8.5B

Solutions for 8.5A Extra Practice Questions: Acid-Base Titration

1. ***Analysis***

$Na_2CO_{3(aq)} + 2\ HCl_{(aq)} \rightarrow H_2CO_{3(aq)} + 2\ NaCl_{(aq)}$

25.0 mL **15.2 mL** *(Note: 15.2 is 15.2 in the calculator.)*

C **0.352 mol/L**

$$n_{HCl} = 15.2\ mL \times \frac{0.352\ mol}{1\ L} = 5.36\ mmol$$

$$n_{Na_2CO_3} = 5.35\ mmol \times \frac{1}{2} = 2.68\ mmol$$

$$C_{Na_2CO_3} = \frac{2.68\ mmol}{25.0\ mL} = 0.107\ mol/L$$

$$\text{or } C_{Na_2CO_3} = 15.2\ mL\ HCl \times \frac{0.352\ mol\ HCl}{1\ L\ HCl} \times \frac{1\ mol\ Na_2CO_3}{2\ mol\ HCL} \times \frac{1}{25.0\ mL}$$

$$= 0.107\ mol/L$$

According to the evidence gathered and the stoichiometric method, the molar concentration of the sodium carbonate solution is 0.107 mol/L.

2. ***Analysis***

$2\ KOH_{(aq)} + H_2SO_{4(aq)} \rightarrow H_2O_{(l)} + K_2SO_{4(aq)}$

10.0 mL **12.6 mL**

C **0.150 mol/L**

$$n_{H_2SO_4} = 12.6\ mL \times \frac{0.150\ mol}{1\ L} = 1.88\ mmol$$

$$n_{KOH} = 1.88\ mmol \times \frac{2}{1} = 3.77\ mmol$$

$$C_{KOH} = \frac{3.77\ mmol}{10.0\ mL} = 0.377\ mol/L$$

$$\text{or } C_{KOH} = 12.6\ mL\ H_2SO_4 \times \frac{0.150\ mol\ H_2SO_4}{1\ L\ H_2SO_4} \times \frac{2\ mol\ KOH}{1\ mol\ H_2SO_4} \times \frac{1}{10.0\ mL} = 0.377\ mol/L$$

Based on the evidence gathered and the stoichiometric method, the molar concentration of the potassium hydroxide solution is 0.377 mol/L.