

Answer on the Question #65772, Chemistry / General chemistry

Calculate the molarity of 20% of nacl if density = 1.127 kg/liter

Solution:

Molarity is the number of component's moles in volume of solution.

$$c(\text{NaCl}) = \frac{n(\text{NaCl})}{V_{\text{solution}}}$$

Assume that the volume of the solution studied is 1L. Mass of solution:

$$m_{\text{solution}} = V_{\text{solution}} \cdot d = 1\text{L} \cdot 1.127 \frac{\text{kg}}{\text{L}} = 1.127 \text{ kg}$$

The mass of the NaCl is:

$$m(\text{NaCl}) = m_{\text{solution}} \cdot 0.2 = 0.225 \text{ kg} = 225 \text{ g}$$

The mol number of the NaCl:

$$n(\text{NaCl}) = \frac{m(\text{NaCl})}{M(\text{NaCl})} = \frac{225\text{g}}{58.5 \text{ g/mol}} = 3.85 \text{ mol}$$

Molarity of the NaCl in solution with volume of 1 liter is:

$$c(\text{NaCl}) = \frac{n(\text{NaCl})}{V_{\text{solution}}} = \frac{3.85 \text{ mol}}{1 \text{ L}} = 3.85 \frac{\text{mol}}{\text{L}} = 3.85\text{M}$$

Answer: molarity of the NaCl 20% with density of 1.127 kg/L equal to 3.85M.