

Empirical formula(EF) and molecular formula (MF)

EF:

Simplest ratio of atoms of each element in the compound

Example:



MF:

Actual ratio of atoms of each element in the compound

Example:



molar mass

molar mass

molecular formula = $n(\text{Empirical formula})$

 **LIVEWORKSHEETS**

An organic compound M contains only carbon, hydrogen and oxygen. A sample of 2.40 g of M is combusted completely in excess oxygen to produce 5.28 g of CO_2 and 2.88 g of H_2O .

Based on the combustion data, determine the empirical formula of M.

If it is **burning or combustion**, the reaction will involve Oxygen gas



Mass of the C in CO_2 is the mass of C in the P. Use molar mass ratio method to determine the mass of C in CO_2

Mass of the H in H_2O is the mass of H in the P. Use molar mass ratio method to determine the mass of H in H_2O

$$\begin{aligned}
 \text{Mass of C in CO}_2 &= \frac{\text{molar mass C}}{\text{molar mass CO}_2} \times \text{mass CO}_2 \\
 &= \frac{\boxed{} \text{ g/mol}}{\boxed{} \text{ g/mol}} \times \boxed{} \text{ g} \\
 &= \boxed{}
 \end{aligned}$$



Do you know why we cannot use the **same method @ molar mass ratio of O** to determine the mass of Oxygen in compound P?

$$\text{Mass of H in H}_2\text{O} = \frac{\text{molar mass H}}{\text{molar mass H}_2\text{O}} \times \text{mass H}_2\text{O}$$

$$= \frac{\boxed{} \text{ g/mol}}{\boxed{} \text{ g/mol}} \times \boxed{} \text{ g}$$

$$= \boxed{}$$

$$\text{Mass of ibuprofen} = \text{mass C} + \text{mass H} + \text{mass O}$$

$$\text{mass O} = \boxed{}$$

Element	C	H	O
Mass, g			
Mole	$\frac{\text{Mass C}}{\text{Molar mass C}} = \frac{\text{ }}{\text{ }}$	$\frac{\text{Mass H}}{\text{Molar mass H}} = \frac{\text{ }}{\text{ }}$	$\frac{\text{Mass O}}{\text{Molar mass O}} = \frac{\text{ }}{\text{ }}$
Ratio of mole	$\frac{\text{Mole of C}}{\text{Smallest mole}} = \frac{\text{ }}{\text{ }}$ $= \frac{\text{ }}{\text{ }}$	$\frac{\text{Mole of H}}{\text{Smallest mole}} = \frac{\text{ }}{\text{ }}$ $= \frac{\text{ }}{\text{ }}$	$\frac{\text{Mole of O}}{\text{Smallest mole}} = \frac{\text{ }}{\text{ }}$ $= \frac{\text{ }}{\text{ }}$
Simplest ratio			

Empirical formula ibuprofen = C_□H_□O_□

$$\frac{\text{molar mass}}{\text{molecular formula}} = n \left(\frac{\text{molar mass}}{\text{Empirical formula}} \right)$$

$$\boxed{} = n \boxed{}$$

$$n = \boxed{}$$

