first)
3. The molar mass of a compound is 92 g/mol. Analysis of a sample of the compound indicates that it contains 31.1 % N and 68.9% O. Find its **molecular formula**. (again, you must find the empirical formula first in order to solve)
4. If 4.04 g of N combine with 11.46 g O to produce a compound with a formula mass of 108.0 amu, what is the **molecular formula** of this compound? (this one’s a bit tricky!)

**Honors Assign #2-Oxidation/ Reduction**

**What:** They are hypothetical numbers assigned to an individual atom or ion using a set of rules.

* They can be +, -, or O
* Can look like charges on ions or valence electrons, but they are not (although they are sometimes the same numbers)

**Rules for Assigning Oxidation Numbers**

|  |  |
| --- | --- |
|  | **Rule** |
| 1 | The oxidation number of any uncombined element is 0. (Uncombined = An element by itself) **EX:** **Na** = 0  This is also true for an diatomic (two-atom) elements. **EX: H2**= 0 **O2**= 0 |
| 2 | The oxidation number of a monatomic (one-atom) ion equals the charge on the ion.  **EX**: **Br-** = -1 **EX:** **Ca2+** = +2 |
|  | The sum of the oxidation numbers in a neutral compound is always 0.  **EX: CaCO3** Ca + C + O (3)  **= 0** |
| 3 | The more electronegative element in a binary (2 different elements) compound is given an oxidation number equal to the charge it would have if it were an ion. EX: **CN-**  N = -3 |
| 4 | **Fluorine** always has an oxidation state of -1 in all of its compounds. (Most electronegative.) **EX:** **NaF** F = -1 Na = +1 |
| 5 | **Oxygen** almost always has an oxidation state of -2.   * Except with fluorine, then it is +2. * Or if it is in a peroxide like H2O2, then it is -1. |
| 6 | **Hydrogen** has an oxidation state of +1 **EX: H2O** (H = +1 & O = -2)   * unless it is with a metal, then it is -1. **EX**: **LiH (**Li = +1 & H = -1) |
| 7 | Elements in Group I, II, and aluminum have oxidation numbers of +1, +2, and +3, (same as their charge)  EX: **Al(OH)3**  (Al = +3, O = -2, & H = +1) |
| 8 | In a polyatomic ion, the sum of the oxidation numbers is equal to the charge of the ion.  **Ex: HSO4-** (H +S +O) = -1 |

**Part I: Oxidation States (reviewed)** (pg 217 – 218 & Pages 591 in textbook)

* Assign oxidation numbers to each element in the compounds/ Ions below:  
  a. HF b. CI4 c. H2O d. PI3

*H = +1 F= -1*

e. CS2 f. Na2O2  g. H2CO3 h. NO2-

i. SO4-2 j. ClO2- k. N2 l. Fe +3

**Part II: Oxidation & Reduction**

1. What does it mean when an element has been oxidized? Reduced?
2. Explain the helpful pneumonic devices “LEO goes GER” & “OIL RIG” for the oxidation/ reduction reactions.

1. Label each of the following half-reactions as either an oxidation or a reduction half-reaction.

0 -1

1. Br2 + 2*e*- 🡪 2Br-

0 +1

1. Na 🡪 Na+ + *e*-

-1 0

1. 2Cl- 🡪 Cl2 + 2*e*-

0 -1

1. Cl2 + 2*e*- 🡪 2Cl-

+1 0

1. Na+ + *e*- 🡪 Na

0 +2

1. Fe 🡪 Fe2+ + 2*e*-

+2 0

1. Cu2+ + 2*e*- 🡪 Cu

+3 +2

1. Fe3+ + *e*- 🡪 Fe2+
2. Which of the following equations represent redox reactions?
3. 2KNO3(*s*) 🡪 2KNO2(*s*) + O2(*g*)
4. H2(*g*) + CuO(*s*) 🡪 Cu(*s*) + H2O(*l*)
5. NaOH(*aq*) + HCl(*aq*) 🡪 NaCl(*aq*) + H2O(*l*)
6. H2(*s*) + Cl2(*g*) 🡪 2HCl(*g*)
7. SO3(*g*) + H2O(*l*) 🡪 H2SO4(*aq*)
8. For each redox equation identified in the previous question, determine which element is oxidized and which is reduced.