Chemistry Lab

Equilibrium Practice Test

Basic Concepts of Equilibrium and Le Chatelier’s Principle

**1. Which statement is correct about a system at equilibrium?**

(A) The forward and reverse reactions occur at identical rates.

(B) The concentrations of reactants must equal the concentrations of the products.

(C) The concentrations of reactants and products can be changed by adding a catalyst.

(D) The concentrations of reactants and products are not affected by a change in temperature.

**2. For the equilibrium system:**

**CO(g) + 2 H2(g) ↔ CH3OH(l)**

**What is Kc?**

(A) Kc = [CH3OH]

 2[CO][H2]

(B) Kc = [CH3OH]

 [CO][H2]2

(C) Kc = \_\_\_\_1\_\_\_\_

 2[CO][H2]

(D) Kc = \_\_\_1\_\_\_

 [CO][H2]2

**3. What is the equilibrium expression for this reaction?**

**2 HgO(s) ↔ 2 Hg(l) + O2(g)**

(A) K = [Hg][O2]

 [HgO]

(B) K = [Hg]2[O2]

 [HgO]2

(C) K = [Hg]2[O2]

(D) K = [O2]

**4. CO(g) + Cl2(g) ↔ COCl(g) + Cl(g) Keq = 1.5 × 10-39**

**If the rate constant, k, for the forward reaction above is 1.4 x 10-28 L·mol-1·sec-1 what is k (in L·mol-1·sec-1) for the backward reaction?**

(A) 2.1 × 10-67

(B) 1.0 × 10-11

(C) 9.3 × 1010

(D) 7.1 × 1027

**5. Consider the reaction carried out at constant volume:**

**2SO2(g) + O2(g) ↔ 2SO3(g)**

**For initial concentrations of SO2 and O2 of 2.0 M and 1.5 M, respectively, the equilibrium O2 concentration is 0.80 M. What is the value of Kc for this reaction?**

(A) 6.8

(B) 2.9

(C) 0.34

(D) 0.15

**6. A 2.0 L container is charged with a mixture of 6.0 moles of CO(g) and 6.0 moles of H2O(g) and the following reaction takes place:**

**CO(g) + H2O(g) ↔ CO2(g) + H2(g)**

**When equilibrium is reached the [CO2] = 2.4 M. What is the value of Kc for the reaction?**

(A) 16

(B) 4.0

(C) 0.25

(D) 0.063

**7. For which reaction does Kp = Kc?**

(A) 2C(s) + O2(g) ↔ 2CO(g)

(B) N2(g) + 3H2(g) ↔ 2NH3(g)

(C) 2H2(g) + O2(g) ↔ 2H2O(g)

(D) H2(g) + I2(g) ↔ 2HI(g)

**8. For the synthesis of ammonia, Kc is 1.2 at 375 ̊C**

**N2(g) + 3H2(g) ↔ 2NH3(g)**

**What is Kp at this temperature?**

(A) 4.1 × 10–8

(B) 4.2 × 10–4

(C) 1.3 × 10–3

(D) 3.4 × 103

**9. Consider these reactions and their corresponding values of K.**

**½N2 + O2 → NO2 K1**

**2NO2 → 2NO + O2 K2**

**NOBr → NO + ½Br2 K3**

**Express the K value for the reaction below in terms of K1, K2, and K3.**

**½N2 + ½O2 +½Br2 → NOBr K = ?**

(A) K1 + K2/2 – K3

(B) K1 + (K2)1/2 – K3

(C) K1K2/2K3

(D) K1(K2)1/2/K3

**10. Determine K for the reaction:**

**H2C2O4(aq) + 2OH–(aq) ↔ C2O42–(aq) + 2H2O(l)**

**H2C2O4(aq) Ka1 = 6.5 × 10–2 Ka2 = 6.1 × 10–5**

**H2O Kw = 1.0 × 10–14**

(A) 4.0 ×10–34

(B) 4.0 ×10–6

(C) 4.0 ×106

(D) 4.0 ×1022

**11. For the reaction 2A(g) + 2B(g) ↔ 3C(g) at a certain temperature, K is 2.5 × 10–2. For which conditions will the reaction proceed to the right at the same temperature?**

 [A], M [B], M [C], M

(A) 0.10 0.10 0.10

(B) 1.0 1.0 1.0

(C) 1.0 0.10 0.10

(D) 1.0 1.0 0.10

**12. Consider the system at equilibrium:**

**2SO2(g) + O2(g) ↔ 2SO3(g) for which ∆H < 0.**

**Which change(s) will increase the yield of SO3(g)?**

**I Increasing the temperature**

**II Increasing the volume of the container**

(A) I only

(B) II only

(C) Both I and II

(D) Neither I nor II

**13. In which reaction at equilibrium will the amount of reactants present increase with an increase in the container volume?**

(A) C(s) + CO2(g) ↔ 2CO(g)

(B) H2(g) + F2(g) ↔ 2HF(g)

(C) CO(g) + NO2(g) ↔ CO2(g) + NO(g)

(D) N2(g) + 3 H2(g) ↔ 2NH3(g)

**14. The equilibrium system N2O4(g) ↔ 2NO2(g) has Kp = 11 and ∆H = 57 kJ·mol–1 at 25 ̊C. Which action will not cause a change in the position of the equilibrium?**

(A) increasing the temperature

(B) adding NO2(g)

(C) adding xenon gas to increase the pressure

(D) increasing the container volume

**15. For the exothermic reaction**

**4 NH3(g) + 7 O2(g) ↔ 4 NO2(g) + 6 H2O(g)**

**Which change will increase the quantity of NO2 in the mixture?**

(A) increasing temperature

(B) decreasing container volume

(C) adding Ne(g)

(D) adding H2O(g)

**16. C(s) + H2O(g) ↔ CO(g) + H2(g) ∆H > 0**

**For the system above at equilibrium, which changes will increase the amount of H2(g)?**

**I Adding C(s)**

**II Increasing the volume of the container**

**III Increasing the temperature**

(A) I only

(B) III only

(C) II and III only

(D) I, II and III

**17. Consider the system at equilibrium:**

**NH4HS(s) ↔ NH3(g) + H2S(g) ∆H > 0**

**Factors which favor the formation of more H2S(g) include which of the following?**

**I adding a small amount of NH4HS(s) at constant volume**

**II increasing the pressure at constant temperature**

**III increasing the temperature at constant pressure**

(A) I only

(B) III only

(C) I and II only

(D) I and III only

**18. Which range includes the value of the equilibrium constant, Keq, for a system with ∆G ̊ << 0?**

(A) –1 < Keq < 0

(B) 0 < Keq < 1

(C) Keq < –1

(D) 1 < Keq

Acid-Base Equilibrium

**19. Weak acids include which of the following?**

**I. HF(aq) II. HI(aq) III. HNO2(aq)**

(A) I only

(B) II only

(C) III only

(D) I and III Only

**20. A 1 M aqueous solution of which molecule has the lowest pH?**

(A) HOCl

(B) H2SO3

(C) H3PO4

(D) H2SO4

**21. When the acids: HClO3, H3BO3, H3PO4, are arranged in order of increasing strength, which order is correct?**

(A) H3BO3 < H3PO4 < HClO3

(B) HClO3 < H3BO3 < H3PO4

(C) H3PO4 < HClO3 < H3BO3

(D) H3BO3 < HClO3 < H3PO4

**22. The addition of 0.01 mol of which of the following to 100 mL of H2O will give the most alkaline aqueous solution?**

(A) NH3

(B) HONH2

(C) CH3NH2

(D) H2NNH2

**23. What is the [OH–] in an aqueous solution which has a pH = 11.70?**

(A) 7.1 × 10–2 M

(B) 5.0 × 10–3 M

(C) 1.4 × 10–6 M

(D) 2.0 × 10–12 M

**24. What is the conjugate base of HSO4–?**

(A) H+

(B) H2SO4

(C) OH–

(D) SO42–

**25. Which is not a conjugate acid/base pair?**

(A) H2CO3 & CO32–

(B) HSO4– & SO42–

(C) H2PO4– & HPO42–

(D) H3O+ & H2O

**26. Which weak acid has the strongest conjugate base?**

(A) acetic acid (Ka = 1.8 × 10–5)

(B) formic acid (Ka = 1.8 × 10–4)

(C) hydrofluoric acid (Ka = 6.8 × 10–4)

(D) propanoic acid (Ka = 5.5 × 10–5)

**27. C6H5OH(aq) + CN–(aq) ↔ HCN(aq) + C6H5O–(aq)**

**The equilibrium constant for this reaction is less than 1. What is the strongest base in this system?**

(A) C6H5OH(aq)

(B) CN–(aq)

(C) HCN(aq)

(D) C6H5O–(aq)

**28. The position of equilibrium lies to the right in each of these reactions.**

**N2H5+ + NH3 ↔ NH4+ + N2H4**

**NH3 + HBr ↔ NH4+ + Br–**

**N2H4 + HBr ↔ N2H5+ + Br–**

**Based on this information, what is the order of acid strength?**

(A) HBr > N2H5+ > NH4+

(B) N2H5+ > N2H4 > NH4+

(C) NH3 > N2H4 > Br–

(D) N2H5+ > HBr > NH4+

**29. What is the pH of a solution made by mixing 200. mL of 0.0657 M NaOH, 140. mL of 0.107 M HCl, and 160. mL of H2O?**

(A) 3.04

(B) 2.74

(C) 2.43

(D) 2.27

**30. Which is the weakest acid?**

(A) ascorbic acid (Ka = 8.0 × 10–5)

(B) boric acid (Ka = 5.8 × 10–10)

(C) butyric acid (Ka = 1.5 × 10–5)

(D) hydrocyanic acid (Ka = 4.9 × 10–10)

**31. At 20.0 ̊C water has Kw = 6.807 × 10–15. What is the pH of pure water at this temperature?**

(A) 6.667

(B) 6.920

(C) 7.000

(D) 7.084

**32. The Ka of hydrocyanic acid, HCN, is 5.0 × 10–10. What is the pH of 0.050 M HCN (aq)?**

(A) between 3.5 and 4.5

(B) between 5.0 and 5.5

(C) between 9.0 and 9.5

(D) between 10.5 and 11.0

**33. A 0.015 M solution of a weak acid has a pH of 3.52. What is the value of the Ka for this acid?**

(A) 2.0 x 10–2

(B) 6.2 x 10–6

(C) 9.1 x 10–8

(D) 1.4 x 10–9

**34. In a solution of formic acid (Ka = 1.7 × 10-4), the [H+] = 2.3 × 10-3. What is the concentration of formic acid in mol·L-1?**

(A) 7.2 × 10-2

(B) 3.1 × 10-2

(C) 5.3 × 10-6

(D) 3.9 × 10-7

**35. What is the percentage ionization of HCOOH molecules in a 0.10 M solution?**

**[Ka = 1.8 × 10–4]**

(A) 4.2%

(B) 2.7%

(C) 1.8%

(D) 1.3%

**36. What is the pH of a 0.010 M solution of a weak acid HA that is 4.0% ionized?**

(A) 0.60

(B) 0.80

(C) 2.80

(D) 3.40

**37. Correct statements about the percentage ionization of weak acids in water include which of the following?**

**I The percentage ionization increases as the ionization constant of the acid becomes larger.**

**II The percentage ionization increases as the concentration of the acid becomes smaller.**

(A) I only

(B) II only

(C) Both I and II

(D) Neither I nor II

**38. Acetylsalicylic acid (aspirin) behaves as an acid according to the equation shown. Calculate Kb for the C9H7O4–(aq) ion. (Ka = 3.0 x 10-4)**

**HC9H7O4(aq) + H2O ↔ H3O+(aq) + C9H7O4–(aq)**

(A) 3.0 x 10-17

(B) 3.3 x 10-11

(C) 9.0 x 10-8

(D) 3.3 x 103

**39. What is the pH of a 0.20 M HA solution (Ka = 1.0 × 10–6) that contains 0.40 M NaA?**

(A) 3.15

(B) 3.35

(C) 5.70

(D) 6.30

**40. Calculate the pH of a 0.10 M solution of H2CO3. (Ka1 = 4.4 × 10-7; Ka2 = 4.7 × 10-11)**

(A) 3.68

(B) 5.76

(C) 7.36

(D) 9.34

**41. A solution of 0.10 M NaZ has a pH = 8.90. What is the Ka of HZ?**

(A) 1.6 × 10–4

(B) 1.6 × 10–5

(C) 6.3 × 10–10

(D) 6.3 × 10–11

**42. Calculate the hydronium ion concentration in 50.0 mL of 0.10 M NaH2AsO4. (K1 = 6.0 × 10-3, K2 = 1.1 × 10-7, K3 = 3.0 × 10-12)**

(A) 2.4 × 10-2

(B) 1.6 × 10-3

(C) 1.0 × 10-4

(D) 2.5 × 10-5

**43. A 0.1 M solution of which salt will have a pH less than 7?**

(A) NaCl

(B) NH4Br

(C) KF

(D) NaO2CCH3

**44. Which salt gives the most acidic 0.1 M solution in water?**

(A) NaCl

(B) NaNO2

(C) NH4Cl

(D) NH4NO2

**45. Which solution has the highest pH? (Ka of CH3COOH = 1.8 × 10–5; Ka of HCN = 5.8 × 10–10)**

(A) 0.10M CH3COOH

(B) 0.10M HCN

(C) 0.10M CH3COOK

(D) 0.10M NaBr

**46. When 0.10 M solutions of HF, HCl, KF, and KCl are arranged in order of increasing pH which order is correct?**

(A) HF, HCl, KF, KCl

(B) HCl, HF, KF, KCl

(C) HCl, HF, KCl, KF

(D) HF, HCl, KCl, KF

**47. HCN is a weak acid (Ka = 6.2 × 10–10). NH3 is a weak base (Kb = 1.8 × 10–5). A 1.0 M solution of NH4CN would be**

(A) strongly acidic

(B) weakly acidic

(C) neutral

(D) weakly basic

**48. When a solution of NH3 (Kb = 1.8 x 10-5) is titrated with a strong acid the indicator used should change color near a pH of**

(A) 1

(B) 5

(C) 9

(D) 13

**49. Which acid-base indicator will give the best results for the titration of an aqueous ammonia solution with 0.10 M HCl?**

 Indicator Color change pH range

(A) Methyl violet red → blue 0 → 2

(B) Methyl red red → yellow 4 → 6

(C) Cresol red yellow → purple 7 → 9

(D) Phenolphthalein colorless → pink 8 →10

**50. The amount of sodium hydrogen carbonate, NaHCO3, in an antacid tablet is to be determined by dissolving the tablet in water and titrating the resulting solution with hydrochloric acid. Which indicator is the most appropriate for this titration? (Ka of H2CO3: 2.5 × 10–4; Ka of HCO3–: 2.4 ×10–8)**

(A) methyl orange, pKin = 3.7

(B) bromothymol blue, pKin = 7.0

(C) phenolphthalein, pKin = 9.3

(D) alizarin yellow, pKin = 12.5

**51. The acid–base indicator methyl red has a Ka of 1 × 10–5. Its acidic form is red while its alkaline form is yellow. If methyl red is added to a colorless solution with a pH = 7, the color will be**

(A) pink

(B) red

(C) orange

(D) yellow

**52. Determine the volume of 0.125 M NaOH required to titrate to the equivalence point 25.0 mL of a 0.175 M solution of a monoprotic weak acid that is 20% ionized.**

(A) 7.00 mL

(B) 17.9 mL

(C) 28.0 mL

(D) 35.0 mL

**53. What is the pH of the solution made by mixing 25.0 mL of 1.00 × 10–3 M HNO3 and 25.0 mL of 1.00 × 10–3 M NH3? [Kb for NH3 = 1.8 × 10–5]**

(A) 4.02

(B) 6.28

(C) 7.72

(D) 9.98

**54. Equal volumes of 0.25 M HNO2 and 0.25 M HNO3 are titrated separately with 0.25 M KOH. Which would be the same for both titrations?**

(A) initial pH

(B) pH halfway to the equivalence point

(C) pH at the equivalence point

(D) pH when 5 mL excess KOH has been added

**55. If the initial pH values are the same for titrations of separate 25 mL samples of weak and strong monoprotic acids, which other value(s) is(are) also the same?**

**I the pH at the equivalence point**

**II the volume of base needed to reach the equivalence point**

(A) I only

(B) II only

(C) Both I and II

(D) Neither I nor II

**56. The curve represents the titration of**

(A) a diprotic acid.

(B) two monoprotic acids with the same Kas but different concentrations.

(C) two monoprotic acids with different Kas but the same concentrations.

(D) two monoprotic acids with different Kas and different concentrations.



**57. A 75 mL solution that is 0.10 M in HC2H3O2 and 0.10 M in NaC2H3O2 has a pH of 4.74. Which of the following actions will change the pH of this solution?**

**I Adding 15 mL of 0.10 M HCl**

**II Adding 0.010 mol of NaC2H3O2**

**III Diluting the solution from 75 mL to 125 mL**

(A) I only

(B) II only

(C) I and II only

(D) I, II and III

**58. What happens to the pH of a buffer solution when it is diluted by a factor of 10?**

(A) The buffer pH decreases by 1 unit.

(B) The buffer pH increases by 1 unit.

(C) The change in pH depends on the buffer used.

(D) The pH does not change appreciably.

**59. A weak monoprotic acid is titrated with NaOH. Over what pH range(s) will the acid being titrated serve as a buffer when mixed with its salt?**

**I. pH 4 – 6**

**II. pH 7 – 9**

**III. pH 12 – 13**

(A) I only

(B) II only

(C) I and III only

(D) I, II and III

**60. What is the pH of a solution that is 0.20 M in HF and 0.40 M in NaF? [Ka****= 7.2 × 10–4]**

(A) 1.92

(B) 2.84

(C) 3.14

(D) 3.44

**61. Which one of the following mixtures creates a buffer solution?**

(A) 10.0 mL 0.10 M NaOH, 10.0 mL 0.10 M HF

(B) 20.0 mL 0.10 M NaOH, 15.0 mL 0.10 M HF

(C) 15.0 mL 0.10 M NaOH, 20.0 mL 0.10 M HF

(D) 10.0 mL 0.10 M NaOH, 5.0 mL 0.20 M HF

**62. Which pair of solutions forms a buffer solution when equal volumes of each are mixed?**

(A) 0.20 M HCl and 0.20 M NaOH

(B) 0.40 M HC2H3O2 and 0.20 M NaOH

(C) 0.20 M HCl and 0.20 M NH3

(D) 0.40 M HCl and 0.20 M NH3

**63. Which base is most suitable to prepare a buffer solution with a pH = 11.00?**

(A) ammonia (Kb = 1.8 × 10-5)

(B) aniline (Kb= 4.0 × 10-10)

(C) methylamine (Kb = 4.4 × 10-4)

(D) pyridine (Kb = 1.7 × 10-9)

**64. A student is asked to prepare a buffer solution with a pH of 4.00. This can be accomplished by using a solution containing which of the following?**

**Ka of HNO2 = 4.5 × 10-4**

**Ka of HCN = 4.9 × 10-10**

(A) HNO2 only

(B) HCN only

(C) HNO2 and NaNO2

(D) HCN and NaCN

**65. What volumes of 0.200 M HNO2 and 0.200 M NaNO2 are required to make 500. mL of a buffer solution with pH = 3.00? [Ka for HNO2 = 4.00 x 10–4]**

(A) 250. mL of each

(B) 143 mL of HNO2 and 357 mL of NaNO2

(C) 200. mL of HNO2 and 300. mL of NaNO2

(D) 357 mL of HNO2 and 143 mL of NaNO2

**66. What will happen to the pH of a buffer solution when a small amount of a strong base is added? The pH will**

(A) increase slightly

(B) decrease slightly

(C) remain exactly the same

(D) become 7.0

**67. What is the pH of a 1.00 L sample of a buffer solution containing 0.10 mol of benzoic acid and 0.10 mol of sodium benzoate to which 0.010 mol of NaOH has been added? [Ka of benzoic acid = 6.5 × 10–5]**

(A) 4.27

(B) 4.23

(C) 4.15

(D) 4.10

**68. 1.0 L of an aqueous solution in which [H2CO3] = [HCO3-] = 0.10 M, has [H+] = 4.2 × 10-7. What is the [H+] after 0.005 mole of NaOH has been added?**

(A) 2.1 × 10-9 M

(B) 2.2 × 10-8 M

(C) 3.8 × 10-7 M

(D) 4.6 × 10-7 M

Solubility Equilibrium

**69. A saturated solution of manganese(II) carbonate (MM = 114.95 g/mol) contains 5.44 ×10–5g of MnCO3 per 100 mL at 25 ̊C. What is its Ksp at this temperature?**

(A) 4.7 ×10–6

(B) 3.0×10–9

(C) 2.2×10–11

(D) 2.2×10–13

**70. What is the solubility in pure water of Ba(IO3)2 in moles per liter at 25 ̊C? [Ksp (25 ̊C) = 6.0 × 10–10]**

(A) 1.2 × 10–5

(B) 1.7 × 10–5

(C) 5.3 × 10–4

(D) 8.4 × 10–4

**71. For which salt is the molar solubility equal to 4 × 10–6 M?**

(A) AgC2H3O2 Ksp = 2 × 10–3

(B) TlBr Ksp = 4 × 10–6

(C) MnCO3 Ksp = 2 × 10–11

(D) Zn(OH)2 Ksp = 3 × 10–17

**72. When solid silver chloride (MM = 143.4 g/mol) is added to 100. mL of H2O, 1.9 x 10-4 grams dissolves. What is the Ksp for silver chloride?**

(A) 1.3 x 10-5

(B) 3.7 x 10-6

(C) 3.7 x 10-8

(D) 1.8 x 10-10

**73. When the compounds below are arranged in order of increasing solubility in water, which order is correct? (Ksp of BaCO3: 2.6 × 10-9; BaSO4: 1.1 × 10-10; CaCO3: 4.9 × 10-9; CaSO4: 7.1 × 10-9)**

(A) BaCO3, BaSO4, CaCO3, CaSO4

(B) BaSO4, CaCO3, CaSO4, BaCO3

(C) CaSO4, CaCO3, BaCO3, BaSO4

(D) BaSO~~4~~, BaCO3, CaCO3, CaSO4

**74. For the reaction: PbI2(s) ↔ Pb2+(aq) + 2I–(aq), Ksp = 8.4 × 10-9**

**What is the concentration of Pb2+ in mol/L in a saturated solution of PbI2 in which [I–] = 0.01 M?**

(A) 8.4 × 10-7

(B) 8.4 × 10-5

(C) 1.3 × 10-3

(D) 2.0 × 10-3

**75. What is the [Mg2+] in 0.10 M NaF that is saturated with MgF2 at 25 ̊C? (Ksp of MgF2 = 6.4 × 10-9)**

(A) 0.050 M

(B) 1.9 × 10-3 M

(C) 1.2 × 10-3 M

(D) 6.4 × 10-7 M

**76. A saturated solution of which salt will have the highest [Ag+]?**

(A) AgCl (Ksp= 1.8 × 10–10)

(B) Ag2CrO4 (Ksp= 1.1 × 10–12)

(C) Ag3PO4 (Ksp= 1.8 × 10–18)

(D) Ag2S (Ksp= 6.0 × 10–51)

**77. A 500. mL saturated solution of MgCO3 (MM = 84 g/mol) is reduced to 120. mL by evaporation. What mass of solid MgCO3 is formed? [Ksp = 4.0 ×10–5]**

(A) 0.0013 g

(B) 0.064 g

(C) 0.20 g

(D) 0.27 g

**78. Which statement is correct about the initial precipitate that forms when a 0.10 M NaF solution is added slowly to a solution that is 0.10 M with respect to both Ca(NO3)2 and Mg(NO3)2? (Ksp of CaF2 = 4.0 × 10–11; Ksp of MgF2 = 6.4 × 10–9)**

(A) The initial precipitate will contain CaF2 only.

(B) The initial precipitate will contain MgF2 only.

(C) The initial precipitate will contain both CaF2 and MgF2 with more CaF2.

(D) The initial precipitate will contain both CaF2 and MgF2 with more MgF2.

**79. Equal volumes of 1 × 10–4 M solutions of Cd2+ and CO32– ions are mixed in one flask and equal volumes of 1 × 10–4 M solutions of Ag+ and CrO42– ions are mixed in a second. Which substances precipitate?**

**Ksp of CdCO3: 5.2 × 10–12**

**Ksp of Ag2CrO4: 1.1 × 10–12**

(A) CdCO3 only

(B) Ag2CrO4 only

(C) Both

(D) Neither

**80. A solution of Pb(NO3)2 is added dropwise to a second solution in which [Cl-] = [F-] = [I-] = [SO42-] = 0.001 M. What is the first precipitate that forms?**

(A) PbCl2  (Ksp = 1.5 × 10-5)

(B) PbF2 (Ksp = 3.7 ×10-8)

(C) PbI2  (Ksp = 8.5 × 10-9)

(D) PbSO4  (Ksp = 1.8 × 10-8)

**81. Lead(II) fluoride (PbF2), lead(II) chloride (PbCl2), lead(II) bromide (PbBr2), and lead(II) iodide (PbI2) are all slightly soluble in water. Which lead salt will increase in solubility when its saturated solution is acidified?**

(A) PbF2

(B) PbCl2

(C) PbBr2

(D) PbI2

**82. The solubility of AgBrO3 in aqueous solution depends on the presence of other substances in solution. Relative to its solubility in H2O the solubility of AgBrO3 is higher in 0.10 M \_\_\_\_ and lower in 0.10 M \_\_\_\_.**

(A) NH3, KBrO3

(B) KBrO3, NH3

(C) HNO3, NH3

(D) NH3, HNO3

Answer Key

1. A

2. D

3. D

4. C

5. A

6. A

7. D

8. B

9. D

10. D

11. D

12. D

13. D

14. C

15. B

16. C

17. B

18. D

19. D

20. D

21. A

22. C

23. B

24. D

25. A

26. A

27. D

28. A

29. C

30. D

31. D

32. B

33. B

34. B

35. A

36. D

37. C

38. B

39. D

40. B

41. B

42. D

43. B

44. C

45. C

46. C

47. D

48. B

49. B

50. A

51. D

52. D

53. B

54. D

55. D

56. D

57. C

58. D

59. A

60. D

61. C

62. B

63. A

64. C

65. D

66. A

67. A

68. C

69. C

70. C

71. C

72. D

73. D

74. B

75. D

76. B

77. C

78. A

79. A

80. D

81. A

82. A