Quick Review

- Nomenclature of ionic and covalent compounds
- Memorize tables 2.5-2.8
- Atomic Mass
- The Mole
- Molar Mass
Mass Percent

There are two common ways for describing the composition of a compound: numbers and types of its constituent atoms or by mass percent of its elements.

Mass % - tells us the mass percentage that each element makes up of the compound.

The mass % of elements are constant in a compound and the sum of the mass % of all elements in a compound must equal 100.
Example

**Question:** Calculate the mass % of Al and O in aluminum oxide.

**Answer:**

**Question:** Would water have a higher or lower mass % of O than aluminum oxide?

**Answer:**
Unknown compound is combusted in the presence of excess oxygen, water and CO₂ are collected and weighed.
Empirical vs. Molecular Formula

**Molecular Formula**: actual number and kinds of atoms in a compound.

**Empirical Formula**: simplest whole number ratio of elements in a compound (obtained from mass % data).

<table>
<thead>
<tr>
<th>Molecular Formula</th>
<th>Empirical Formula</th>
</tr>
</thead>
<tbody>
<tr>
<td>H₂O</td>
<td></td>
</tr>
<tr>
<td>H₂O₂</td>
<td></td>
</tr>
<tr>
<td>C₂H₄O₂</td>
<td></td>
</tr>
<tr>
<td>C₄H₈</td>
<td></td>
</tr>
</tbody>
</table>

**Question**: What is the difference in mass between molecular and empirical formulas?
Examples of Problems

1. A certain gas is 81.10 % B and 18.90 % hydrogen by mass. The molar mass of the gas is 53.4 g/mol. Determine the empirical and molecular formula of the gas.

Step #1:
Problem 1 Continued

Step #2:

Step #3:
2. Glucose is the main sugar found in blood. It contains carbon, hydrogen, and oxygen atoms. An elemental analysis of 1.00 g of glucose (i.e. combustion of 1.00 g of glucose) yields 1.47 g of CO$_2$ and 0.600 g of H$_2$O. Glucose has a molar mass of 180.16 g/mol. What is the mass % composition and the empirical and molecular formulas of glucose?
Problem 2 Continued
Problem 2 Continued
Examples of Problems

3. A given sample of xenon fluoride compound contains molecules of the type $\text{XeF}_n$ where $n$ is some whole number. Given that $9.03 \times 10^{20}$ molecules of $\text{XeF}_n$ weighs 0.368 g, determine the value of $n$. 
4. A sample of LSD (D-lysergic acid diethylamide, $\text{C}_{24}\text{H}_{30}\text{N}_3\text{O}$) is added to some table salt (sodium chloride) to form a mixture. Given that a 1.00 g sample of the mixture undergoes combustion to produce 1.20 g of carbon dioxide, what is the mass % of LSD in the mixture?