

Steps for Determining an Empirical Formula

1. Start with the number of grams of each element, given in the problem.
 - o If percentages are given instead of grams, assume that the total mass is 100 grams so that **the mass of each element = the percent given**
2. Convert the mass of each element to moles using the molar mass from the periodic table. **Think ROADMAP! grams → moles!**
3. Compare the moles you calculated for each element and find the element with the **smallest number of moles**. Then **divide** the number of moles for each element by the smallest number of moles.
4. Round to the nearest whole number (ex: 2.1 → 2; 8.9 → 9). This is the **mole ratio** of the elements and is represented by subscripts in the empirical formula.
 - o If the number is too far to round (between .2 - .8), then multiply each solution by the same factor to get the lowest whole number multiple.

Examples:

$$1.5 \times 2 = 3$$

$$1.25 \times 4 = 5$$

$$3.5 \times 2 = 7$$

$$0.75 \times 4 = 3$$