Empirical Formula
Sample Problems

① Calculate the empirical formula for a compound that is 94.1% O and 5.9% H.

* Assume a total mass of 100g

94.1g O

5.9g H
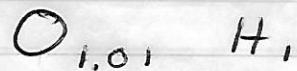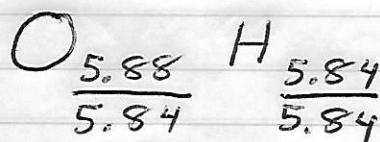
change grams to moles

$$\frac{94.1g\ O}{16.0g/mol} = 5.88\ mol\ O$$

atomic masses from periodic table
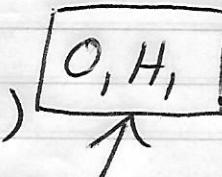
$$\frac{5.9g\ H}{1.01g/mol} = 5.84\ mol\ H$$

formula:

$$O_{\frac{5.88}{5.84}}\ H_{\frac{5.84}{5.84}}$$

$$O_{1.01}\ H_1$$

close enough to $\boxed{O_1 H_1}$ (can round numbers)

↑ empirical formula

- you need to multiply and/or divide to make the subscripts whole numbers

* dividing all subscripts by the smallest number is usually a good place to start

② Calculate the empirical formula for a compound that is 67.6% Hg, 10.8% S and 21.6% O.

*Assume a total of 100g

67.6g Hg

10.8g S

21.6g O

$$\frac{67.6g\ Hg}{200.59g/mol} = 0.34\ mol\ Hg$$

$$\frac{10.8g\ S}{32.06g/mol} = 0.34\ mol\ S$$

$$\frac{21.6g\ O}{16.00g/mol} = 1.35\ mol\ O$$

$$Hg_{\frac{0.34}{0.34}}\ S_{\frac{0.34}{0.34}}\ O_{\frac{1.35}{0.34}}$$

$$Hg_1\ S_1\ O_{3.97}$$

$$\boxed{Hg\,SO_4}$$