Chapter Four. Solution

Student:

60. What mass of K_2CO_3 is needed to prepare 200. mL of a solution having a potassium ion concentration of 0.150 M?

A. 4.15 g
B. 10.4 g
C. 13.8 g
D. 2.07 g
E. 1.49 g

61. What mass of Na_2SO_4 is needed to prepare 350. mL of a solution having a sodium ion concentration of 0.125 M?

A. 3.11 g
B. 24.9 g
C. 12.4 g
D. 6.21 g
E. 8.88 g

62. What mass of Li_3PO_4 is needed to prepare 500. mL of a solution having a lithium ion concentration of 0.175 M?

A. 6.75 g
B. 10.1 g
C. 19.3 g
D. 30.4 g
E. 3.38 g

63. A 50.0 mL sample of 0.436 M NH_4NO_3 is diluted with water to a total volume of 250.0 mL. What is the ammonium nitrate concentration in the resulting solution?

A. 21.8 M
B. 0.459 M
C. 2.18×10^{-2} M
D. 8.72×10^{-2} M
E. 0.109 M

64. A 20.00 mL sample of 0.1015 M nitric acid is introduced into a flask, and water is added until the volume of the solution reaches 250. mL. What is the concentration of nitric acid in the final solution?

A. 1.27 M
B. 8.12×10^{-3} M
C. 0.406 M
D. 3.25×10^{-2} M
E. 5.08×10^{-4} M

65. A 3.682 g sample of $KClO_3$ is dissolved in enough water to give 375. mL of solution. What is the chlorate ion concentration in this solution?

A. 3.00×10^{-2} M
B. 4.41×10^{-2} M
C. 0.118 M
D. 1.65×10^{-2} M
E. 8.01×10^{-2} M

66. A 4.691 g sample of $MgCl_2$ is dissolved in enough water to give 750. mL of solution. What is the magnesium ion concentration in this solution?

A. 3.70×10^{-2} M
B. 1.05×10^{-2} M
C. 6.57×10^{-2} M
D. 4.93×10^{-2} M
E. 0.131 M

67. A 0.9182 g sample of $CaBr_2$ is dissolved in enough water to give 500. mL of solution. What is the calcium ion concentration in this solution?

A. 9.19×10^{-3} M
B. 2.30×10^{-3} M
C. 2.72×10^{-3} M
D. 4.59×10^{-3} M
E. 1.25×10^{-3} M

68. 35.0 mL of 0.255 M nitric acid is added to 45.0 mL of 0.328 M $Mg(NO_3)_2$. What is the concentration of nitrate ion in the final solution?

A. 0.481 M
B. 0.296 M
C. 0.854 M
D. 1.10 M
E. 0.0295 M

69. 17.5 mL of a 0.1050 M Na_2CO_3 solution is added to 46.0 mL of 0.1250 M NaCl. What is the concentration of sodium ion in the final solution?

A. 0.205 M
B. 0.119 M
C. 0.539 M
D. 0.148 M
E. 0.165 M

70. 25.0 mL of a 0.2450 M NH_4Cl solution is added to 55.5 mL of 0.1655 M $FeCl_3$. What is the concentration of chloride ion in the final solution?

A. 0.607 M
B. 0.418 M
C. 1.35 M
D. 0.190 M
E. 0.276 M

71. When 38.0 mL of 0.1250 M H_2SO_4 is added to 100. mL of a solution of PbI_2, a precipitate of $PbSO_4$ forms. The $PbSO_4$ is then filtered from the solution, dried, and weighed. If the recovered $PbSO_4$ is found to have a mass of 0.0471 g, what was the concentration of iodide ions in the original solution?

A. 3.10×10^{-4} M
B. 1.55×10^{-4} M
C. 6.20×10^{-3} M
D. 3.11×10^{-3} M
E. 1.55×10^{-3} M

72. When 50.0 mL of a 0.3000 M $AgNO_3$ solution is added to 50.0 mL of a solution of $MgCl_2$, an AgCl precipitate forms immediately. The precipitate is then filtered from the solution, dried, and weighed. If the recovered AgCl is found to have a mass of 0.1183 g, what was the concentration of magnesium ions in the original $MgCl_2$ solution?

A. 0.300 M
B. 8.25×10^{-3} M
C. 1.65×10^{-2} M
D. 2.06×10^{-5} M
E. 4.13×10^{-3} M

73. When 20.0 mL of a 0.250 M $(NH_4)_2S$ solution is added to 150.0 mL of a solution of $Cu(NO_3)_2$, a CuS precipitate forms. The precipitate is then filtered from the solution, dried, and weighed. If the recovered CuS is found to have a mass of 0.3491 g, what was the concentration of copper ions in the original $Cu(NO_3)_2$ solution?

A. 3.65×10^{-3} M
B. 1.22×10^{-2} M
C. 3.33×10^{-2} M
D. 4.87×10^{-2} M
E. 2.43×10^{-2} M

74. 34.62 mL of 0.1510 M NaOH was needed to neutralize 50.0 mL of an H_2SO_4 solution. What is the concentration of the original sulfuric acid solution?

A. 0.0229 M
B. 0.218 M
C. 0.0523 M
D. 0.209 M
E. 0.105 M

75. The concentration of oxalate ion ($C_2O_4^{2-}$) in a sample can be determined by titration with a solution of permanganate ion (MnO_4^-) of known concentration. The net ionic equation for this reaction is

$$2MnO_4^- + 5C_2O_4^{2-} + 16H^+ \rightarrow 2Mn^{2+} + 8H_2O + 10CO_2$$

A 30.00 mL sample of an oxalate solution is found to react completely with 21.93 mL of a 0.1725 M solution of MnO_4^-. What is the oxalate ion concentration in the sample?

A. 0.02914 M
B. 0.4312 M
C. 0.1821 M
D. 0.3152 M
E. 0.05044 M

76. One method of determining the concentration of hydrogen peroxide (H_2O_2) in a solution is through titration with iodide ion. The net ionic equation for this reaction is

$$H_2O_2 + 2I^- + 2H^+ \rightarrow I_2 + 2H_2O$$

A 50.00 mL sample of a hydrogen peroxide solution is found to react completely with 37.12 mL of a 0.1500 M KI solution. What is the concentration of hydrogen peroxide in the sample?

A. 5.568×10^{-2} M
B. 0.2227 M
C. 0.1010 M
D. 0.4041 M
E. 0.1114 M

77. Zinc dissolves in hydrochloric acid to yield hydrogen gas:

$Zn(s) + 2HCl(aq) \rightarrow ZnCl_2(aq) + H_2(g)$

What mass of hydrogen gas is produced when a 7.35 g chunk of zinc dissolves in 500. mL of 1.200 M HCl?

A. 0.605 g
B. 0.113 g
C. 0.302 g
D. 0.453 g
E. 0.227 g

78. Zinc dissolves in hydrochloric acid to yield hydrogen gas:

$Zn(s) + 2HCl(aq) \rightarrow ZnCl_2(aq) + H_2(g)$

When a 12.7 g chunk of zinc dissolves in 500. mL of 1.450 M HCl, what is the concentration of hydrogen ions remaining in the final solution?

A. 0.776 M
B. 0.388 M
C. 0.674 M
D. 1.06 M
E. 0 M

79. Lithium metal dissolves in water to yield hydrogen gas and aqueous lithium hydroxide. What is the final concentration of hydroxide ions when 5.500 g of lithium metal is dropped into 750. mL of water?

A. 1.06 M
B. 0.528 M
C. 2.11 M
D. 0.792 M
E. 0.943 M

80. When solid iron(II) hydroxide is added to water, the resulting solution contains 1.4×10^{-3} g of dissolved iron(II) hydroxide per liter of solution. What is the hydroxide ion concentration in this solution?

A. 7.8×10^{-6} M
B. 1.6×10^{-5} M
C. 2.5×10^{-10} M
D. 3.1×10^{-5} M
E. 4.0×10^{-3} M

81. A 250. mL sample of 0.0328 M HCl is partially neutralized by the addition of 100. mL of 0.0245 M NaOH. Find the concentration of hydrochloric acid in the resulting solution.

A. 0.00700 M
B. 0.0164 M
C. 0.0383 M
D. 0.0230 M
E. 0.0575 M

82. A 350. mL sample of 0.276 M HNO_3 is partially neutralized by 125 mL of 0.0120 M $Ca(OH)_2$. Find the concentration of nitric acid in the resulting solution.

A. 0.210 M
B. 0.00632 M
C. 0.203 M
D. 0.0240 M
E. 0.197 M

83. 158 mL of a 0.148 M NaCl solution is added to 228 mL of a 0.369 M NH_4NO_3 solution. The concentration of ammonium ions in the resulting mixture is

A. 0.157 M.
B. 0.218 M.
C. 0.625 M.
D. 0.369 M.
E. 0 M.

84. 1.40 g of silver nitrate is dissolved in 125 mL of water. To this solution is added 5.00 mL of 1.50 M hydrochloric acid, and a precipitate forms. Find the concentration of silver ions remaining in the solution.

A. 5.7×10^{-3} M
B. 6.34×10^{-2} M
C. 5.77×10^{-2} M
D. 0.121 M
E. 5.9×10^{-3} M

85. Calcium sulfate dihydrate (commonly known as gypsum) dissolves in cold water to the extent of 0.241 g per 100. cm^3. What is the concentration of calcium ions in this solution?

A. 1.77×10^{-2} M
B. 2.80×10^{-2} M
C. 1.77×10^{-3} M
D. 3.54×10^{-2} M
E. 1.40×10^{-2} M

86. Calcium nitrate tetrahydrate dissolves in cold water to the extent of 266 g per 100. cm^3. What is the concentration of nitrate ions in this solution?

A. 32.4 M
B. 22.5 M
C. 11.3 M
D. 16.2 M
E. 8.10 M

Chapter 4 Reactions in Aqueous Solution Key

60.D	72.B	
61.A	73.E	
62.E	74.C	
63.D	75.D	
64.B	76.A	
65.E	77.E	
66.C	78.C	
67.A	79.A	
68.A	80.D	
69.D	81.B	
70.B	82.E	
71.D	83.B	