Answer on Question #56065 – 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.

Answer:

$$v = \frac{m}{M}$$
$$\rho = \frac{m}{v} \qquad m = \rho V$$
$$m(H_2O) = 0.997 \cdot 60.0 = 59.8 \; g$$
M($CaCl_2$)=111 g/mol
M(H_2O)=18.1 g/mol
$$v(CaCl_2) = \frac{5.00}{111} = 0.05 \; mol$$
$$v(H_2O) = \frac{59.8}{18.1} = 3.30 \; mol$$
$$v(CaCl_2)\% = \frac{0.05}{3.30 + 0.05} \cdot 100\% = 1.49\%$$