

Answer on Question #49815 – Chemistry - Inorganic Chemistry

Calculate the molarity of a 750.0 mL solution prepared by dissolving 65.00 g of zinc acetate into water

Solution:

$$V_{\text{sol}} = 750.0 \text{ mL} = 0.75 \text{ L}$$

$$m(\text{Zn}(\text{CH}_3\text{COO})_2) = 65.00 \text{ g}$$

$$c(\text{Zn}(\text{CH}_3\text{COO})_2) - ?$$

In chemistry, the molar concentration, it is also called molarity, c_i is defined as the amount of a constituent n_i (usually measured in moles – hence the name) divided by the volume of the mixture V_{sol} :

$$c_i = \frac{n_i}{V_{\text{sol}}}; n_i = \frac{m_i}{Mw_i} \quad \text{so} \quad c_i = \frac{m_i}{Mw_i \times V_{\text{sol}}}$$

Molecular mass or molecular weight refers to the mass of a molecule. It is calculated as the sum of the mass of each constituent atom multiplied by the number of atoms of that element in the molecular formula:

$$Mw = \sum A_i$$

In case of zinc acetate:

$$\begin{aligned} Mw(\text{Zn}(\text{CH}_3\text{COO})_2) &= A(\text{Zn}) + 4 \times A(\text{C}) + 6 \times A(\text{H}) + 4 \times A(\text{O}) \\ &= 65.38 + 4 \times 12.01 + 6 \times 1.01 + 4 \times 15.99 = 183.44 \text{ g/mol} \end{aligned}$$

$$c(\text{Zn}(\text{CH}_3\text{COO})_2) = \frac{65.00 \text{ g}}{183.44 \text{ g/mol} \times 0.75 \text{ L}} = 0.47 \text{ mol/L}$$

Answer: 0.47 mol/L.