Answer on Question #48966 - Chemistry – Inorganic Chemistry

Question

10g of sample of mixture of $CaCl_2$ and NaCl is treated to precipitate all calcium as $CaCO_3$. This $CaCO_3$ is heated to convert all Ca to CaO and final mass of CaO is 1.62g. The percent by mass of $CaCl_2$ in original mixture is

Answer:

The scheme of this converting is:

$$CaCl_2 \rightarrow CaCO_3 \rightarrow CaO$$

We see that 1 mole of $CaCl_2$ forms 1 mole of $CaCO_3$, then 1 mole of $CaCO_3$ forms 1 mole of CaO.

Number of moles of CaO is:

$$n(CaO) = \frac{m(CaO)}{M(CaO)} = \frac{1.62}{40.1} = 0.029\ mol$$

Therefore, number of moles of $CaCl_2$ in original mixture was 0.029 moles too. Then the mass of $CaCl_2$ in original mixture is:

$$m(CaCl_2) = n(CaCl_2)M(CaCl_2) = 0.029 \cdot 111.1 = 3.22\ g$$

The percent by mass of $CaCl_2$ in original mixture is:

$$\omega(CaCl_2) = \frac{m(CaCl_2)}{m(mixture)} \cdot 100\% = \frac{3.22}{10} \cdot 100\% = 32.2\%$$

Answer: 32.2 %