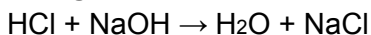


SAMPLE NEUTRALIZATION PROBLEMS

Using the balanced chemical equation:



The reaction uses one mole of sodium hydroxide for every one mole of hydrochloric acid.

YOU WILL USE THIS INFORMATION FOR “n” IN THE EQUATION BELOW:

$$n_b * M_a * V_a = n_a * M_b * V_b \quad \text{(} n_a / n_b = \# \text{ moles of acid/base from balanced equation)}$$

n_a = moles of acid $n_a = 1$ mole

n_b = moles of base $n_b = 1$ mole

M_a = Molarity of Acid $M_a = 0.273$ mol/L

V_a = Volume of Acid $V_a = 25.00$ mL (convert mL to “L”)

M_b = Molarity of Base $M_b = ???$

V_b = Volume of Base $V_b = 43.21$ mL (convert mL to “L”)

Solve the following neutralization problems:

1. What is the concentration of sodium hydroxide if it takes 43.21 mL of sodium hydroxide to neutralize 25.00 mL of 0.273 M hydrochloric acid? $\text{HCl} + \text{NaOH} \rightarrow \text{H}_2\text{O} + \text{NaCl}$

2. Calculate the volume of a 0.200 M KOH solution that is needed to neutralize 25.00 mL of a 0.115 M HCl solution. $\text{KOH} + \text{HCl} \rightarrow \text{KCl} + \text{H}_2\text{O}$

3. Calculate the volume of a 0.35 M H_3PO_4 solution that is needed to neutralize 100 mL of a 3.5 M $\text{Mg}(\text{OH})_2$ solution. $3 \text{Mg}(\text{OH})_2 + 2 \text{H}_3\text{PO}_4 \rightarrow \text{Mg}_3(\text{PO}_4)_2 + 6 \text{H}_2\text{O}$

4. What is the concentration of aluminum hydroxide if it takes 21.21 mL of 3.0 M nitric acid to neutralize 40.00 mL of aluminum hydroxide



5. What is the concentration of hydrochloric acid if it takes 100 mL of a 3.5 M sodium oxide solution to neutralize 150.00 mL of hydrochloric acid?



6. Find the volume of a 6M sulfuric acid solution needed to neutralize 1 liter of a 1.5 M aluminum hydroxide solution.



7. Identify the acid, base, conjugate acid and base in the following:

