

Answer on Question #56162 - Chemistry - General chemistry

Question:

Calcium chloride, CaCl_2 , is commonly used as an electrolyte in sports drinks and other beverages, including bottled water. A solution is made by adding 5.00 g of CaCl_2 to 60.0 mL of water at 25°C . The density of the solvent at that temperature is 0.997 g/mL. Calculate the mole percent of CaCl_2 in the solution.

Express your answer as a percent to three significant figures.

This is what they are looking for: mole/mole percent (mol/mol) =???

I entered this....and it was wrong?

Solution:

Let's first calculate the mole number of CaCl_2 and H_2O in the solution:

$$n(\text{CaCl}_2) = m(\text{CaCl}_2) / M(\text{CaCl}_2) = 5 / (40 + 35.5 \times 2) = 0.045 \text{ mol}$$

$$n(\text{H}_2\text{O}) = m(\text{H}_2\text{O}) / M(\text{H}_2\text{O})$$

$$\text{and the mass can be calculated from the density } m(\text{H}_2\text{O}) = V(\text{H}_2\text{O}) \times d(\text{H}_2\text{O}) = 60 \times 0.997 = 59.82 \text{ g}$$

$$n(\text{H}_2\text{O}) = 59.82 / 18 = 3.32 \text{ mol}$$

The mole percent of CaCl_2 can be calculated as follows:

$$n\%(\text{CaCl}_2) = n(\text{CaCl}_2) / [n(\text{CaCl}_2) + n(\text{H}_2\text{O})] = 0.045 / (0.045 + 3.32) = 0.0134 = 1.34\%$$

$$\text{Answer: } n\%(\text{CaCl}_2) = 1.34\%$$