

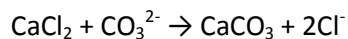
Question#47294 – Chemistry – Inorganic Chemistry

Question:

10 g sample of  $\text{CaCl}_2$  and  $\text{NaCl}$  is treated to precipitate all the Calcium as  $\text{CaCO}_3$ . This  $\text{CaCO}_3$  is heated to convert all the Ca into  $\text{CaO}$  and final mass of  $\text{CaO}$  is 1.62 g. The % by mass of  $\text{CaCl}_2$  in the original mixture is?

Answer:

The precipitation of  $\text{CaCO}_3$ :



Calcium chloride will react, while sodium chloride will remain untouched.

The heating of  $\text{CaCO}_3$ :



If the mass of  $\text{CaO}$  produced is 1.62 g, then the corresponding mass of  $\text{CaCO}_3$ :

$$m(\text{CaCO}_3) = \frac{m(\text{CaO}) \times M(\text{CaCO}_3)}{M(\text{CaO})} = \frac{1.62 \text{ g} \times 100 \text{ g/mol}}{56 \text{ g/mol}} = 2.89 \text{ g}$$

The corresponding mass of  $\text{CaCl}_2$ :

$$m(\text{CaCl}_2) = \frac{m(\text{CaCO}_3) \times M(\text{CaCl}_2)}{M(\text{CaCO}_3)} = \frac{2.89 \text{ g} \times 111 \text{ g/mol}}{100 \text{ g/mol}} = 3.21 \text{ g}$$

The percentage of  $\text{CaCl}_2$ :

$$\omega(\text{CaCl}_2) = \frac{m(\text{CaCl}_2)}{m(\text{CaCl}_2) + m(\text{NaCl})} \times 100\% = \frac{3.21}{10} \times 100\% = 32.1\%$$