Ionic Equilibrium

Q.1. The strongest conjugate base is

a) NO_3^-
b) Cl^-
c) SO_4^{2-}
d) CH_3COO^-

Q.2. A 0.2 molar solution of formic acid is 3.2% ionized. Its ionisation constant is

a) 9.6×10^{-3}
b) 2.1×10^{-4}
c) 1.25×10^{-6}
d) 4.8×10^{-5}

Q.3. Which of the following will produce a buffer solution when mixed in equal volumes?

a) 0.1 mol dm^{-3} NH_4OH and 0.1 mol dm^{-3} HCl
b) 0.05 mol dm^{-3} NH_4OH and 0.1 mol dm^{-3} HCl
c) 0.1 mol dm^{-3} NH_4OH and 0.05 mol dm^{-3} HCl
d) 0.1 mol dm^{-3} CH_3COONa and 0.1 mol dm^{-3} NaOH

Q.4. A solution which is 10^{-3} M each in Mn^{2+}, Fe^{2+}, Zn^{2+} and Hg^{2+} is treated with 10^{-6} M sulphide ion. If K_{sp} of MnS, FeS, ZnS and HgS are 10^{-15}, 10^{-23}, 10^{-20} and 10^{-54} respectively which one will precipitate first

a) FeS
b) MgS
c) HgS
d) ZnS

Q.5. The solubility product of AgCl is 4.0×10^{-10} at 298 K. The solubility of AgCl in 0.04 M $CaCl_2$ will be

a) 2.0×10^{-5} M
b) 1.0×10^{-4} M
c) 5.0×10^{-9} M
d) 2.2×10^{-4} M

Q.6. The pH of a solution is increased from 3 to 6; its H^+ ion concentration will be

a) reduced to half
b) reduced by 1000 times
c) doubled
d) increased by 1000 times

Q.7. For preparing a buffer solution of pH 6 by mixing sodium acetate and acetic acid, the ratio of the concentration of salt and acid should be ($Ka = 10^{-5}$)

a) 1 : 10
b) 10 : 1
c) 100 : 1
d) 1 : 100

Q.8. Identify the indicator used to titrate Na_2CO_3 solution with HCl

a) Methyl orange
b) dil. H2SO4
c) Phenolphthalein
d) None of these

Q.9. If pH of a saturated solution of $Ba(OH)_2$ is 12, the value of its K_{sp} is :

a) $5.00 \times 10^{-7}\ M^3$
b) $4.00 \times 10^{-7}\ M^3$
c) $5.00 \times 10^{-6}\ M^3$
d) $4.00 \times 10^{-6}\ M^3$

Q.10. The conjugate base of $H_2PO_4^-$ is

a) H_3PO_4
b) P_2O_5
c) PO_4^{3-}
d) HPO_4^{2-}

Q.11. Ostwald's dilution law is applicable to:

a) Weak electrolyte only
b) Non-electrolytes
c) Strong electrolytes only
d) Strong and weak electrolytes

Q.12. Which of the following pairs constitutes a buffer ?

a) NaOH and HCl
b) HNO_3 and NH_4NO_3
c) HCl and KCl
d) HNO_2 and $NaNO_2$

Q.13. A base according to Bronsted concept is a substance which can:

a) lose pair of electron
b) donate protons
c) gain a pair of electrons
d) accept protons

Q.14. When NH_4Cl is added to NH_4OH solution the dissociation of ammonium hydroxide is reduced. It is due to:

a) common ion effect
b) hydrolysis
c) oxidation
d) reduction

Q.15. Which is not Lewis acid?

a) BF_3
b) AgCl
c) $BeCl_2$
d) $MgCl_2$

Q.16. The pH of a solution of hydrochloric acid is 4. The molarity of the solution is

a) 4.0
b) 0.4
c) 0.0001
d) 0.04

Q.17. In the reaction

$I_2 + I^- \rightarrow I^-_3$, the Lewis base is

a) I_2
b) I^-
c) I^-_3
d) None of these

Q.18. The pH of a 0.005 M aqueous solution of sulphuric acid is

a) 0.005
b) 2
c) 1
d) 0.01

Q.19. In the hydrolysis of a salt of weak acid and weak base the hydrolysis constant Kb is equal to

a) Kw/Kb
b) Kb/Kw
c) Kw/KaKb
d) KaKb

Q.20. Water is a

a) Protophobic solvent
b) Protophilic solvent
c) Amphiprotic solvent
d) Aprotic solvent

Q.21. Which of the following has highest pH?

a) CH_3COOK
b) Na_2CO_3
c) NH_4Cl
d) $NaNO_3$

Q.22. The pH range of methyl red indicator is

a) 4.2 to 6.3
b) 8.3 to 10
c) 8.0 to 9.6
d) 6.8 to 8.4

Q.23. In which of the following acid-base titration pH is greater than 8 at the equivalent point.

a) Acetic acid Vs ammonia
b) Acetic acid Vs sodium hydroxide
c) Hydrochloric acid Vs sodium hydroxide.
d) Hydrochloric acid Vs ammonia

Q.24. The pH of 0.1 M aqueous solution of a weak acid (HA) is 3. What is its degree of dissociation?

a) 1%
b) 10%
c) 50%
d) 25%

Q.25. Boric acid is an acid because its molecule

a) contains replaceable H^+ ion
b) gives up a proton
c) accepts OH^- from water releasing proton
d) combines with proton from water molecule