

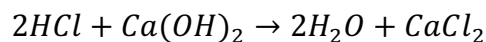
Answer on the question #60144, Chemistry / Other

Question:

What volume of 0.117 M HCl is needed to neutralize 28.67 mL of 0.137 M Ca(OH)₂ ?

Solution:

Let's write the reaction equation:



One can see that 2 moles of hydrochloric acid reacts with 1 mole of calcium hydroxide:

$$\frac{n(\text{HCl})}{2} = n(\text{Ca}(\text{OH})_2).$$

The volume of HCl is equal to the ratio of the number of the moles and concentration:

$$V(\text{HCl}) = \frac{n(\text{HCl})}{c(\text{HCl})} = \frac{2 \cdot n(\text{Ca}(\text{OH})_2)}{c(\text{HCl})}.$$

In its turn, the number of the moles of calcium hydroxide is the product of its volume and molar concentration:

$$\begin{aligned} n(\text{Ca}(\text{OH})_2) &= V(\text{Ca}(\text{OH})_2) \cdot c(\text{Ca}(\text{OH})_2) = 28.67 \cdot 10^{-3}(\text{L}) \cdot 0.137(\text{mol L}^{-1}), \\ n(\text{Ca}(\text{OH})_2) &= 3.928 \cdot 10^{-3}(\text{mol}). \end{aligned}$$

And finally, the volume of hydrochloric acid is:

$$V(\text{HCl}) = \frac{2 \cdot 3.928 \cdot 10^{-3}(\text{mol})}{0.117(\text{mol L}^{-1})} = 67.2 \cdot 10^{-3} \text{ L, or } 67.14 \text{ mL}.$$

Answer: 67.14 mL