Acid-Base Chemistry Review

- Arrenhius Concept of Acid and Bases (Old and Revised)
- Bronsted-Lowry Acid-Base Concept

(Identify acids/bases, amphiprotic)

- Conjugate Acids and Bases
- Water Equilibrium
- Strong/weak Acids/Bases

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Section 19.4

1. $2NaOH(aq) + H_2SO_4(aq) \rightarrow Na_2SO_4(aq) + 2H_2O(l)$

$$0.014\ \cancel{L\ H_2SO_4} \times \frac{0.75\ \cancel{mol\ H_2SO_4}}{1\ \cancel{L\ H_2SO_4}} \times \frac{2\ mol\ NaOH}{1\ \cancel{mol\ H_2SO_4}} = 0.021\ mol\ NaOH$$

$$\text{Molarity} = \frac{\text{moles}}{\text{liters}} = \frac{0.021\ mol\ NaOH}{0.038\ L\ NaOH} = 0.55M\ NaOH$$

2. $Ca(OH)_2(aq) + 2HC_2H_3O_2(aq) \rightarrow Ca(C_2H_3O_2)_2(aq) + 2H_2O(l)$

$$0.0142\ \cancel{L\ HC_2H_3O_2} \times \frac{0.0140\ \cancel{mol\ HC_2H_3O_2}}{1\ \cancel{L\ HC_2H_3O_2}} \times \frac{1\ mol\ Ca(OH)_2}{2\ \cancel{mol\ HC_2H_3O_2}} = 9.94 \times 10^{-5}\ mol\ Ca(OH)_2$$

$$= 9.94 \times 10^{-5}\ mol\ Ca(OH)_2$$

$$\text{Molarity} = \frac{9.94 \times 10^{-5}\ mol\ Ca(OH)_2}{0.0246\ L\ Ca(OH)_2} = 0.00404M$$

$= 0.00404M$

3. $Ca(OH)_2(aq) + H_2SO_4(aq) \rightarrow CaSO_4(aq) + 2H_2O(l)$

$$0.0198 \text{ L } \cancel{Ca(OH)_2} \times \frac{0.0100 \text{ mol } \cancel{Ca(OH)_2}}{1 \text{ L } \cancel{Ca(OH)_2}} \times \frac{1 \text{ mol } H_2SO_4}{1 \text{ mol } \cancel{Ca(OH)_2}} = 0.000198 \text{ mol } H_2SO_4$$

$$= 0.000198 \text{ mol } H_2SO_4$$

$$\text{Molarity} = \frac{\text{moles}}{\text{liters}} = \frac{0.000198 \text{ mol } H_2SO_4}{0.0124 \text{ L } H_2SO_4}$$

$$= 0.0160M \text{ } H_2SO_4$$

4. $Ba(OH)_2(aq) + 2HCl(aq) \rightarrow BaCl_2(aq) + 2H_2O(l)$

$$0.0122 \text{ L } \cancel{HCl} \times \frac{0.25 \text{ mol } \cancel{HCl}}{1 \text{ L } \cancel{HCl}} \times \frac{1 \text{ mol } Ba(OH)_2}{2 \text{ mol HC}}$$

$$= 0.0015 \text{ mol } Ba(OH)_2$$

$$\text{liters} = \frac{\text{moles}}{\text{molarity}} = \frac{0.0015 \text{ mol } Ba(OH)_2}{0.12M \text{ } Ba(OH)_2}$$

$$= 0.0125 \text{ L } Ba(OH)_2 = 13 \text{ mL } Ba(OH)_2$$

5. $Al(OH)_3(aq) + 3HCl(aq) \rightarrow AlCl_3(aq) + 3H_2O(l)$

$$0.0550 \text{ g } \cancel{Al(OH)_3} \times \frac{1 \text{ mol } \cancel{Al(OH)_3}}{78.0 \text{ g } \cancel{Al(OH)_3}} \times \frac{3 \text{ mol HCl}}{1 \text{ mol } \cancel{Al(OH)_3}} = 0.00212 \text{ mol HCl}$$

$$\text{liters} = \frac{\text{moles}}{\text{molarity}} = \frac{0.00212 \text{ mol HCl}}{0.200M \text{ HCl}}$$

$$= 0.0106 \text{ L HCl} = 10.6 \text{ mL HCl}$$

Section 19.5

1. $CHO_2^- + H^+ \rightleftharpoons HCHO_2$

$HCHO_2 + OH^- \rightleftharpoons CHO_2^- + H_2O$

2. **a.** neutral solution

b. acidic solution

c. basic solution

Section Review 19.4

Part A Completion

1. acid
2. hydroxide
3. water
4. neutralization
5. titration
6. end point
7. equivalence

Part B True-False

8. AT
9. AT
10. AT
11. NT

Part C Matching

12. c
13. e
14. a
15. b
16. d

Part D Problem

17. **a.** $H_3PO_4 + Al(OH)_3 \rightarrow AlPO_4 + 3H_2O$

b. $2HI + Ca(OH)_2 \rightarrow CaI_2 + 2H_2O$

19.5

Part A Completion

1. salt
2. acidic
3. basic
4. neutral
5. hydrolyze
6. strong
7. weak
8. buffer
9. capacity

Part B True-False

10. NT
11. NT
12. ST
13. AT

Part C Matching

14. a
15. d
16. b
17. c

Part D Questions and Problems

18. **a.** acidic
    b. neutral
    c. basic

Worksheet

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