

A carbohydrate on analysis gave the following composition: carbon = 40.0%; hydrogen = 6.71%, and oxygen made up the rest. Calculate the molecular formula of this organic compound which has a molecular mass of 181.

Assume the mass of the sample is equal tog then

1-Mass of each element

$$C = \dots \text{ g} \quad H = \dots \text{ g} \quad O = \dots \text{ g}$$

2-Moles of each element

$$\text{Moles of C} = \left(\frac{\text{g C}}{\text{g C}} \right) \times \frac{1 \text{ mol C}}{\text{g C}} = \text{mol C}$$

$$\text{Moles of H} = \left(\frac{\text{g H}}{\text{g F}} \right) \times \frac{1 \text{ mol H}}{\text{g F}} = \text{mol H}$$

$$\text{Moles of O} = \left(\frac{\text{g O}}{\text{g O}} \right) \times \frac{1 \text{ mol O}}{\text{g O}} = \text{mol O}$$

3-Dividing by the smallest number of moles to get the ratio

$$\frac{\text{mol C}}{\text{mol}} : \frac{\text{mol H}}{\text{mol}} : \frac{\text{mol O}}{\text{mol}}$$

If the numbers are close to the integer numbers, then round the numbers if not, multiply by the appropriate coefficient.

The empirical formula $C_{\dots} H_{\dots} O_{\dots}$

4- calculate the mass of the empirical formula

empirical formula= x + x +x =

5- calculate the molecular formula from the next equation

$$n = \frac{\text{molar mass}}{\text{mass of empirical formula}} \quad \text{then } \rightarrow n \times (\text{empirical formula})$$

$$n = \frac{\dots}{\dots} =$$

Molecular formula = $C_{\dots} H_{\dots} O_{\dots}$