

Neutralization 25 mL

17. i) $0.150 \frac{\text{mol NaOH}}{\cancel{\text{L}}} \times 0.025 \cancel{\text{L}} = 0.00375 \text{ mol NaOH}$

ii) $0.00375 \frac{\text{mol NaOH}}{\cancel{\text{mol NaOH}}} \times \frac{1 \text{ mol HNO}_3}{1 \text{ mol NaOH}} = 0.00375 \text{ mol HNO}_3$

iii) $\frac{0.00375 \text{ mol HNO}_3}{0.0178 \text{ L HNO}_3} = 0.2106 \frac{\text{mol}}{\text{L}} \text{ HNO}_3$

19 (c) Calcium Hydroxide Ca(OH)_2

$2 \text{HCl} + \text{Ca(OH)}_2 \rightarrow \text{CaCl}_2 + 2\text{H}_2\text{O}$

i) $\frac{0.0045 \text{ mol Ca(OH)}_2}{1 \cancel{\text{L Ca(OH)}_2}} \times 0.080 \cancel{\text{L Ca(OH)}_2} = 0.00036 \text{ mol Ca(OH)}_2$

ii) $0.00036 \text{ mol Ca(OH)}_2 \times \frac{2 \text{ mol HCl}}{1 \text{ mol Ca(OH)}_2} = 0.00072 \text{ mol HCl}$

iii) $\frac{0.00072 \text{ mol HCl}}{0.150 \cancel{\text{mol HCl}}} \times \frac{0.150 \cancel{\text{mol HCl}}}{\text{L HCl}} = 0.0048 \text{ L}$
or
4.8 mL

Hydrolysis Reactions

Salt + Water \rightarrow Acid + Base
(Reverse of neutralization rxn)

* Given a salt, predict if its solution is acidic, basic or neutral.

Examples -

1. $\text{NH}_4\text{Cl} + \text{H}_2\text{O} \rightarrow ?$ focus on ions
 $\text{NH}_4^+ + \text{Cl}^- + \text{H}^+ + \text{OH}^- \rightarrow \text{NH}_4\text{OH} + \text{HCl}$
Base Acid
Weak Strong
Answer: Acidic

2. A NaF solution
 $\text{NaF} + \text{H}^+ + \text{OH}^- \rightarrow \text{NaOH} + \text{HF}$
Strong Weak
base acid
Answer: Base

3. A KNO_3 solution
 $\text{K}^+ \text{OH}^- \text{H}^+ \text{NO}_3^-$
Strong Strong
base acid
neutral

Lab: Is Vinegar 5% Acetic Acid

Calculations

1. Neutralization -
 $\text{CH}_3\text{COOH} + \text{NaOH} \rightarrow \text{NaCH}_3\text{COO} + \text{H}_2\text{O}$

3. Divide by 1000

4. $\frac{1.0 \text{ mol NaOH}}{1 \cancel{\text{L}}} \times 0.00065 \cancel{\text{L NaOH}} = 0.00065 \text{ mol NaOH}$

5. $0.00065 \cancel{\text{mol NaOH}} \times \frac{1 \text{ mol CH}_3\text{COOH}}{1 \cancel{\text{mol NaOH}}} = 0.00065 \text{ mol CH}_3\text{COOH}$

6. $[\text{CH}_3\text{COOH}] = \frac{0.00065 \text{ mol}}{0.00092 \text{ L}} = 0.71 \text{ mol/L}$