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:

$$2HCl + Ca(OH)_2 \rightarrow 2H_2O + CaCl_2$$

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

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

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

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

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

$$n(Ca(OH)_2) = V(Ca(OH)_2) \cdot c(Ca(OH)_2) = 28.67 \cdot 10^{-3}(L) \cdot 0.137(mol\ L^{-1}),$$

$$n(Ca(OH)_2) = 3.928 \cdot 10^{-3}(mol).$$

And finally, the volume of hydrochloric acid is:

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

Answer: 67.14 mL