

If you dissolve 10.0 g of sugar, $C_{12}H_{22}O_{11}$, in a cup of water (250.0 g) what are the mass fractions of sugar and water?

Solution:

Mass fraction formula:

$$\omega(\text{sugar}) = \frac{m_{\text{sugar}}}{m_{\text{total}}};$$

As the total mass is a sum of sugar mass and water mass, we can transform equation:

$$\omega(\text{sugar}) = \frac{m_{\text{sugar}}}{m_{\text{total}}} = \frac{10 \text{ g}}{250 \text{ g} + 10 \text{ g}} = \frac{10 \text{ g}}{260 \text{ g}} = 0.03846;$$

Mass fraction of water could be determined either by formula or by subtracting $\omega(\text{sugar})$ value from 1 (because we have two component system and sum of all mass fractions of system must be equal to 1):

$$\omega(\text{water}) = \frac{m_{\text{water}}}{m_{\text{total}}} = \frac{250 \text{ g}}{250 \text{ g} + 10 \text{ g}} = \frac{250 \text{ g}}{260 \text{ g}} = 0.96154;$$

or

$$\omega(\text{water}) = 1 - \omega(\text{sugar}) = 1 - 0.03846 = 0.96154;$$

Answer:

Mass fraction of sugar in solution equals to 0.03846; mass fraction of water in solution equals to 0.96154.

Answer provided by www.AssignmentExpert.com