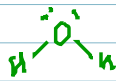
EMPIRICAL FORMULA – the formula for a compound with the smallest possible subscripts

* usually the true formula for ionic compounds

tin(IV) oxide $Sn_2^{4+}O_4^{2-} \longrightarrow SnO_2$ EF

glucose $C_6H_{12}O_6 \longrightarrow CH_2O$ EF

H_2O  subscripts give us a mole ratio of one element to another

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A 7.20g sample of a compound was found to be composed of 2.14g S and 5.06g F. What is the empirical formula? $S_?F_?$

S: $2.14g \times \frac{1\ mol}{32.07g} = \frac{0.0667}{0.0667} \Rightarrow 1$

F: $5.06g \times \frac{1\ mol}{18.99g} = \frac{0.2665}{0.0667} \Rightarrow 3.99 \Rightarrow 4$

SF_4

A compound was found to be 25.9% N and 74.1% O by mass. What is the empirical formula?

N: $25.9g\ N \times \frac{1\ mol}{14.01g} = \frac{1.8487}{1.8487} \Rightarrow 1 \times 2 \rightarrow 2$

O: $74.1g\ O \times \frac{1\ mol}{16.00g} = \frac{4.6313}{1.8487} \Rightarrow 2.51 \times 2 \rightarrow 5$

N_2O_5

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N_2O_5

In a lab procedure, Fe reacts with HCl to produce an iron chloride. $FeCl_2$

a) mass of empty beaker = 25.34g
b) mass of beaker + Fe = 26.84g
c) mass of beaker + iron chloride = 28.74g

mass of Fe = b − a = 1.50g Fe

mass of Cl = c − b = 1.90g Cl

Fe: $1.50\,g \times \frac{1\,mol}{55.85\,g} = \frac{0.0269}{0.0269} \Rightarrow 1$

Cl: $1.90\,g \times \frac{1\,mol}{35.453\,g} = \frac{0.0536}{0.0269} \Rightarrow 2$

$FeCl_2$ iron(II) chloride

$Fe_{(s)} + HCl_{(aq)} \longrightarrow FeCl_{2(s)} + H_2$