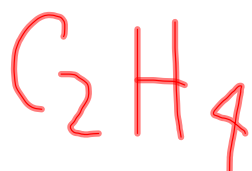
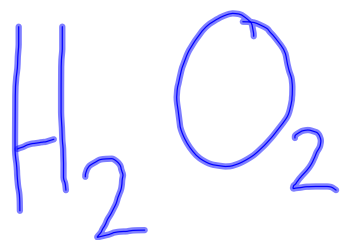
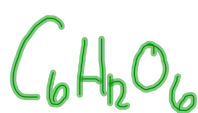


Empirical formulas:

the simplest formula for a
compound written in
smallest whole
number ratios



Which of these IS an empirical formula?



Steps for Determining Empirical Formula (Summarized)

A compound contains 4.8 g N and 8.16 g O. What is the empirical formula?

1. Start with grams (Convert % comp to grams by assuming 100 g)

4.8 g N

8.16 g O

2. Convert grams to moles.

$$\frac{4.8 \text{ g N}}{14 \text{ g/mol}} = 0.34 \text{ mol N}$$

$$\frac{8.16 \text{ g O}}{16 \text{ g/mol}} = 0.51 \text{ mol O}$$

3. Find element with **smallest** number of moles.

0.34 mol N is the smallest

4. Divide each amount of moles by smallest number of moles.

$$\frac{0.34 \text{ mol N}}{0.34} = 1$$

$$\frac{0.51 \text{ mol O}}{0.34} = 1.5$$

5. Depending on the tenths place either round to nearest whole number **OR** multiply each number the same factor to get the smallest **whole number** ratio.

$$1 \text{ N} \times 2 = 2 \text{ N}$$

$$1.5 \text{ O} \times 2 = 3 \text{ O}$$

can't round this! need to multiply to make whole #!



21.52 g K

8.82 g S

17.62 g O

1. Start with grams (Convert % comp to grams by assuming 100 g)
2. Convert grams to moles.
3. Find element with **smallest** number of moles.
4. Divide each amount of moles by smallest number of moles.
5. Depending on the tenths place either round to nearest whole number **OR** multiply each number the same factor to get the smallest **whole number** ratio.

1. Start with grams (Convert % comp to grams by assuming 100 g)

75% C

25% H

2. Convert grams to moles.

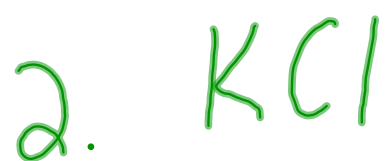
3. Find element with **smallest** number of moles.

4. Divide each amount of moles by smallest number of moles.

5. Depending on the tenths place either round to nearest whole number **OR** multiply each number the same factor to get the smallest **whole number** ratio.

3. MgCl_2

5. CaO





1. Start with grams (Convert % comp to grams by assuming 100 g)

$$\begin{array}{ccc}
 32.4\% \text{ Na} & 22.5\% \text{ S} & 45.1\% \text{ O} \\
 32.4 \text{ g Na} & 22.5 \text{ g S} & 45.1 \text{ g O}
 \end{array}$$

2. Convert grams to moles.

$$\frac{32.4 \text{ g Na}}{23 \text{ g/mol}} = 1.4 \text{ mol} \quad \frac{22.5 \text{ g S}}{32 \text{ g/mol}} = 0.7 \text{ mol} \quad \frac{45.1 \text{ g O}}{16 \text{ g/mol}} = 2.8 \text{ mol}$$

3. Find element with **smallest** number of moles.

$$.7 \text{ mol}$$

4. Divide each amount of moles by smallest number of moles.

$$\frac{1.4}{.7} = 2 \quad \frac{.7}{.7} = 1 \quad \frac{2.8}{.7} = 4$$

5. Depending on the tenths place either round to nearest whole number **OR** multiply each number the same factor to get the smallest **whole number** ratio.





1. Start with grams (Convert % comp to grams by assuming 100 g)



2. Convert grams to moles.

$$\frac{4.78 \text{ g K}}{39 \text{ g/mol}} = .12 \text{ mol} \quad \frac{6.37 \text{ g Cr}}{52 \text{ g/mol}} = .12 \text{ mol} \quad \frac{6.82 \text{ g O}}{16 \text{ g/mol}} = 0.43 \text{ mol}$$

3. Find element with **smallest** number of moles.

$$.12 \text{ mol}$$

4. Divide each amount of moles by smallest number of moles.

$$\frac{.12}{.12} = 1 \quad \frac{.12}{.12} = 1 \quad \frac{.43}{.12} = 3.5$$

5. Depending on the tenths place either round to nearest whole number **OR** multiply each number the same factor to get the smallest **whole number** ratio.

$$1 \times 2 = 2 \quad 1 \times 2 = 2 \quad 3.5 \times 2 = 7$$

