Unit 8: Acids and Bases

Chapter 15: Acids and Bases

15.2: Acidity, Basicity, and pH

(Practice on pg. 541)

1. $[H_3O^+] = 1.38 \times 10^{-11}$ mol/L **2.** $[OH^-] = 2.22 \times 10^{-14}$ mol/L **3.** $[H_3O^+] = 2.67 \times 10^{-13}$ mol/L
4. $[OH^-] = 5.00 \times 10^{-14}$ mol/L **5.** $[OH^-] = 2.4 \times 10^{-4}$ mol/L; $[H_3O^+] = 4.2 \times 10^{-11}$ mol/L

(Practice on pg. 544)

1. pH = 2.3 **2.** pH = 0.70 **3.** pH = 11.30 **4.** pH = 13.54

(Practice on pg. 545)

1. $[H_3O^+] = 5.0 \times 10^{-4}$ mol/L **2.** $[OH^-] = 5.0 \times 10^{-3}$ mol/L
3. $[H_3O^+] = 7.9 \times 10^{-9}$ mol/L; $[OH^-] = 1.3 \times 10^{-6}$ mol/L
4. $[H_3O^+] = 2.14 \times 10^{-8}$ mol/L; $[OH^-] = 4.7 \times 10^{-7}$ mol/L (The patient has a mild case of alkalosis.)

(Section Review on pg. 547)

7. $[OH^-] = 3.16 \times 10^{-12}$ mol/L; pH = 2.50 **8.** $[H_3O^+] = 1.3 \times 10^{-3}$ mol/L; $[OH^-] = 7.7 \times 10^{-12}$ mol/L
9. $[OH^-] = 0.088$ mol/L; $[H_3O^+] = 1.1 \times 10^{-13}$ mol/L; pH = 12.95
10. $[H_3O^+] = 3.1 \times 10^{-4}$ mol/L; pH = 3.51 **11.** 1.00×10^{-2} mol HBr **12.** 32 L
13. Yes, pH is negative whenever the hydronium concentration exceeds 1.0 mol/L.

15.3: Neutralization and Titration

(Practice on pg. 556)

1. [NaOH] = 6.9×10^{-3} mol/L **2.** [NaOH] = 0.585 mol/L
3. $n = 4.674 \times 10^{-3}$ mol **4.** $[H_3O^+] = 2.31 \times 10^{-5}$ mol/L

(Section Review on pg. 556)

8. $[OH^-] = 0.177$ mol/L **9.** V of HNO_3 = 13.5 mL **10.** [Base] = 0.0791 mol/L
11. $[H_3O^+] = 0.18$ mol/L **12.** V of HNO_3 = 58 mL

(Chapter Review on pg. 445−447)

20. **(a)** base; conjugate = CH_3COOH **(b)** acid; conjugate = CN^-
(c) acid; conjugate = $OOCCOO^{2-}$ **(d)** acid; conjugate = $C_6H_5NH_2$
21. HCN (acid) + H_2O (base) → CN^- (conjugate base) + H_3O^+ (conjugate acid)
24. $2\ H_2O_{(l)} \rightarrow H_3O^+_{(aq)} + OH^-_{(aq)}$ **25.** pH = 11 is basic, pH = 3 is acidic, pH = 7 is neutral.
26. 1000; 100; 10; 3.16 **41.** $[H_3O^+] = 2.74 \times 10^{-14}$ mol/L **43.** $[OH^-] = 5.35 \times 10^{-12}$ mol/L
45. $[H_3O^+] = 1.41 \times 10^{-7}$ mol/L **47.** pH = 12.13 **49.** pH = 12.91
51. **(a)** pH = 2.3 **(b)** pH = 1.3 **(c)** pH = 0.3 **(d)** pH = −0.7
53. pH = 13.48 **55.** pH = 0.17 **57.** pH = 5.72
59. $[H_3O^+] = 3.2 \times 10^{-10}$ mol/L; $[OH^-] = 3.2 \times 10^{-5}$ mol/L **61.** $n = 3 \times 10^{-5}$ mol
63. $[OH^-] = 5.25 \times 10^{-6}$ mol/L **65.** $[H_3O^+] = 7.9 \times 10^{-11}$ mol/L; $[OH^-] = 1.3 \times 10^{-4}$ mol/L
67. $[OH^-] = 2.0 \times 10^{-10}$ mol/L **69.** $[H_3O^+] = 1.0 \times 10^{-3}$ mol/L **71.** $[H_3O^+] = 5.0 \times 10^{-14}$ mol/L
75. V of NaOH = 55.0 mL **76.** V of NaOH = 37.5 mL **77.** [NaOH] = 0.5260 mol/L
78. [KOH] = 1.412 mol/L **79.** [Acid] = 0.798 mol/L **81.** [Acid] = 0.1544 mol/L
97. **(a)** bromphenol blue

(Standardize Test Prep on pg. 572 & 573)

1. C **2.** H **3.** D
4. Sulphuric acid is a strong acid which completely dissociates in water. Citric acid is a weak acid, which only partially dissociates, so there are fewer ions in solution to carry a charge.
5. Omit **6.** 0.010 mol/L solution of a strong base, such as NaOH or KOH.
7. H **8.** C **9.** G **10.** A **11.** G **12.** C **13.** pH = 13