

# Quiz: Ionic Equilibrium 1

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**Q1: For a weak acid HA, the dissociation constant  $K_a$  is related to degree of dissociation  $\alpha$  and initial concentration  $C$  by:**

- A)  $K_a = C\alpha$
- B)  $K_a = C\alpha^2$
- C)  $K_a = \frac{C\alpha^2}{1-\alpha}$
- D)  $K_a = \frac{\alpha}{C(1-\alpha)}$

**Q2: The pH of a 0.01 M strong acid solution is:**

- A) 1
- B) 2
- C) 3
- D) 4

**Q3: Which of the following is a conjugate base?**

- A) HCl
- B)  $\text{NH}_4^+$
- C)  $\text{CH}_3\text{COO}^-$
- D)  $\text{H}_2\text{SO}_4$

**Q4: The pH of pure water at 25 degC is 7 because:**

- A)  $[\text{H}^+] = 1$
- B)  $K_w = 1$
- C)  $[\text{H}^+] = 10^{-7}$
- D)  $K_a = K_b$

**Q5: For a weak acid, dilution will:**

- A) Decrease degree of dissociation
- B) Increase degree of dissociation
- C) Not affect dissociation
- D) Stop dissociation

**Q6: Which salt will give acidic solution in water?**

- A) NaCl
- B)  $\text{NH}_4\text{Cl}$
- C)  $\text{CH}_3\text{COONa}$
- D) KCl

**Q7: The pH of a 0.1 M NaOH solution is:**

- A) 1
- B) 7
- C) 13
- D) 14

**Q8: Which of the following is the strongest acid?**

- A)  $\text{CH}_3\text{COOH}$
- B)  $\text{H}_2\text{CO}_3$
- C)  $\text{HCl}$
- D)  $\text{HF}$

**Q9: The ionization constant of water  $K_w$  at 25 degC is:**

- A)  $10^{-7}$
- B)  $10^{-14}$
- C)  $10^{-21}$
- D)  $10^{-1}$

**Q10: Which of the following solutions will have  $\text{pH} > 7$ ?**

- A)  $\text{NH}_4\text{Cl}$
- B)  $\text{CH}_3\text{COONa}$
- C)  $\text{NaCl}$
- D)  $\text{HCl}$

**Q11: For a weak base  $\text{BOH}$ , the relation between  $K_b$ , degree of dissociation  $\alpha$  and concentration  $C$  is:**

- A)  $K_b = C\alpha$
- B)  $K_b = \frac{C\alpha^2}{1-\alpha}$
- C)  $K_b = \frac{\alpha}{C}$
- D)  $K_b = \alpha^2$

**Q12: The pH of a solution with  $[\text{H}^+] = 3.16 \times 10^{-5} \text{ M}$  is approximately:**

- A) 3
- B) 4
- C) 5
- D) 6

**Q13: Which salt undergoes basic hydrolysis?**

- A)  $\text{NaCl}$
- B)  $\text{KNO}_3$
- C)  $\text{NH}_4\text{Cl}$
- D)  $\text{CH}_3\text{COONa}$

**Q14: For a buffer solution, addition of small amount of acid will:**

- A) Change pH drastically
- B) Increase pH
- C) Decrease pH slightly
- D) Not change pH at all

**Q15: Which of the following is a buffer solution?**

- A)  $\text{HCl} + \text{NaCl}$
- B)  $\text{CH}_3\text{COOH} + \text{CH}_3\text{COONa}$
- C)  $\text{NaOH} + \text{NaCl}$
- D)  $\text{HCl} + \text{NaOH}$

**Q16: The Henderson-Hasselbalch equation is:**

- A)  $\text{pH} = \text{pK}_a + \log \frac{[\text{salt}]}{[\text{acid}]}$
- B)  $\text{pH} = \text{pK}_b + \log \frac{[\text{acid}]}{[\text{salt}]}$
- C)  $\text{pH} = 14 - \text{pOH}$
- D)  $\text{pH} = -\log K_a$

**Q17: The pH of a buffer is equal to pKa when:**

- A)  $[\text{acid}] = [\text{salt}]$
- B)  $[\text{acid}] > [\text{salt}]$
- C)  $[\text{acid}] < [\text{salt}]$
- D)  $K_a = K_b$

**Q18: Which of the following has maximum acidic strength?**

- A) HF
- B) HCl
- C) HBr
- D) HI

**Q19: The pH of 0.01 M acetic acid ( $K_a = 1.8 \times 10^{-5}$ ) is approximately:**

- A) 2.9
- B) 3.0
- C) 3.4
- D) 4.0

**Q20: Which species acts as both acid and base?**

- A) HCl
- B)  $\text{NH}_3$
- C)  $\text{H}_2\text{O}$
- D) NaOH

**Q21: The common ion effect is suppression of:**

- A) Strong electrolyte dissociation
- B) Weak electrolyte dissociation
- C) Hydrolysis
- D) Buffer action

**Q22: For salt of weak acid and strong base, the pH depends on:**

- A)  $K_a$
- B)  $K_b$
- C)  $K_w$
- D)  $K_a$  and concentration

**Q23: Which of the following has highest pH?**

- A) 0.1 M HCl
- B) 0.1 M NaOH
- C) 0.1 M  $\text{NH}_4\text{Cl}$
- D) 0.1 M  $\text{CH}_3\text{COOH}$

**Q24: The pOH of a solution with pH = 4 is:**

- A) 4
- B) 6
- C) 10
- D) 14

**Q25: Which ion undergoes hydrolysis?**

- A)  $\text{Na}^+$
- B)  $\text{Cl}^-$
- C)  $\text{NH}_4^+$
- D)  $\text{K}^+$

**Q26: For a salt of weak base and strong acid, the solution is:**

- A) Neutral
- B) Basic
- C) Acidic
- D) Buffer

**Q27: The pH of a neutral salt solution at 25 degC is:**

- A) 0
- B) 7
- C) 14
- D) Depends on salt

**Q28: Which equilibrium constant represents acid strength?**

- A)  $K_b$
- B)  $K_w$
- C)  $K_a$
- D)  $K_c$

**Q29: The conjugate acid of  $\text{NH}_3$  is:**

- A)  $\text{NH}_2^-$
- B)  $\text{NH}_4^+$
- C)  $\text{N}_3^-$
- D)  $\text{NO}_3^-$

**Q30: Which of the following is not a buffer?**

- A)  $\text{NH}_3 + \text{NH}_4\text{Cl}$
- B)  $\text{CH}_3\text{COOH} + \text{CH}_3\text{COONa}$
- C)  $\text{HCl} + \text{NaCl}$
- D)  $\text{H}_2\text{CO}_3 + \text{NaHCO}_3$

**Q31: The pH of a solution increases on dilution if it is:**

- A) Acidic
- B) Basic
- C) Neutral
- D) Buffer

**Q32: Which of the following acids is weakest?**

- A) HCl
- B) HNO<sub>3</sub>
- C) CH<sub>3</sub>COOH
- D) H<sub>2</sub>SO<sub>4</sub>

**Q33: For buffer solution, maximum buffering action occurs when:**

- A)  $\text{pH} = \text{pK}_a$
- B)  $\text{pH} > \text{pK}_a$
- C)  $\text{pH} < \text{pK}_a$
- D)  $\text{K}_a = \text{K}_b$

**Q34: The pH of 0.1 M NH<sub>4</sub>OH ( $\text{K}_b = 1.8 \times 10^{-5}$ ) is approximately:**

- A) 9.0
- B) 9.6
- C) 10.0
- D) 11.0

**Q35: Which of the following salts will have pH = 7?**

- A) NH<sub>4</sub>Cl
- B) CH<sub>3</sub>COONa
- C) NaCl
- D) Na<sub>2</sub>CO<sub>3</sub>

**Q36: The pH range of acidic buffer is:**

- A) Below 7
- B) Above 7
- C) Equal to 7
- D) Any value

**Q37: Which of the following increases  $\text{K}_w$  of water?**

- A) Decrease temperature
- B) Increase temperature
- C) Add acid
- D) Add base

**Q38: Which expression represents hydrolysis constant  $\text{K}_h$  for salt of weak acid and strong base?**

- A)  $\text{K}_h = \frac{\text{K}_w}{\text{K}_a}$
- B)  $\text{K}_h = \frac{\text{K}_w}{\text{K}_b}$
- C)  $\text{K}_h = \text{K}_a \text{K}_b$
- D)  $\text{K}_h = \text{K}_w$

**Q39: Which solution will have lowest pH?**

- A) 0.1 M HCl
- B) 0.1 M CH<sub>3</sub>COOH
- C) 0.1 M NH<sub>4</sub>Cl
- D) 0.1 M NaCl

**Q40: The conjugate base of  $\text{H}_2\text{SO}_4$  is:**

- A)  $\text{SO}_4^{2-}$
- B)  $\text{HSO}_4^-$
- C)  $\text{H}_3\text{SO}_4^+$
- D)  $\text{S}^{2-}$

**Q41: The pH of a 0.001 M solution of a strong monoprotic acid is:**

- A) 1
- B) 2
- C) 3
- D) 4

**Q42: For a weak acid HA, if  $K_a = 10^{-5}$ , the value of  $\text{p}K_a$  is:**

- A) 2
- B) 3
- C) 5
- D) 7

**Q43: Which of the following pairs forms a basic buffer?**

- A)  $\text{NH}_4\text{Cl} + \text{NH}_4\text{OH}$
- B)  $\text{CH}_3\text{COOH} + \text{CH}_3\text{COONa}$
- C)  $\text{HCl} + \text{NaCl}$
- D)  $\text{H}_2\text{SO}_4 + \text{Na}_2\text{SO}_4$

**Q44: The pH of a solution increases on dilution if the solution is initially:**

- A) Strongly acidic
- B) Weakly acidic
- C) Strongly basic
- D) Neutral

**Q45: For the salt  $\text{NH}_4\text{Cl}$ , the hydrolysis constant  $K_h$  is related to:**

- A)  $K_w/K_b$
- B)  $K_w/K_a$
- C)  $K_a/K_w$
- D)  $K_b/K_w$

**Q46: The pH of 0.01 M HCl solution after adding equal volume of water will be:**

- A) 1
- B) 1.5
- C) 2
- D) 3

**Q47: Which of the following acids has highest  $K_a$  value?**

- A) HF
- B)  $\text{HNO}_3$
- C)  $\text{CH}_3\text{COOH}$
- D)  $\text{H}_2\text{CO}_3$

**Q48: The pH of a buffer solution does NOT change appreciably on addition of small amount of:**

- A) Strong acid
- B) Strong base
- C) Water
- D) All of these

**Q49: For a weak base, degree of ionization increases on:**

- A) Increase in concentration
- B) Dilution
- C) Addition of common ion
- D) Decrease in temperature

**Q50: Which ion does NOT undergo hydrolysis in water?**

- A)  $\text{Al}^{3+}$
- B)  $\text{NH}_4^+$
- C)  $\text{Cl}^-$
- D)  $\text{CO}_3^{2-}$

**Q51: The pH of a 0.01 M  $\text{Na}_2\text{CO}_3$  solution will be:**

- A)  $<7$
- B)  $=7$
- C)  $>7$
- D)  $\sim 7$

**Q52: For a weak acid buffer, the pH is given by:**

- A)  $\text{pH} = \text{pK}_b + \log \frac{[\text{salt}]}{[\text{base}]}$
- B)  $\text{pH} = \text{pK}_a + \log \frac{[\text{salt}]}{[\text{acid}]}$
- C)  $\text{pH} = 7$
- D)  $\text{pH} = -\log K_a$

**Q53: Which of the following will increase the pH of an acidic buffer?**

- A) Adding acid
- B) Adding salt
- C) Adding base
- D) Adding water

**Q54: For salt of weak acid and weak base, pH depends on:**

- A)  $K_a$  only
- B)  $K_b$  only
- C)  $K_a$  and  $K_b$
- D)  $K_w$  only

**Q55: The pH of a solution containing equal concentrations of  $\text{NH}_4\text{OH}$  and  $\text{NH}_4\text{Cl}$  is:**

- A)  $<7$
- B)  $>7$
- C)  $=7$
- D) Cannot be predicted

**Q56: Which of the following expressions is correct for  $K_w$ ?**

- A)  $[H^+, OH^-]$
- B)  $[H^+]$
- C)  $[OH^-]$
- D)  $[H_2O]$

**Q57: Which acid has maximum conjugate base strength?**

- A) HCl
- B)  $HNO_3$
- C) HF
- D)  $H_2SO_4$

**Q58: For a buffer, maximum resistance to pH change is observed when:**

- A)  $[salt] \gg [acid]$
- B)  $[acid] \gg [salt]$
- C)  $[acid] = [salt]$
- D)  $K_a$  is large

**Q59: The pH of a 0.1 M solution of  $CH_3COONa$  will be:**

- A)  $< 7$
- B)  $= 7$
- C)  $> 7$
- D)  $\sim 7$

**Q60: Which factor increases dissociation of a weak acid?**

- A) Addition of strong acid
- B) Addition of salt
- C) Dilution
- D) Decrease in temperature

**Q61: The pH of a solution having  $pOH = 5$  is:**

- A) 5
- B) 7
- C) 9
- D) 14

**Q62: Which of the following statements is correct?**

- A) Strong acids have small  $K_a$
- B) Weak acids have large  $K_a$
- C)  $K_a K_b = K_w$  for conjugate pair
- D)  $K_w$  depends on concentration

**Q63: The pH of distilled water at 25 degC is 7 due to:**

- A)  $K_w = 1$
- B)  $[H^+] = 10^{-7}$
- C)  $[OH^-] = 10^{-7}$
- D) Both  $[H^+]$  and  $[OH^-]$  equal

**Q64: Which of the following has the highest buffering capacity?**

- A) Dilute buffer
- B) Concentrated buffer
- C) Neutral solution
- D) Pure acid

**Q65: Which salt gives acidic solution due to cation hydrolysis?**

- A) NaCl
- B) KNO<sub>3</sub>
- C) AlCl<sub>3</sub>
- D) CH<sub>3</sub>COONa

**Q66: The pH of a solution decreases when:**

- A) [H<sup>+</sup>] decreases
- B) [OH<sup>-</sup>] increases
- C) [H<sup>+</sup>] increases
- D) K<sub>w</sub> decreases

**Q67: Which of the following solutions will have pH closest to 7?**

- A) 0.1 M HCl
- B) 0.1 M NaOH
- C) 0.1 M NaCl
- D) 0.1 M NH<sub>4</sub>Cl

**Q68: The pH of a solution depends directly on:**

- A) [OH<sup>-</sup>]
- B) [H<sup>+</sup>]
- C) K<sub>a</sub>
- D) K<sub>b</sub>

**Q69: Which of the following acids is diprotic?**

- A) HCl
- B) HNO<sub>3</sub>
- C) H<sub>2</sub>SO<sub>4</sub>
- D) CH<sub>3</sub>COOH

**Q70: Which solution will show maximum common ion effect?**

- A) HCl + NaCl
- B) CH<sub>3</sub>COOH + CH<sub>3</sub>COONa
- C) NaOH + NaCl
- D) NH<sub>4</sub>OH + NaCl

**Q71: The pH of 0.001 M NaOH solution is:**

- A) 9
- B) 10
- C) 11
- D) 12

**Q72: Which of the following has minimum  $[H^+]$  concentration?**

- A) pH 3
- B) pH 5
- C) pH 7
- D) pH 9

**Q73: For a salt of weak acid and strong base, the solution is:**

- A) Acidic
- B) Neutral
- C) Basic
- D) Buffer

**Q74: Which species acts as Bronsted-Lowry acid?**

- A)  $NH_3$
- B)  $OH^-$
- C)  $H_2O$
- D)  $Cl^-$

**Q75: The pH of a solution containing  $[OH^-]=10^{-6}$  M is:**

- A) 6
- B) 7
- C) 8
- D) 10

**Q76: Which of the following acids has smallest  $pK_a$  value?**

- A) HF
- B) HCl
- C)  $H_2CO_3$
- D)  $CH_3COOH$

**Q77: Which salt gives basic solution due to anion hydrolysis?**

- A)  $NH_4Cl$
- B) NaCl
- C)  $CH_3COONa$
- D)  $KNO_3$

**Q78: For a buffer solution, dilution will:**

- A) Change pH drastically
- B) Increase pH
- C) Decrease pH
- D) Have negligible effect on pH

**Q79: The pH of a solution becomes zero when:**

- A)  $[H^+]=1$
- B)  $[H^+]=10^{-7}$
- C)  $[OH^-]=1$
- D)  $K_w=1$

**Q80: Which statement about pH scale is correct?**

- A) It is linear
- B) It is logarithmic
- C) It depends on temperature only
- D) It is always between 0 and 14

**Q81: The pH of a 0.02 M solution of a strong monoprotic acid is:**

- A) 1.7
- B) 2.0
- C) 2.3
- D) 3.0

**Q82: For a weak acid HA, if  $K_a=1.0 \times 10^{-4}$  and concentration is 0.1 M, the degree of dissociation  $\alpha$  is approximately:**

- A) 0.01
- B) 0.03
- C) 0.1
- D) 0.3

**Q83: The conjugate base of  $\text{HCO}_3^-$  is:**

- A)  $\text{H}_2\text{CO}_3$
- B)  $\text{CO}_3^{2-}$
- C)  $\text{H}_3\text{CO}_3^+$
- D)  $\text{OH}^-$

**Q84: Which of the following solutions will have the highest pH?**

- A) 0.01 M NaOH
- B) 0.1 M NaOH
- C) 0.01 M  $\text{NH}_4\text{OH}$
- D) 0.1 M  $\text{NH}_4\text{OH}$

**Q85: For the salt of weak acid and weak base, the pH of solution is determined by:**

- A)  $K_a$  only
- B)  $K_b$  only
- C)  $K_a$  and  $K_b$
- D)  $K_w$  only

**Q86: The pH of a 0.01 M solution of  $\text{NH}_4\text{Cl}$  ( $K_b$  for  $\text{NH}_4\text{OH}=1.8 \times 10^{-5}$ ) is approximately:**

- A) 4.6
- B) 5.1
- C) 5.6
- D) 6.0

**Q87: Which of the following is a conjugate acid-base pair?**

- A)  $\text{NH}_3/\text{NH}_4^+$
- B)  $\text{HCl}/\text{NaCl}$
- C)  $\text{H}_2\text{SO}_4/\text{Na}_2\text{SO}_4$
- D)  $\text{NaOH}/\text{NaCl}$

**Q88: The pH of 0.1 M acetic acid ( $K_a=1.8 \times 10^{-5}$ ) is approximately:**

- A) 2.4
- B) 2.9
- C) 3.0
- D) 3.4

**Q89: Which of the following statements about buffers is correct?**

- A) Buffer resists pH change on large addition of acid
- B) Buffer resists pH change on small addition of acid or base
- C) Buffer has  $\text{pH} = 7$  always
- D) Buffer works only for acids

**Q90: The pH of a solution containing  $[\text{H}^+]=1.0 \times 10^{-8}$  M is:**

- A) 6
- B) 7
- C) 8
- D) 9

**Q91: Which salt will produce a basic solution in water?**

- A) NaCl
- B)  $\text{NH}_4\text{NO}_3$
- C)  $\text{Na}_2\text{CO}_3$
- D) KCl

**Q92: For the equilibrium  $\text{H}_2\text{O} \rightleftharpoons \text{H}^+ + \text{OH}^-$ , increasing temperature will:**

- A) Decrease  $K_w$
- B) Increase  $K_w$
- C) Not affect  $K_w$
- D) Make  $K_w=1$

**Q93: Which of the following has the strongest conjugate acid?**

- A)  $\text{Cl}^-$
- B)  $\text{CH}_3\text{COO}^-$
- C)  $\text{F}^-$
- D)  $\text{NO}_3^-$

**Q94: The common ion effect is best illustrated by:**

- A) Decrease in solubility of AgCl in NaCl solution
- B) Increase in solubility of AgCl in NaCl solution
- C) Increase in pH of water on dilution
- D) Hydrolysis of salts

**Q95: For a buffer with  $[\text{acid}]=0.2$  M and  $[\text{salt}]=0.02$  M, the pH relative to  $\text{pK}_a$  is:**

- A) Equal to  $\text{pK}_a$
- B) Greater than  $\text{pK}_a$
- C) Less than  $\text{pK}_a$
- D) Independent of  $\text{pK}_a$

**Q96: Which of the following ions acts as a Lewis acid in water?**

- A)  $\text{Na}^+$
- B)  $\text{K}^+$
- C)  $\text{Al}^{3+}$
- D)  $\text{Cl}^-$

**Q97: The pH of a solution decreases by one unit means  $[\text{H}^+]$  becomes:**

- A) 10 times smaller
- B) 10 times larger
- C) 2 times larger
- D) 2 times smaller

**Q98: For a weak base B, if  $K_b=10^{-5}$ , then  $\text{p}K_b$  is:**

- A) 2
- B) 3
- C) 5
- D) 7

**Q99: Which of the following will have minimum buffering capacity?**

- A) 0.1 M buffer
- B) 0.01 M buffer
- C) 0.5 M buffer
- D) 1.0 M buffer

**Q100: The pH of a solution containing equal concentrations of  $\text{CH}_3\text{COOH}$  and  $\text{CH}_3\text{COONa}$  is:**

- A) 7
- B)  $\text{p}K_a$
- C)  $\text{p}K_b$
- D) 14

**Q101: Which of the following species can act as both acid and base?**

- A)  $\text{HCl}$
- B)  $\text{NH}_3$
- C)  $\text{H}_2\text{O}$
- D)  $\text{NaOH}$

**Q102: The pH of a 0.001 M solution of  $\text{NH}_4\text{OH}$  ( $K_b=1.8 \times 10^{-5}$ ) is approximately:**

- A) 9.0
- B) 9.6
- C) 10.1
- D) 11.0

**Q103: Which of the following solutions will show no hydrolysis?**

- A)  $\text{NaCl}$
- B)  $\text{NH}_4\text{Cl}$
- C)  $\text{CH}_3\text{COONa}$
- D)  $\text{AlCl}_3$

**Q104: The pH of a solution becomes acidic if:**

- A)  $[H^+] = [OH^-]$
- B)  $[H^+] > [OH^-]$
- C)  $[H^+] < [OH^-]$
- D)  $K_w = 10^{-14}$

**Q105: For a salt of weak acid and strong base, the hydrolysis constant is:**

- A)  $K_h = K_w / K_a$
- B)  $K_h = K_w / K_b$
- C)  $K_h = K_a K_b$
- D)  $K_h = K_w$

**Q106: Which acid has the highest  $pK_a$  value?**

- A) HCl
- B) HNO<sub>3</sub>
- C) CH<sub>3</sub>COOH
- D) H<sub>2</sub>SO<sub>4</sub>

**Q107: The pH of 0.1 M NaHCO<sub>3</sub> solution will be:**

- A)  $< 7$
- B)  $= 7$
- C)  $> 7$
- D)  $\sim 7$

**Q108: Which of the following will increase the pH of pure water?**

- A) Adding HCl
- B) Adding NaOH
- C) Adding NaCl
- D) Cooling the water

**Q109: The pH scale is logarithmic, meaning:**

- A) Equal pH change means equal  $[H^+]$  change
- B) pH change of 1 means tenfold change in  $[H^+]$
- C) pH is proportional to  $[H^+]$
- D) pH is independent of  $[H^+]$

**Q110: Which of the following will have maximum  $[OH^-]$  concentration?**

- A) pH 9
- B) pH 10
- C) pH 11
- D) pH 12

**Q111: For a weak acid solution,  $K_a$  can be expressed as:**

- A)  $\frac{[H^+, A^-]}{[HA]}$
- B)  $\frac{[HA]}{[H^+, A^-]}$
- C)  $[H^+, OH^-]$
- D)  $\frac{[A^-]}{[HA]}$

**Q112: Which of the following statements is true?**

- A) Strong acids have high  $pK_a$
- B) Weak acids have low  $pK_a$
- C) Strong acids have low  $pK_a$
- D)  $pK_a$  is independent of acid strength

**Q113: The pH of a solution containing  $[OH^-]=1.0 \times 10^{-3}$  M is:**

- A) 10
- B) 11
- C) 12
- D) 13

**Q114: Which salt will have pH less than 7?**

- A)  $Na_2CO_3$
- B)  $NH_4Cl$
- C)  $CH_3COONa$
- D)  $NaCl$

**Q115: For a buffer solution, addition of common ion will:**

- A) Destroy buffer action
- B) Increase buffer capacity
- C) Not affect pH significantly
- D) Make solution neutral

**Q116: The pH of a 0.1 M solution of  $H_2SO_4$  (first dissociation complete, second neglected) is:**

- A) 0.7
- B) 1.0
- C) 1.3
- D) 2.0

**Q117: Which of the following will have pH exactly equal to 7 at 25 degC?**

- A) Pure water
- B) 0.01 M  $NaCl$
- C) Both A and B
- D) 0.01 M  $HCl$

**Q118: The species that increases pH on addition to water is:**

- A)  $HCl$
- B)  $NH_4Cl$
- C)  $Na_2CO_3$
- D)  $CO_2$

**Q119: For an acidic buffer, the pH range of effective buffering is approximately:**

- A)  $pK_a \pm 0.5$
- B)  $pK_a \pm 1$
- C)  $pK_a \pm 2$
- D)  $pK_a \pm 3$

**Q120: Which factor does NOT affect the pH of an aqueous solution?**

- A) Temperature
- B) Nature of solute
- C) Concentration of solute
- D) Amount of solvent taken

**Q121: The solubility product constant  $K_{sp}$  of AgCl is  $1.8 \times 10^{-10}$ . The solubility of AgCl in pure water (in mol L<sup>-1</sup>) is approximately:**

- A)  $1.8 \times 10^{-10}$
- B)  $1.34 \times 10^{-5}$
- C)  $1.8 \times 10^{-5}$
- D)  $1.34 \times 10^{-10}$

**Q122: Which salt will have minimum solubility in presence of 0.1 M AgNO<sub>3</sub>?**

- A) AgCl
- B) AgBr
- C) AgI
- D) AgF

**Q123: If  $K_{sp}$  of BaSO<sub>4</sub> is  $1.1 \times 10^{-10}$ , its solubility in 0.1 M Na<sub>2</sub>SO<sub>4</sub> is approximately:**

- A)  $1.1 \times 10^{-10}$
- B)  $1.1 \times 10^{-9}$
- C)  $1.1 \times 10^{-11}$
- D)  $1.1 \times 10^{-12}$

**Q124: Which condition favors precipitation of a sparingly soluble salt?**

- A)  $Q < K_{sp}$
- B)  $Q = K_{sp}$
- C)  $Q > K_{sp}$
- D)  $K_{sp}$  very large

**Q125: The solubility of CaF<sub>2</sub> increases in presence of:**

- A) NaF
- B) CaCl<sub>2</sub>
- C) HCl
- D) NaCl

**Q126: For salt MX<sub>2</sub> with solubility  $s$ , the solubility product is:**

- A)  $4s^3$
- B)  $s^2$
- C)  $2s^2$
- D)  $s^3$

**Q127: Which of the following has highest solubility in water?**

- A) AgCl
- B) AgBr
- C) AgI
- D) AgNO<sub>3</sub>

**Q128: If ionic product is less than  $K_{sp}$ , the solution is:**

- A) Saturated
- B) Supersaturated
- C) Unsaturated
- D) Precipitated

**Q129: The solubility of AgCl in presence of  $NH_3$  increases due to formation of:**

- A) AgOH
- B)  $[Ag(NH_3)_2]^+$
- C) AgNH<sub>2</sub>
- D) Ag<sub>2</sub>O

**Q130: Which of the following is used for selective precipitation of cations?**

- A) Common ion effect
- B) Buffer action
- C) Complex formation
- D) Hydrolysis

**Q131: The solubility of  $Mg(OH)_2$  decreases in presence of:**

- A)  $NH_4Cl$
- B) HCl
- C) NaOH
- D) NaCl

**Q132: For salt AB, if solubility is s, then  $K_{sp}$  equals:**

- A) s
- B)  $s^2$
- C) 2s
- D)  $4s^2$

**Q133: Which of the following will NOT affect solubility of a sparingly soluble salt?**

- A) Common ion
- B) pH
- C) Temperature
- D) Catalyst

**Q134: The precipitation of AgCl will start when:**

- A)  $[Ag^+, Cl^-] = K_{sp}$
- B)  $[Ag^+, Cl^-] > K_{sp}$
- C)  $[Ag^+, Cl^-] < K_{sp}$
- D)  $K_{sp} = 0$

**Q135: The solubility of  $CaCO_3$  increases in acidic medium because:**

- A)  $Ca^{2+}$  reacts
- B)  $CO_3^{2-}$  reacts with  $H^+$
- C)  $K_{sp}$  increases
- D) Common ion effect

**Q136: Which salt shows maximum common ion effect on AgCl solubility?**

- A) NaCl
- B) NaNO<sub>3</sub>
- C) KNO<sub>3</sub>
- D) NH<sub>4</sub>NO<sub>3</sub>

**Q137: If  $K_{sp}$  of PbI<sub>2</sub> is  $7.1 \times 10^{-9}$ , the solubility (s) is approximately:**

- A)  $1.3 \times 10^{-3}$
- B)  $1.3 \times 10^{-2}$
- C)  $7.1 \times 10^{-9}$
- D)  $2.6 \times 10^{-3}$

**Q138: Which of the following is correct regarding  $K_{sp}$ ?**

- A) Depends on concentration
- B) Depends on temperature
- C) Depends on common ion
- D) Depends on pH

**Q139: The solubility of Al(OH)<sub>3</sub> increases in presence of:**

- A) NaOH
- B) HCl
- C) NaCl
- D) NH<sub>4</sub>Cl

**Q140: Which of the following will precipitate first when Cl<sup>-</sup> is added gradually?**

- A) AgCl
- B) PbCl<sub>2</sub>
- C) Hg<sub>2</sub>Cl<sub>2</sub>
- D) NaCl

**Q141: For selective precipitation, which salt is precipitated first?**

- A) Higher  $K_{sp}$
- B) Lower  $K_{sp}$
- C) Higher solubility
- D) Lower molar mass

**Q142: Which of the following salts has highest  $K_{sp}$ ?**

- A) AgCl
- B) AgBr
- C) AgI
- D) AgF

**Q143: If solubility of a salt increases, its  $K_{sp}$ :**

- A) Always increases
- B) Always decreases
- C) May increase or decrease
- D) Remains constant at same temperature

**Q144: Which factor does NOT affect solubility of a sparingly soluble salt?**

- A) Common ion
- B) pH
- C) Complex formation
- D) Catalyst

**Q145: The solubility of  $\text{Ag}_2\text{CrO}_4$  decreases in presence of:**

- A)  $\text{NaNO}_3$
- B)  $\text{K}_2\text{CrO}_4$
- C)  $\text{NH}_3$
- D)  $\text{HNO}_3$

**Q146: Which statement is correct?**

- A) High  $K_{\text{sp}}$  means low solubility
- B) Low  $K_{\text{sp}}$  means low solubility
- C)  $K_{\text{sp}}$  depends on concentration
- D)  $K_{\text{sp}}$  changes with dilution

**Q147: The solubility of  $\text{ZnS}$  increases in presence of:**

- A)  $\text{Na}_2\text{S}$
- B)  $\text{HCl}$
- C)  $\text{NaCl}$
- D)  $\text{ZnCl}_2$

**Q148: Which salt will NOT show common ion effect with  $\text{BaSO}_4$ ?**

- A)  $\text{Na}_2\text{SO}_4$
- B)  $\text{K}_2\text{SO}_4$
- C)  $\text{BaCl}_2$
- D)  $\text{NaNO}_3$

**Q149: If  $Q = K_{\text{sp}}$  for a salt solution, the solution is:**

- A) Unsaturated
- B) Supersaturated
- C) Saturated
- D) Precipitated

**Q150: Which of the following will increase solubility of  $\text{AgCl}$ ?**

- A)  $\text{NaCl}$
- B)  $\text{HCl}$
- C)  $\text{NH}_3$
- D)  $\text{AgNO}_3$

**Q151: The solubility of  $\text{Fe}(\text{OH})_3$  is minimum at:**

- A) Low pH
- B) High pH
- C) Neutral pH
- D) All pH

**Q152: Which of the following salts is least soluble?**

- A) AgCl
- B) AgBr
- C) AgI
- D) AgF

**Q153: For salt  $M_3X_2$ , if solubility is  $s$ , then  $K_{sp}$  is:**

- A)  $s^5$
- B)  $36s^5$
- C)  $4s^3$
- D)  $27s^5$

**Q154: Which of the following is true for selective precipitation?**

- A) Higher solubility precipitates first
- B) Lower  $K_{sp}$  precipitates first
- C) Higher  $K_{sp}$  precipitates first
- D) All precipitate together

**Q155: The solubility of AgCl decreases on adding:**

- A)  $NH_3$
- B) NaCl
- C)  $HNO_3$
- D)  $NaNO_3$

**Q156: Which of the following salts will dissolve more in acidic medium?**

- A) AgCl
- B)  $BaSO_4$
- C)  $CaCO_3$
- D) NaCl

**Q157: The solubility product of a salt is numerically equal to:**

- A) Solubility
- B) Ionic product at equilibrium
- C) Degree of dissociation
- D) Molar mass

**Q158: Which of the following does NOT increase solubility of a salt?**

- A) Complex formation
- B) pH change
- C) Common ion addition
- D) Temperature increase

**Q159: For salt MX, precipitation will start when:**

- A)  $Q > K_{sp}$
- B)  $Q < K_{sp}$
- C)  $Q = 0$
- D)  $K_{sp} = 0$

**Q160: Which of the following statements about  $K_{sp}$  is correct?**

- A) It changes with dilution
- B) It changes with common ion
- C) It depends on temperature
- D) It depends on initial concentration