

QAD Series

Equilibrium + Electrochemistry + Acid, base + Redox reaction

- In the case of gaseous homogeneous reaction, the active mass of the reactant is obtained by the expression
a) PV/RT b) P/RT c) RT/P d) $(n/v)RT$
- If in the reaction $N_2O_4 \rightleftharpoons 2NO_2$, α is the part of N_2O_4 which dissociates, then the number of moles at equilibrium will be
a) 3 b) 1 c) $(1-\alpha)^2$ d) $(1+\alpha)$
- An equilibrium mixture for the reaction $2H_2S(g) \rightleftharpoons 2H_2(g) + S_2(g)$ had 1 mole of H_2S , 0.2 mole of H_2 and 0.8 mole of S_2 in a 2 litre flask. The value of K_c in molL^{-1} is
a) 0.004 b) 0.080 c) 0.016 d) 0.160
- At a certain temperature $2HI \rightleftharpoons H_2 + I_2$, only 50% HI is dissociated at equilibrium. The equilibrium constant is
a) 0.25 b) 1.0 c) 3.0 d) 0.5
- For the reaction $PCl_5 \rightleftharpoons PCl_3 + Cl_2$, K_p is
a) $\frac{x^2 P}{(1-x^2)}$ b) $\frac{64x^2}{2}$ c) $\frac{x^2}{V(a-x)}$ d) none
- For which of the following reactions $K_p = K_c$
a) $2NOCl(g) \rightleftharpoons 2NO(g) + Cl_2(g)$
b) $N_2(g) + 3H_2(g) \rightleftharpoons 2NH_3(g)$
c) $H_2(g) + Cl_2(g) \rightleftharpoons 2HCl(g)$ d) $N_2O_4(g) \rightleftharpoons 2NO_2(g)$
- At a given temperature, the equilibrium constant for the reaction $PCl_5(g) \rightleftharpoons PCl_3(g) + Cl_2(g)$ is 2.4×10^{-3} . At the same temperature the equilibrium constant for the reaction $PCl_3(g) + Cl_2(g) \rightleftharpoons PCl_5$ is
a) 2.4×10^{-3} b) -2.4×10^{-3} c) 4.2×10^2 d) 4.8×10^{-2}
- The oxidation of SO_2 by O_2 to SO_3 is an exothermic reaction. The yield of SO_3 will be maximum if
a) Temperature is increased and pressure is kept constant
b) Temperature is reduced and pressure is increased
c) Both temperature and pressure are increased
d) Both temperature and pressure are decreased
- The dissociation constant of H_2CO_3 as an acid in aqueous medium at room temperature is X if the first and second dissociation constant of H_2CO_3 are X_1 and X_2 respectively then:
a) $x = x_1/x_2$ b) $x = x_2/x_1$ c) $x = x_1x_2$ d) $x = x_1x_2/2$
- For an elementary reaction, the specific rate constants for forward and reverse reactions are 0.50 and 5×10^4 respectively. The equilibrium constant for the reaction would be
a) 2.5×10^3 b) 2.5×10^4 c) 1×10^{-5} d) 1×10^5
- Select the expressing regarding the relationship between K_p and K_c for the reaction $aX + bY \rightarrow bZ + aW$:
a) $K_p = K_c (RT)^{a+b}$ b) $K_p = K_c / (a+b)^2$
c) $K_p = K_c RT$ d) $K_p = K_c$
- Vapour Density of PCl_5 is 70.2 at 200°C . Its degree of dissociation is
a) 0.97 b) 0.242 c) 0.327 d) 0.485
- The exothermic equilibrium is represented by expression $Cl_2(g) + 3F_2(g) \rightleftharpoons 2ClF_3(g)$
Which of the following will increase the quantity of ClF_3 in an equilibrium mixture of Cl_2 , F_2 and ClF_3 ?
a) increasing the temperature b) removing Cl_2
c) increasing the volume of the container
d) adding F_2
- For the reaction $C(s) + CO_2(g) \rightleftharpoons 2CO(g)$, the partial pressure of CO_2 and CO are 2.0 and 4.0 atm respectively at equilibrium. The K_p for the reaction is
a) 0.5 b) 4.0 c) 8.0 d) 32.0
- In the reaction $PCl_5 \rightleftharpoons PCl_3 + Cl_2$, the amounts of PCl_5 , PCl_3 and Cl_2 at equilibrium are 2 mole each and the total pressure is 3 atm. The equilibrium constant K_p is
a) 1.0 atm b) 2.0 atm c) 3.0 atm d) 6.0 atm
- Under equilibrium condition if the concentration of reactant and product is double, K_c would become:
a) half b) twice
c) one fourth d) remains same
- In a reversible reaction, study of its mechanism says that both the forward and reverse reaction follows first order kinetics. If the half-life of forward reaction $(t_{1/2})_f$ is 400 sec and that of reverse reaction $(t_{1/2})_r$ is 250 sec. The equilibrium constant of the reaction is
a) 1.6 b) 0.433 c) 0.625 d) 1.109
- The degree of ionization of substances:
a) Decreases with dilution
b) Increases with dilution
c) May increases or decreases with dilution
d) No effects on dilution
- To which of the following, Ostwald's dilution law is applicable?
a) CH_3COOH b) HCl c) HNO_3 d) H_2SO_4
- The value of ionic product of water at 393 K is
a) less than 1×10^{-14} b) greater than 1×10^{-14}
c) equal to 1×10^{-14} d) equal to 1×10^{-7}
- If ionic product of water is 10^{-14} , what is H^+ ion concentration of 0.1 M NaOH solution?
a) 10^{-13} M b) 10^{-14} M c) 14 M d) 13 M
- What will be the pH of a 10^{-5} M HCl solution?
a) 8.0 b) 7.0 c) 6.98 d) 14.0
- The pH of the solution produced when an aqueous solution of pH 5 is mixed with an equal volume of aqueous solution of pH 3 is
a) 3.5 b) 4.0 c) 4.5 d) 3.3
- Solubility of salt M_2X_3 is x gm moleL⁻¹. The solubility product of the salt will be
a) x^5 b) $16x^2$ c) $96x^5$ d) $108 x^5$
- If the solubility of $PbBr_2$ is 's' gm molecule per litre, considering 80% ionization, its solubility product is
a) $2.048 s^3$ b) $20.48 s^3$ c) $2.048 s^2$ d) $2.048 s^4$
- Solubility product of sparingly soluble salt of the type AB at room temperature is $1.21 \times 10^{-6} \text{ M}^2$. Its molar solubility is
a) 1.21×10^{-6} b) 1.1×10^{-4} c) 1.1×10^{-3} d) 1.1×10^{-6}
- Which of the following has maximum pH?
a) 10^{-2} M of HCl b) 10^{-2} M of NaOH
c) 10^{-4} M of Mg_2SO_4 d) 10^{-2} M of CH_3COOH
- By adding 20 mL of 0.1 N HCl to 20 mL 0.001 N KOH, the pH of the obtained solution will be
a) 2 b) 1.3 c) 0 d) 7
- 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
- The pH of 1% ionised 0.1 M solution of a weak monoprotic acid is
a) 1 b) 2 c) 3 d) all
- The pH of 0.1 M solution of the following salts increases in the order
a) $NaCl < NH_4Cl < NaCN < HCl$
b) $HCl < NH_4Cl < NaCl < NaCN$
c) $NaCN < NH_4Cl < NaCl < HCl$
d) $HCl < NaCl < NaCN < NH_4Cl$
- In which of the following, the solubility of AgCl will be maximum?
a) 0.1 M $AgNO_3$ b) Water
c) 0.1M NaCl d) Same solubility
- The pH of solution A, B, C, D are 9.5, 2.5, 3.5 and 5.5 respectively. The most acidic solution is:
a) A b) B c) C d) D
- The pH of 0.1M CH_3COOH is 2.873. What is pH of 0.1M NH_4OH . $K_a(CH_3COOH) = 1.8 \times 10^{-5}$ and $K_b(NH_4OH) = 1.8 \times 10^{-5}$
a) 11.127 b) 2.873 c) 7 d) 9.53
- A monoprotic acid in 0.1 M solution has $K_a = 1.0 \times 10^{-5}$. The degree of dissociation of acid is:
a) 1.0% b) 99.9% c) 0.1% d) 99%

36. The values of dissociation constant of some acids (at 25°C) are given below. The strongest acid in water is
a) 1.4×10^{-2} b) 1.6×10^{-4} c) 4.4×10^{-10} d) 4.3×10^{-7}
37. pH of a saturated solution of $\text{Ba}(\text{OH})_2$ is 12. Hence, K_{sp} of $\text{Ba}(\text{OH})_2$ is:
a) $5 \times 10^{-7} \text{ M}^3$ b) $5 \times 10^{-4} \text{ M}^2$ c) $1 \times 10^{-6} \text{ M}^3$ d) $4 \times 10^{-6} \text{ M}^3$
38. Which of the following is most soluble?
a) CaF_2 ; $K_{sp} = 1.7 \times 10^{-10}$ b) BaSO_4 ; $K_{sp} = 1.5 \times 10^{-9}$
c) PbSO_4 ; $K_{sp} = 1.3 \times 10^{-8}$ d) AgCl ; $K_{sp} = 1.7 \times 10^{-10}$
39. When one faraday of electric current is passed, the mass deposited is equal to:
a) one gram equivalent b) one gram mole
c) electrochemical equivalent d) half gram equivalent
40. Molten sodium chloride conducts electricity due to the presence of:
a) free electrons b) free ions
c) free molecules d) free atoms of Na & Cl
41. The reference electrode is made from which of the following?
a) ZnCl_2 b) CuSO_4 c) Hg_2Cl_2 d) HgCl_2
42. A solution of sodium sulphate in water is electrolysed using inert electrodes. The products at the cathode and anode are respectively:
a) H_2 , O_2 b) O_2 , H_2 c) O_2 , Na d) O_2 , SO_2
43. The specific conductance of a salt of 0.01 M concentration is 1.06×10^{-3} . Molar conductance of the same solution will be:
a) 1.061×10^{-4} b) 1.061 c) 10.61 d) 106.1
44. How many coulombs are required for the oxidation of 1 mol of H_2O_2 to O_2
a) 93000C b) $1.93 \times 10^5 \text{ C}$ c) $9.65 \times 10^4 \text{ C}$ d) $19.3 \times 10^2 \text{ C}$
45. When lead storage battery is charged:
a) PbO_2 dissolves
b) lead electrode becomes coated with lead sulphate
c) sulphuric acid is regenerated
d) amount of acid decreases
46. The standard reduction potential values of three metallic cations X, Y, Z are 0.52, -3.03 and -1.18V respectively. The order of reducing power of the corresponding metal is:
a) $Y > Z > X$ b) $X > Y > Z$ c) $Z > Y > X$ d) $Z > X > Y$
47. A smuggler could not carry gold by depositing iron on the gold surface since
a) gold is denser b) iron rusts
c) gold has higher reduction potential than iron
d) gold has lower reduction potential than iron
48. Three faradays of electricity are passed through molten Al_2O_3 , aqueous solution of CuSO_4 and molten NaCl taken in different electrolytic cells. The amount of Al, Cu and Na deposited at the cathodes will be the ratio of
a) 1 mole : 2 mole : 3 mole b) 3 mole : 2 mole : 1 mole
c) 1 mole : 1.5 mole : 3 mole d) 1.5 mole : 2 mole : 3 mole
49. The no. of Faradays needed to reduce 4 gm equivalent of Cu^{2+} to Cu metal will be:
a) 1 b) 2 c) $\frac{1}{2}$ d) 4
50. In galvanic cells
a) electrical energy is converted into chemical energy
b) chemical energy is converted into electrical energy
c) electrical energy is converted into heat
d) chemical energy is converted into heat
51. If 0.25g of copper is deposited by a current of 0.2 Ampere in 10 minutes than electrochemical equivalent of the copper is.
a) 0.2 b) 0.02 c) 0.002 d) 0.00002
52. A 5 A current is passed through a solution of zinc sulphate for 40 minutes. Find the amount of zinc deposited at the cathode:
a) 40.65 g b) 4.065 g c) 0.4065 g d) 65.04 g
53. The current in a given wire is 1.8 A. In 1.36 minutes the number of coulombs transferred in wire is:
a) 136.44 C b) 138.88 C c) 146.88 C d) 150.66 C
54. Cell reaction is spontaneous when:
a) E_{cell}^{int} is negative b) E_{cell}^{int} is positive
c) ΔG° is negative d) ΔG° is positive
55. 0.04 N solution of a weak acid has specific conductance $4.23 \times 10^{-4} \text{ mho cm}^{-1}$ and degree of dissociation is 0.0612. The equivalent conductance of weak acid at infinite dilution is:
a) 1.72 mho b) 17.29 mho c) 142.27 mho d) 172.79 mho
56. For reducing 1 mol of Cr_2 to Cr^{3+} the charge required is:
a) $3 \times 96500 \text{ coulomb}$ b) $6 \times 96500 \text{ coulomb}$
c) 0.3 F d) 0.6 F
57. By removing a salt bridge between the two half cells, the voltage:
a) increase gradually b) increase rapidly
c) does not change d) drops to zero
58. The best conductor of electricity is a 0.1 M solution of:
a) H_2SO_4 b) CH_3COOH
c) $\text{CH}_3\text{CH}_2\text{COOH}$ d) boric acid
59. How much chlorine will be liberated on passing one ampere current for 30 min through NaCl solution?
a) 0.66 mol b) 0.33 mol c) 0.66 g d) 0.33 g
60. The E.M.F. of the cell: $\text{Cu(s)} \mid \text{Cu}^{2+}(\text{aq}) \parallel \text{Ag}^+(\text{aq}) \mid \text{Ag(s)}$ is
 $E_{\text{Cu}/\text{Cu}^{2+}}^\circ = -0.34 \text{ V}$; $E_{\text{Ag}/\text{Ag}^+}^\circ = -0.80 \text{ V}$
a) +0.46 V b) -0.46 V c) +1.14 V d) -1.14 V
61. In an aqueous solution hydrogen will not reduce:
a) Ag^+ b) Cu^{2+} c) Zn^{2+} d) Fe^{3+}
62. The unit of equivalent conductivity is:
a) $\text{ohm}^{-1} \text{ cm}^2(\text{equivalent})^{-1}$ b) $\text{ohm cm}^2(\text{g-equivalent})$
c) ohm cm^2 d) $\text{ohm}^{-1} \text{ m}^{-1}$
63. When a Zn strip is placed in CuSO_4 solution, the Cu gets precipitated because standard oxidation potential of Zn is:
a) $< \text{Cu}$ b) $> \text{Cu}$ c) $< \text{SO}_4$ d) $> \text{SO}_4$
64. H_3BO_3 is:
a) Monobasic and weak Lewis acid
b) Tribasic and weak Bronsted acid
c) Monobasic and weak Bronsted acid
d) Monobasic and strong Lewis acid
65. Which one of the following compound is not protonic acid?
a) $\text{B}(\text{OH})_3$ b) $\text{SO}_2(\text{OH})_2$ c) $\text{SO}(\text{OH})_2$ d) $\text{PO}(\text{OH})_3$
66. Which of the following is a Lewis acid?
a) H_2O b) SnCl_4 c) $\text{C}_2\text{H}_5\text{OH}$ d) Cl^-
67. Which of the following is not a Lewis base?
a) CN^- b) ROH c) NH_3 d) AlCl_3
68. Which of the following substance is a Arrhenius base but not the Bronsted base?
a) NaOH b) CO_3^{2-} c) NH_3 d) H_2O
69. A solution of NH_4Cl is
a) Acidic b) Basic c) Neutral d) Amphoteric
70. $\text{Mg}(\text{OH})\text{Cl}$ is an example of
a) Acid salt b) Base salt
c) Neutral salt d) Amphoteric acid
71. Water is a
a) protophobic solvent b) protophilic solvent
c) amphiprotic solvent d) aprotic solvent
72. In the following reaction,
 $4\text{P} + 3\text{KOH} + 3\text{H}_2\text{O} \rightarrow 3\text{KH}_2\text{PO}_2 + \text{PH}_3$
a) P is oxidised only b) P is reduced only
c) P is oxidised as well as reduced
d) None of these above
73. In which iron has the lowest oxidation state?
a) $\text{Fe}(\text{CO})_5$ b) Fe_2O_3
c) $\text{K}_4\text{Fe}(\text{CN})_6$ d) $\text{FeSO}_4 \cdot (\text{NH}_4)_2\text{SO}_4 \cdot 6\text{H}_2\text{O}$
74. Which one is not an example of redox reaction?
a) $\text{Cl}_2 + 2\text{H}_2\text{O} + \text{SO}_2 \rightarrow 4\text{H}^+ + \text{SO}_4^{2-} + 2\text{Cl}^-$
b) $\text{Cu}^{2+} + \text{Zn} \rightarrow \text{Zn}^{2+} + \text{Cu}$
c) $2\text{H}_2 + \text{O}_2 \rightarrow 2\text{H}_2\text{O}$ d) $\text{HCl} + \text{H}_2\text{O} \rightarrow \text{H}_3\text{O}^+ + \text{Cl}^-$
75. The number of mole of electrons in the process $\text{MnO}_4^- \rightarrow \text{MnO}_4^{2-}$ is
a) 2 b) 1 c) 3 d) 4
76. The oxyacid which acts both as oxidizing and reducing agent is
a) H_2SO_4 b) H_3PO_4 c) HNO_2 d) HClO_4
77. In the reaction of O_3 and H_2O_2 , the later acts as
a) Oxidizing agent b) Reducing agent
c) Bleaching agent
d) Both oxidizing and bleaching agent
78. The correct order of reducing power of halide ions is
a) $\text{Cl}^- > \text{Br}^- > \text{I}^- > \text{F}^-$ b) $\text{Cl}^- > \text{I}^- > \text{Br}^- > \text{F}^-$
c) $\text{Br}^- > \text{Cl}^- > \text{I}^- > \text{F}^-$ d) $\text{I}^- > \text{Br}^- > \text{Cl}^- > \text{F}^-$
79. Which is strongest oxidizing agent?
a) O_3 b) O_2 c) Cl_2 d) F_2
80. Starch iodide paper is used to for the presence of
a) Iodine b) Iodide ion c) Oxidant d) Reductant
81. Equivalent weight of hydrazine when it is converted to N_2O_5 is:
a) M/4 b) M/6 c) M/8 d) M/10
82. In the reaction $2\text{Na}_2\text{S}_2\text{O}_3 + \text{I}_2 \rightarrow \text{Na}_2\text{S}_4\text{O}_6 + 2\text{NaI}$, the oxidation state of sulphur is
a) Decreased b) Increased c) Unchanged d) None