Molecular formula - the same or multiple of the empirical formula and is based on the actual (true) # of atoms of each element in the compound.

Emp. forms can be molecular form, but Molecular. forms can NEVER be EF!

Nov 21-9:18 AM

An unknown compound is found to consist of 40.0% carbon, 6.7% hydrogen, and 53.5% oxygen. If the molecular mass of the compound is 60 g/mol, what is the molecular formula of the compound?

1) Find Empirical Formula

2) $\frac{\text{molecular mass}}{\text{empirical mass}} = n$

CH_2O

30 g/mol

$\frac{60}{30} = 2$

$C_2H_4O_2$

Molecular formula- shows the true or actual amount of atoms that make up a compound. It is a multiple of the empirical formula.

$C_{12}H_{24}O_{12}$

MF $C_6H_{12}O_6$ sugar

EF CH_2O

EF
MF H_2O

EF
MF CO_2

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

24.3 g C, 4.1g H, 71.6 g Cl

2. Convert grams to moles.

$\frac{24.3\text{g C}}{12\text{g C}} = 2\text{ mol C}$ $\frac{4.1\text{g H}}{1\text{g H}} = 4.1\text{mol H}$ $\frac{71.6\text{g Cl}}{35\text{g Cl}} = 2\text{ mol Cl}$

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

2 mol smallest

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

$\frac{2\text{ mol C}}{2} = 1$ $\frac{4.1\text{mol H}}{2} \approx 2$ $\frac{2\text{ mol Cl}}{2} = 1$

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.

CH_2Cl

$$\frac{\text{molecular mass}}{\text{empirical mass}} = n$$

EF: NO_2 , 46 g/mol (EM)

14+16+16

$\frac{MM}{EM} = n$

MM = 92 g/mol

MF = ?

$\frac{92}{46} = 2$

$(NO_2)_2$

MF N_2O_4

EF = CH_2

Emp. Mass = 14 g/mol

Molec. Mass = 70 g/mol

MF = ?

$\frac{70}{14} = n = 5$ (Always whole #!)

$(CH_2)_5$

C_5H_{10}

Dec 18-8:06 AM

1. N_2O_4
2. C_5H_{10}
3. $C_2H_4O_2$
4. $C_4H_{10}O$
5. $C_4H_8O_2$

Dec 18-8:31 AM