EXERCISE-I

Reversible and Irreversible reaction

1. A reversible reaction is one which
(A) Proceeds in one direction
(B) Proceeds in both directions
(C) Proceeds spontaneously
(D) All the statements are wrong

2. Which of the following is a characteristic of a reversible reaction
(A) Number of moles of reactants and products are equal
(B) It can be influenced by a catalyst
(C) It can never proceed to completion
(D) None of the above

3. The reaction $CaCO_3 \rightleftharpoons CaO + CO_2(g)$ goes to completion in lime kiln because
(A) Of the high temperature
(B) CaO is more stable than $CaCO_3$
(C) CaO is not dissociated
(D) CO_2 escapes continuously

4. In the given reaction $N_2 + O_2 \rightleftharpoons 2NO$, equilibrium means that
(A) Concentration of reactants is changing where as concentration of products is constant
(B) Concentration of all substances is constant
(C) Concentration of reactants is constant where as concentration of products is changing
(D) Concentration of all substances is changing

5. Which of the following reactions is reversible
(A) $H_2 + I_2 \longrightarrow 2HI$
(B) $H_2SO_4 + Ba(OH)_2 \longrightarrow BaSO_4 + 2H_2O$
(C) $NaCl + AgNO_3 \longrightarrow NaNO_3 + AgCl$
(D) $Fe + S \longrightarrow FeS$

Equilibrium state

6. In any chemical reaction, equilibrium is supposed to be establish when
(A) Mutual opposite reactions undergo
(B) Concentration of reactants and resulting products are equal
(C) Velocity of mutual reactions become equal
(D) The temperature of mutual opposite reactions become equal

7. Which of the following conditions represents an equilibrium
(A) Freezing of ice in a open vessel, temperature of ice is constant
(B) Few drops of water is present along with air in a balloon, temperature of balloon is constant
(C) Water is boiling in an open vessel over stove, temperature of water is constant
(D) All the statements (A), (B) and (C) are correct for the equilibrium

8. When rate of forward reaction becomes equal to backward reaction, this state is termed as
(A) Chemical equilibrium
(B) Reversible state
(C) Equilibrium
(D) All of these

9. In chemical reaction $A \rightleftharpoons B$, the system will be known in equilibrium when
(A) A completely changes to B
(B) 50% of A changes to B
(C) The rate of change of A to B and B to A on both the sides are same
(D) Only 10% of A changes to B

10. A chemical reaction is at equilibrium when
(A) Reactants are completely transformed into products
(B) The rates of forward and backward reactions are equal
(C) Formation of products is minimised
(D) Equal amounts of reactants and products are present

11. Theory of 'active mass' indicates that the rate of chemical reaction is directly proportional to the
(A) Equilibrium constant
(B) Properties of reactants
(C) Volume of apparatus
(D) Concentration of reactants

12. The rate at which substances react depends on their
(A) Atomic weight
(B) Molecular weight
(C) Equivalent weight
(D) Active mass

13. Which is false
(A) The greater the concentration of the substances involved in a reaction, the lower the speed of the reaction
(B) The point of dynamic equilibrium is reached when the reaction rate in one direction just balances the reaction rate in the opposite direction
(C) The dissociation of weak electrolyte is a reversible reaction
(D) The presence of free ions facilitates chemical changes

14. Chemical equations convey quantitative information on the
(A) Type of atoms/molecules taking part in the reaction
(B) Number of atoms/molecules of the reactants and products involved in the reaction
(C) Relative number of moles of reactants and products involved in the reaction
(D) Quantity of reactant consumed and quantity of product formed

15. In the thermal decomposition of potassium chlorate given as $2K\,ClO_3 \longrightarrow 2KCl + 3O_2$, law of mass action
(A) Cannot be applied
(B) Can be applied
(C) Can be applied at low temperature
(D) Can be applied at high temp. and pressure

Law of equilibrium and Equilibrium constant

16. The decomposition of N_2O_4 to NO_2 is carried out at $280K$ in chloroform. When equilibrium has been established, 0.2 mol of N_2O_4 and 2×10^{-3} mol of NO_2 are present in 2 litre solution. The equilibrium constant for reaction $N_2O_4 \rightleftharpoons 2NO_2$ is
(A) 1×10^{-2} (B) 2×10^{-3}
(C) 1×10^{-5} (D) 2×10^{-5}

17. Concentration of a gas is expressed in the following terms in the calculation of equilibrium constant
(A) No. of molecules per litre
(B) No. of grams per litre
(C) No. of gram equivalent per litre
(D) No. of molecules equivalent per litre

18. The unit of equilibrium constant K for the reaction $A+B \rightleftharpoons C$ would be
(A) $mol\ litre^{-1}$ (B) $litre\ mol^{-1}$
(C) $mol\ litre$ (D) Dimensionless

19. In a reaction $A+B \rightleftharpoons C+D$, the concentrations of A, B, C and D (in moles/litre) are 0.5, 0.8, 0.4 and 1.0 respectively. The equilibrium constant is
(A) 0.1 (B) 1.0
(C) 10 (D) ∞

20. In a chemical equilibrium $A+B \rightleftharpoons C+D$, when one mole each of the two reactants are mixed, 0.6 mole each of the products are formed. The equilibrium constant calculated is
(A) 1 (B) 0.36
(C) 2.25 (D) 4/9

21. For the reaction $2SO_2 + O_2 \rightleftharpoons 2SO_3$, the units of K_c are
(A) $litre\,mole^{-1}$ (B) $mol\ litre^{-1}$
(C) $(mol\ litre^{-1})^2$ (D) $(litre\ mole^{-1})^2$

22. A quantity of PCl_5 was heated in a 10 litre vessel at $250^o C$; $PCl_5(g) \rightleftharpoons PCl_3(g) + Cl_2(g)$. At equilibrium the vessel contains 0.1 mole of PCl_5 0.20 mole of PCl_3 and 0.2 mole of Cl_2. The equilibrium constant of the reaction is

(A) 0.02 (B) 0.05
(C) 0.04 (D) 0.025

23. A mixture of 0.3 mole of H_2 and 0.3 mole of I_2 is allowed to react in a 10 *litre* evacuated flask at $500^o C$. The reaction is $H_2 + I_2 \rightleftharpoons 2HI$, the K is found to be 64. The amount of unreacted I_2 at equilibrium is

(A) 0.15 mole (B) 0.06 mole
(C) 0.03 mole (D) 0.2 mole

24. In a chemical equilibrium, the rate constant of the backward reaction is 7.5×10^{-4} and the equilibrium constant is 1.5. So the rate constant of the forward reaction is

(A) 5×10^{-4} (B) 2×10^{-3}
(C) 1.125×10^{-3} (D) 9.0×10^{-4}

25. 28 g of N_2 and 6 g of H_2 were kept at $400^o C$ in 1 *litre* vessel, the equilibrium mixture contained $27.54 g$ of NH_3. The approximate value of K_c for the above reaction can be (in $mole^{-2}\ litre^2$)

(A) 75 (B) 50
(C) 25 (D) 100

26. 4.5 moles each of hydrogen and iodine heated in a sealed ten litre vessel. At equilibrium, 3 moles of HI were found. The equilibrium constant for $H_2(g) + I_2(g) \rightleftharpoons 2HI(g)$ is

(A) 1 (B) 10
(C) 5 (D) 0.33

27. An equilibrium mixture of the reaction $2H_2S(g) \rightleftharpoons 2H_2(g) + S_2(g)$ had 0.5 mole H_2S, 0.10 mole H_2 and 0.4 mole S_2 in one litre vessel. The value of equilibrium constant (K) in *mole litre*$^{-1}$ is

(A) 0.004 (B) 0.008
(C) 0.016 (D) 0.160

28. At 3000 K the equilibrium pressures of CO_2, CO and O_2 are 0.6,0.4 and 0.2 atmospheres respectively. K_p for the reaction, $2CO_2 \rightleftharpoons 2CO + O_2$ is

(A) 0.089 (B) 0.0533
(C) 0.133 (D) 0.177

29. The rate constant for forward and backward reactions of hydrolysis of ester are 1.1×10^{-2} and 1.5×10^{-3} per minute respectively. Equilibrium constant for the reaction is

$CH_3COOC_2H_5 + H_2O \rightleftharpoons CH_3COOH + C_2H_5OH$

(A) 4.33 (B) 5.33
(C) 6.33 (D) 7.33

30. At a certain temp. $2HI \rightleftharpoons H_2 + I_2$ Only 50% HI is dissociated at equilibrium. The equilibrium constant is

(A) 0.25 (B) 1.0
(C) 3.0 (D) 0.50

31. 15 moles of H_2 and 5.2 moles of I_2 are mixed and allowed to attain equilibrium at $500^o C$. At equilibrium, the concentration of HI is found to be 10 moles. The equilbrium constant for the formation of HI is

(A) 50 (B) 15
(C) 100 (D) 25

32. In a chemical reaction equilibrium is established when

(A) Opposing reaction ceases
(B) Concentration of reactants and products are equal
(C) Velocity of opposing reaction is the same as that of forward reaction
(D) Reaction ceases to generate heat

33. For the reaction $H_2 + I_2 = 2HI$,the equilibrium concentration of H_2, I_2 and HI are 8.0, 3.0 and 28.0 *mol per litre* respectively, the equilibrium constant of the reaction is

(A) 30.66 (B) 32.66
(C) 34.66 (D) 36.66

34. Change in volume of the system does not alter the number of moles in which of the following equilibrium

(A) $N_{2(g)} + O_{2(g)} \rightleftharpoons 2NO_{(g)}$

(B) $PCl_{5(g)} \rightleftharpoons PCl_{3(g)} + Cl_{2(g)}$

(C) $N_{2(g)} + 3H_{2(g)} \rightleftharpoons 2NH_{3(g)}$

(D) $SO_2Cl_{2(g)} \rightleftharpoons SO_{2(g)} + Cl_{2(g)}$

35. The rate of forward reaction is two times that of reverse reaction at a given temperature and identical concentration. $K_{\text{equilibrium}}$ is

(A) 2.5 (B) 2.0

(C) 0.5 (D) 1.5

36. In the reaction $PCl_{5(g)} \rightleftharpoons PCl_{3(g)} + Cl_{2(g)}$.

The equilibrium concentrations of PCl_5 and PCl_3 are 0.4 and 0.2 *mole/litre* respectively. If the value of K_c is 0.5 what is the concentration of Cl_2 in *moles/litre*

(A) 2.0 (B) 1.5

(C) 1.0 (D) 0.5

37. In Haber process 30 *litres* of dihydrogen and 30 *litres* of dinitrogen were taken for reaction which yielded only 50% of the expected product. What will be the composition of gaseous mixture under the aforesaid condition in the end

(A) 20 *litres* ammonia, 25 *litres* nitrogen, 15 *litres* hydrogen

(B) 20 *litres* ammonia, 20 *litres* nitrogen, 20 *litres* hydrogen

(C) 10 *litres* ammonia, 25 *litres* nitrogen, 15 *litres* hydrogen

(D) 20 *litres* ammonia, 10 *litres* nitrogen, 30 *litres* hydrogen

38. For the reaction equilibrium $N_2O_4 \rightleftharpoons 2NO_{2(g)}$, the concentrations of N_2O_4 and NO_2 at equilibrium are 4.8×10^{-2} and 1.2×10^{-2} $mol\,litre^{-1}$ respectively. The value of K_c for the reaction is

(A) 3.3×10^2 $mol\ litre^{-1}$ (B) 3×10^{-1} $mol\ litre^{-1}$

(C) 3×10^{-3} $mol\ litre^{-1}$ (D) 3×10^3 $mol\ litre^{-1}$

39. 3.2 moles of hydrogen iodide were heated in a sealed bulb at $444^o C$ till the equilibrium state was reached. Its degree of dissociation at this temperature was found to be 22%. The number of moles of hydrogen iodide present at equilibrium are

(A) 2.496 (B) 1.87

(C) 2 (D) 4

40. 56 *g* of nitrogen and 8 *g* hydrogen gas are heated in a closed vessel. At equilibrium 34 *g* of ammonia are present. The equilibrium number of moles of nitrogen, hydrogen and ammonia are respectively

(A) 1,2,2 (B) 2,2,1

(C) 1,1,2 (D) 2,1,2

41. In the reaction, $H_2 + I_2 \rightleftharpoons 2HI$. In a 2 litre flask 0.4 moles of each H_2 and I_2 are taken. At equilibrium 0.5 moles of HI are formed. What will be the value of equilibrium constant, K_c

(A) 20.2 (B) 25.4

(C) 0.284 (D) 11.1

42. Ammonia carbonate when heated to 200°C gives a mixture of NH_3 and CO_2 vapour with a density of 13.0. What is the degree of dissociation of ammonium carbonate

(A) $3/2$ (B) $1/2$

(C) 2 (D) 1

43. 2 mol of N_2 is mixed with 6 mol of H_2 in a closed vessel of one litre capacity. If 50% of N_2 is converted into NH_3 at equilibrium, the value of K_c for the reaction $N_{2(g)} + 3H_{2(g)} \rightleftharpoons 2NH_{3(g)}$ is

(A) $4/27$ (B) $27/4$

(C) $1/27$ (D) 24

44. For a reaction $H_2 + I_2 \rightleftharpoons 2HI$ at $721K,$ the value of equilibrium constant is 50. If 0.5 mols each of H_2 and I_2 is added to the system the value of equilibrium constant will be

(A) 40 (B) 60

(C) 50 (D) 30

45. What is the effect of halving the pressure by doubling the volume on the following system at 500°C $H_{2(g)} + I_{2(g)} \rightleftharpoons 2HI_{(g)}$

(A) Shift to product side
(B) Shift to product formation
(C) Liquefaction of HI
(D) No effect

K_p & K_c Relationship and Characteristics of K

46. Two gaseous equilibria $SO_{2(g)} + \frac{1}{2}O_{2(g)} \rightleftharpoons SO_{3(g)}$ and $2SO_{3(g)} \rightleftharpoons 2SO_{2(g)} + O_{2(g)}$ have equilibrium constants K_1 and K_2 respectively at $298\,K$. Which of the following relationships between K_1 and K_2 is correct

(A) $K_1 = K_2$ (B) $K_2 = K_1^2$
(C) $K_2 = \frac{1}{K_1^2}$ (D) $K_2 = \frac{1}{K_1}$

47. $H_2 + I_2 \rightleftharpoons 2HI$
In the above equilibrium system if the concentration of the reactants at $25^o C$ is increased, the value of K_c will

(A) Increase
(B) Decrease
(C) Remains the same
(D) Depends on the nature of the reactants

48. At a given temperature, the equilibrium constant for reaction $PCl_5(g) \rightleftharpoons PCl_3(g) + Cl_2(g)$ is 2.4×10^{-3}. At the same temperature, the equilibrium constant for reaction $PCl_3(g) + Cl_2(g) \rightleftharpoons PCl_5(g)$ is

(A) 2.4×10^{-3} (B) -2.4×10^{-3}
(C) 4.2×10^2 (D) 4.8×10^{-2}

49. 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

50. K for the synthesis of HI is 50. K for dissociation of HI is

(A) 50 (B) 5
(C) 0.2 (D) 0.02

51. For which one of the following reactions $K_p = K_c$

(A) $N_2 + 3H_2 \rightleftharpoons 2NH_3$ (B) $N_2 + O_2 \rightleftharpoons 2NO$
(C) $PCl_5 \rightleftharpoons PCl_3 + Cl_2$ (D) $2SO_3 \rightleftharpoons 2SO_2 + O_2$

52. The equilibrium constant for the reversible reaction, $N_2 + 3H_2 \rightleftharpoons 2NH_3$ is K and for the reaction $\frac{1}{2}N_2 + \frac{3}{2}H_2 \rightleftharpoons NH_3$ the equilibrium constant is K'. K and K' will be related as

(A) $K = K'$ (B) $K' = \sqrt{K}$
(C) $K = \sqrt{K'}$ (D) $K \times K' = 1$

53. The equilibrium constant (K_p) for the reaction $PCl_5(g) \to PCl_3(g) + Cl_2(g)$ is 16. If the volume of the container is reduced to one half its original volume, the value of K_p for the reaction at the same temperature will be

(A) 32 (B) 64
(C) 16 (D) 4

54. $2NO_2 \rightleftharpoons 2NO + O_2$; $K = 1.6 \times 10^{-12}$

$NO + \frac{1}{2}O_2 \rightleftharpoons NO_2 K' = ?$

(A) $K' = \frac{1}{K^2}$ (B) $K' = \frac{1}{K}$
(C) $K' = \frac{1}{\sqrt{K}}$ (D) None of these

55. The value of K_p for the following reaction $2H_2S(g) \rightleftharpoons 2H_2(g) + S_2(g)$ is 1.2×10^{-2} at $106.5^o C$. The value of K_c for this reaction is

(A) 1.2×10^{-2} (B) $< 1.2 \times 10^{-2}$
(C) 83 (D) $> 1.2 \times 10^{-2}$

56. If K_c is the equilibrium constant for the formation of NH_3, the dissociation constant of ammonia under the same temperature will be

(A) K_c (B) $\sqrt{K_c}$
(C) K_c^2 (D) $1/K_c$

57. 3.2 moles of hydrogen iodide were heated in a scaled bulb at 444°C till the equilibrium was reached. The degree of dissociation of HI at this temperature was found to be 22%. The number of moles of hydrogen iodide present at equilibrium are

(A) 1.87 (B) 2.496

(C) 4.00 (D) 2.00

58. The K_c for $H_{2(g)} + I_{2(g)} \rightleftharpoons 2HI_{(g)}$ is 64. If the volume of the container is reduced to one-half of its original volume, the value of the equilibrium constant will be

(A) + 28 (B) 64

(C) 32 (D) 16

59. A reversible reaction $H_2 + Cl_2 \rightleftharpoons 2HCl$ is carries out in one litre flask. If the same reaction is carried out in two litre flask, the equilibrium constant will be

(A) Decreased (B) Doubled

(C) Halved (D) Same

60. For the reaction $2NO_{2(g)} \rightleftharpoons 2NO_{(g)} + O_{2(g)}$, $K_c = 1.8 \times 10^{-6}$ at $185°C$. At $185°C$ the K_c for $NO_{(g)} + \frac{1}{2}O_{2(g)} \rightleftharpoons NO_{2(g)}$ is

(A) 1.95×10^{-3} (B) 1.95×10^{3}

(C) 7.5×10^{2} (D) 0.9×10^{6}

61. For reaction, $2A(g) \rightleftharpoons 3C(g) + D(s)$, the value of K_c will be equal to

(A) $K_p(RT)$ (B) K_p / RT

(C) $= K_p$ (D) None of these

62. In the reaction, $A_2(g) + 4B_2(g) \rightleftharpoons 2AB_4(g)$ $\Delta H < 0$ the formation of AB_4 is will be favoured at

(A) Low temperature, high pressure

(B) High temperature, low pressure

(C) Low temperature, low pressure

(D) High temperature, high pressure

63. The formation of SO_3 takes place according to the following reaction, $2SO_2 + O_2 \rightleftharpoons 2SO_3$; $\Delta H = -45.2\ kcal$

The formation of SO_3 is favoured by

(A) Increasing in temperature

(B) Removal of oxygen

(C) Increase of volume

(D) Increasing of pressure

64. What is the effect of increasing pressure on the dissociation of PCl_5 according to the equation $PCl_{5(g)} \rightleftharpoons PCl_{3(g)} + Cl_{2(g)} - x\ cal$

(A) Dissociation decreases

(B) Dissociation increases

(C) Dissociation does not change

(D) None of these

65. If equilibrium constants of reaction, $N_2 + O_2 \rightleftharpoons 2NO$ is K_1 and $\frac{1}{2}N_2 + \frac{1}{2}O_2 \rightleftharpoons NO$ is K_2, then

(A) $K_1 = K_2$ (B) $K_2 = \sqrt{K_1}$

(C) $K_1 = 2K_2$ (D) $K_1 = \frac{1}{2}K_2$

66. The vapour density of completely dissociated NH_4Cl would be

(A) Slight less than half that of NH_4Cl

(B) Half that of NH_4Cl

(C) Double that of NH_4Cl

(D) Determined by the amount of solid NH_4Cl in the experiment

67. In an equilibrium reaction for which $\Delta G^0 = 0$, the equilibrium constant $K =$

(A) 0 (B) 1

(C) 2 (D) 10

68. For a system in equilibrium $\Delta G = 0$ under conditions of constant

(A) Temperature and pressure

(B) Temperature and volume

(C) Energy and volume

(D) Pressure and volume

69. A reaction attains equilibrium when the free energy change accompanying it is
(A) Positive and large
(B) Zero
(C) Negative and large
(D) Negative and small

70. $\Delta G^0(HI, g) \cong +1.7\, kJ$. What is the equilibrium constant at $25^o C$ for $2HI(g) \leftrightarrows H_2(g) + I_2(g)$
(A) 24.0 (B) 3.9
(C) 2.0 (D) 0.5

Le-Chaterlier principle and It's application

71. According to Le-chatelier principle, if heat is given to solid-liquid system, then
(A) Quantity of solid will reduce
(B) Quantity of liquid will reduce
(C) Increase in temperature
(D) Decrease in temperature

72. In the reaction $A(g) + 2B(g) \rightleftharpoons C(g) + Q\, kJ$, greater product will be obtained **or** the forward reaction is favoured by
(A) At high temperature and high pressure
(B) At high temperature and low pressure
(C) At low temperature and high pressure
(D) At low temperature and low pressure

73. Following gaseous reaction is undergoing in a vessel $C_2H_4 + H_2 \rightleftharpoons C_2H_6$; $\Delta H = -32.7\, Kcal$ Which will increase the equilibrium concentration of C_2H_6
(A) Increase of temperature
(B) By reducing temperature
(C) By removing some hydrogen
(D) By adding some C_2H_6

74. The effect of increasing the pressure on the equilibrium $2A + 3B \rightleftharpoons 3A + 2B$ is
(A) Forward reaction is favoured
(B) Backward reaction is favoured
(C) No effect
(D) None of the above

75. For the equilibrium $2NO_2(g) \rightleftharpoons N_2O_4(g) + 14.6\, kcal$ the increase in temperature would
(A) Favour the formation of N_2O_4
(B) Favour the decomposition of N_2O_4
(C) Not alter the equilibrium
(D) Stop the reaction

76. According to Le-chatelier's principle, an increase in the temperature of the following reaction will
$N_2 + O_2 \rightleftharpoons 2NO - 43,200\, kcal$
(A) Increase the yield of NO
(B) Decrease the yield of NO
(C) Not effect the yield of NO
(D) Not help the reaction to proceed in forward direction

77. In the manufacture of NH_3 by Haber's process, the condition which would give maximum yield is
$N_2 + 3H_2 \rightleftharpoons 2NH_3 + Q\, kcal$
(A) High temperature, high pressure and high concentrations of the reactants
(B) High temperature, low pressure and low concentrations of the reactants
(C) Low temperature and high pressure
(D) Low temperature, low pressure and low concentration of H_2

78. Suppose the reaction $PCl_{5(s)} \rightleftharpoons PCl_{3(s)} + Cl_{2(g)}$ is in a closed vessel at equilibrium stage. What is the effect on equilibrium concentration of $Cl_{2(g)}$ by adding PCl_5 at constant temperature
(A) Decreases
(B) Increases
(C) Unaffected
(D) Cannot be described without the value of K_p

79. In which of the following equilibrium reactions, the equilibrium would shift to the right, if total pressure is increased
(A) $N_2 + 3H_2 \rightleftharpoons 2NH_3$ (B) $H_2 + I_2 \rightleftharpoons 2HI$
(C) $H_2 + Cl_2 \rightleftharpoons 2HCl$ (D) $N_2O_4 \rightleftharpoons 2NO$

80. In which of the following gaseous equilibrium an increase in pressure will increase the yield of the products

(A) $2HI \rightleftharpoons H_2 + I_2$

(B) $2SO_2 + O_2 \rightleftharpoons 2SO_3$

(C) $H_2 + Br_2 \rightleftharpoons 2HBr$

(D) $H_2O + CO \rightleftharpoons H_2 + CO_2$

81. The equilibrium $SO_2Cl_{2(g)} \rightleftharpoons SO_{2(g)} + Cl_{2(g)}$ is attained at $25°C$ in a closed container and an inert gas helium is introduced which of the following statement is correct

(A) More chlorine is formed

(B) Concentration of SO_2 is reduced

(C) More SO_2Cl_2 is formed

(D) Concentration of SO_2Cl_2, SO_2 and Cl_2 does not change

82. Which of the following equilibria will shift to right side on increasing the temperature

(A) $CO_{(g)} + H_2O_{(g)} \rightleftharpoons CO_{2(g)} + H_{2(g)}$

(B) $2SO_{2(g)} + O_{2(g)} \rightleftharpoons 2SO_{3(g)}$

(C) $H_2O_{(g)} \rightleftharpoons H_{2(g)} + \frac{1}{2}(O_2)_{(g)}$

(D) $4HCl_{(g)} + O_{2(g)} \rightleftharpoons 2H_2O_{(g)} + 2Cl_{2(g)}$

83. Sodium sulphate dissolves in water with evolution of heat. Consider a saturated solution of sodium sulphate. If the temperature is raised, then according to Le-Chatelier principle

(A) More solid will dissolve

(B) Some solid will precipitate out from the solution

(C) The solution will become supersaturated

(D) Solution concentration will remain unchanged

84. Consider the equilibrium $N_2(g) + 3H_2(g) \rightleftharpoons 2NH_3(g)$; $\Delta H = -93.6\ KJ$. The maximum yield of ammonia is obtained by

(A) Decrease of temp. and increase of pressure

(B)Increase of temp. and decrease of pressure

(C) Decrease of both the temp. and pressure

(D) Increase of both the temp. and pressure

85. In the equilibrium $AB \rightleftharpoons A + B$; if the equilibrium concentration of A is doubled, the equilibrium concentration of B would become:

(A) Twice (B) Half

(C) $1/4^{th}$ (D) $1/8^{th}$

86. Le-Chatelier's principle is applicable only to a

(A) System in equilibrium

(B) Irreversible reaction

(C) Homogeneous reaction

(D) Heterogeneous reaction

87. In a vessel containing SO_3, SO_2 and O_2 at equilibrium, some helium gas is introduced so that the total pressure increases while temperature and volume remain constant. According to Le–Chatelier principle the dissociation of SO_3

(A) Increases

(B) Decreases

(C) Remains unaltered

(D) Changes unpredictably

88. $H_{2(g)} + I_{2(g)} \rightleftharpoons 2HI_{(g)}$ $\Delta H = +q\ cal$, then formation of *HI*:

(A) Is favoured by lowering the temperature

(B) Is favoured by increasing the pressure

(C) Is unaffected by change in pressure

(D) Is unaffected by change in temperature

89. In which of the following equilibrium systems is the rate of the backward reaction favoured by increase of pressure

(A) $PCl_5 \rightleftharpoons PCl_3 + Cl_2$ (B) $2SO_2 + O_2 \rightleftharpoons 2SO_3$

(C) $N_2 + 3H_2 \rightleftharpoons 2NH_3$ (D) $N_2 + O_2 \rightleftharpoons 2NO$

90. Which of the following equilibrium is not shifted by increase in the pressure

(A) $H_{2(g)} + I_{2(g)} \rightleftharpoons 2HI_{(g)}$

(B) $N_{2(g)} + 3H_{2(g)} \rightleftharpoons 2NH_{3(g)}$

(C) $2CO_{(g)} + O_{2(g)} \rightleftharpoons 2CO_{2(g)}$

(D) $2C_{(S)} + O_{2(g)} \rightleftharpoons 2CO_{(g)}$

91. According to Le–Chatelier's principal adding heat to a solid and liquid in equilibrium with endothermic nature will cause the

(A) Temperature to rise

(B) Temperature to fall

(C) Amount of solid to decrease

(D) Amount of liquid to decrease

92. On addition of an inert gas at constant volume to the reaction $N_2 + 3H_2 \rightleftharpoons 2NH_3$ at equilibrium

(A) The reaction remains unaffected

(B) Forward reaction is favoured

(C) The reaction halts

(D) Backward reaction is favoured

93. Le-Chatelier principle is not applicable to

(A) $H_{2(g)} + I_{2(g)} \rightleftharpoons 2HI_{(g)}$

(B) $Fe_{(S)} + S_{(S)} \rightleftharpoons FeS_{(S)}$

(C) $N_{2(g)} + 3H_{2(g)} \rightleftharpoons 2NH_{3(g)}$

(D) $N_{2(g)} + O_{2(g)} \rightleftharpoons 2NO_{(g)}$

94. For the reaction: $A + B + Q \rightleftharpoons C + D$, if the temperature is increased, then concentration of the products will

(A) Increase (B) Decrease

(C) Remain same (D) Become Zero

95. $H_{2(g)} + I_{2(g)} \rightleftharpoons 2HI_{(g)}$

In this reaction when pressure increases, the reaction direction

(A) Does not change (B) Forward

(C) Backward (D) Decrease

96. The formation of nitric oxide by contact process $N_2 + O_2 \rightleftharpoons 2NO$. $\Delta H = 43.200\ kcal$ is favoured by

(A) Low temperature and low pressure

(B) Low temperature and high pressure

(C) High temperature and high pressure

(D) High temperature and excess reactants concentration

97. The chemical reaction : $BaO_{2(S)} \rightleftharpoons BaO_{(s)} + O_{2(g)}$, $\Delta H = +ve$. In equilibrium condition, pressure of O_2 depends upon

(A) Increase mass of BaO

(B) Increase mass of BaO_2

(C) Increase in temperature

(D) Increase mass of BaO_2 and BaO both

98. The yield of product in the reaction $A_{2(g)} + 2B_{(g)} \rightleftharpoons C_{(g)} + Q.kJ.$ would be high at

(A) High temperature and high pressure

(B) High temperature and low pressure

(C) Low temperature and high pressure

(D) Low temperature and low pressure

99. Which reaction is not effected by change in pressure

(A) $H_2 + I_2 \rightleftharpoons 2HI$ (B) $2C + O_2 \rightleftharpoons 2CO$

(C) $N_2 + 3H_2 \rightleftharpoons 2NH_3$ (D) $PCl_5 \rightleftharpoons PCl_3 + Cl_2$

100. The gaseous reaction $A + B \rightleftharpoons 2C + D$; $+Q$ is most favoured at

(A) Low temperature and high pressure

(B) High temperature and high pressure

(C) High temperature and low pressure

(D) Low temperature and low pressure

Electrical conductors, Arrhenius theory and Ostwald's dilution law

101. If α is the degree of ionization, C the concentration of a weak electrolyte and K_a the acid ionization constant, then the correct relationship between α, C and K_a is

(A) $\alpha^2 = \sqrt{\frac{K_a}{C}}$ (B) $\alpha^2 = \sqrt{\frac{C}{K_a}}$

(C) $\alpha = \sqrt{\frac{K_a}{C}}$ (D) $\alpha = \sqrt{\frac{C}{K_a}}$

102. Theory of ionization was given by

(A) Rutherford (B) Graham

(C) Faraday (D) Arrhenius

103. An ionizing solvent has
(A) Low value of dielectric constant
(B) High value of dielectric constant
(C) A dielectric constant equal to 1
(D) Has a high melting point

104. The extent of ionization increases
(A) With the increase in concentration of solute
(B) On addition of excess water to solution
(C) On decreasing the temperature of solution
(D) On stirring the solution vigorously

105. Which is generally true about ionic compounds
(A) Have low boiling point
(B) Have low melting point
(C) Soluble in non polar solvents
(D) Conduct electricity in the fused state

106. Vant hoff factor of $BaCl_2$ of conc. $0.01M$ is 1.98. Percentage dissociation of $BaCl_2$ on this conc. Will be
(A) 49 (B) 69
(C) 89 (D) 98

107. In which of the following solutions, ions are present
(A) Sucrose in water
(B) Sulphur in CS_2
(C) Caesium nitrate in water
(D) Ethanol in water

108. The following equilibrium exists inaqueous solution, $CH_3COOH \rightleftharpoons CH_3COO^- + H^+$ if dil HCl is added, without change in temperature, the
(A) Concentration of CH_3COO^- will increase
(B) Concentration of CH_3COO^- will decrease
(C) The equilibrium constant will increase
(D) The equilibrium constant will decrease

109. Which will not affect the degree of ionisation
(A) Temperature (B) Concentration
(C) Type of solvent (D) Current

110. The addition of a polar solvent to a solid electrolyte results in
(A) Polarization (B) Association
(C) Ionization (D) Electron transfer

111. 0.2 molar solution of formic acid is ionized 3.2%. Its ionization constant is
(A) 1×10^{-12} (B) 2.1×10^{-4}
(C) 1.25×10^{-6} (D) 1×10^{-14}

112. The best conductor of electricity is a 1.0 M solution of
(A) Boric acid (B) Acetic acid
(C) Sulphuric acid (D) Phosphoric acid

113. The colour of an electrolyte solution depends on
(A) The nature of the anion
(B) The nature of the cation
(C) The nature of both the ions
(D) The nature of the solvent

114. Ionisation depends upon
(A) Pressure (B) Volume
(C) Dilution (D) None of these

115. The values of dissociation constants of some acids (at 25^oC) are as follows. Indicate which is the strongest acid in water
(A) 1.4×10^{-2} (B) 1.6×10^{-4}
(C) 4.4×10^{-10} (D) 4.3×10^{-7}

Acids and Bases

116. The conjugate base of NH_2^- is
(A) NH_3 (B) NH^{2-}
(C) NH_4^+ (D) N_3^-

117. The strength of an acid depends on its tendency to
(A) Accept protons (B) Donate protons
(C) Accept electrons (D) Donate electrons

118. Which is not a electrophile
(A) $AlCl_3$ (B) BF_3
(C) $(CH_3)_3C^+$ (D) NH_3

119. Ammonia gas dissolves in water to give NH_4OH. In this reaction water acts as

(A) An acid (B) A base

(C) A salt (D) A conjugate base

120. In the equilibrium

$CH_3COOH + HF \rightleftharpoons CH_3COOH_2^+ + F^-$

(A) F^- is the conjugate acid of CH_3COOH

(B) F^- is the conjugate base of HF

(C) CH_3COOH is the conjugate acid of $CH_3COOH_2^+$

(D) $CH_3COOH_2^+$ is the conjugate base of CH_3COOH

121. H^+ is a

(A) Lewis acid

(B) Lewis base

(C) Bronsted-Lowry base

(D) None of the above

122. Dissociation of H_3PO_4 takes place in following steps

(A) 1 (B) 2

(C) 3 (D) 4

123. The aqueous solution of disodium hydrogen phosphate is

(A) Acidic (B) Neutral

(C) Basic (D) None

124. Which of the following is a conjugated acid-base pair

(A) $HCl, NaOH$ (B) NH_4Cl, NH_4OH

(C) H_2SO_4, HSO_4^- (D) KCN, HCN

125. The solution of strong acid and weak base NH_4Cl is

(A) Acidic (B) Basic

(C) Neutral (D) None of the above

126. Lewis base is

(A) CO_2 (B) SO_3

(C) SO_2 (D) ROH

127. 10 ml of 1 M H_2SO_4 will completely neutralise

(A) 10 ml of 1 M $NaOH$ solution

(B) 10 ml of 2 M $NaOH$ solution

(C) 5 ml of 2 M KOH solution

(D) 5 ml of 1 M Na_2CO_3 solution

128. When 100 ml of 1M $NaOH$ solution is mixed with 10 ml of 10 M H_2SO_4, the resulting mixture will be

(A) Acidic (B) Alkaline

(C) Neutral (D) Strongly alkaline

129. The pH indicators are

(A) Salts of strong acids and strong bases

(B) Salts of weak acids and weak bases

(C) Either weak acids or weak bases

(D) Either strong acids or strong bases

130. Which of the following is not Lewis acid

(A) BF_3 (B) $AlCl_3$

(C) $FeCl_3$ (D) PH_3

131. The strength of an acid depends on its tendency to

(A) Accept protons (B) Donate protons

(C) Accept electrons (D) Donate electrons

132. In Lewis acid-base theory, neutralization reaction may be considered as

(A) Formation of salt and water

(B) Competition for protons by acid and base

(C) Oxidation reduction

(D) Coordinate covalent bond formation

133. The salt that forms neutral solution in water is

(A) NH_4Cl (B) $NaCl$

(C) Na_2CO_3 (D) K_3BO_3

134. Which of the following cannot act as a Lewis or Bronsted acid

(A) BF_3 (B) $AlCl_3$

(C) $SnCl_4$ (D) CCl_4

135. Which one of the following salts gives an acidic solution in water

(A) CH_3COONa (B) NH_4Cl

(C) $NaCl$ (D) CH_3COONH_4

136. The correct order of acid strength is

(A) $HClO < HClO_2 < HClO_3 < HClO_4$

(B) $HClO_4 < HClO < HClO_2 < HClO_3$

(C) $HClO_2 < HClO_3 < HClO_4 < HClO$

(D) $HClO_4 < HClO_3 < HClO_2 < HClO$

137. The strongest acid is

(A) H_3AsO_4 (B) H_3AsO_3

(C) H_3PO_3 (D) H_3PO_4

138. Which of the following is the strongest base

(A) $C_2H_5^-$ (B) $C_2H_5COO^-$

(C) $C_2H_5O^-$ (D) OH^-

139. The aqueous solution of which one of the following is basic

(A) $HOCl$ (B) $NaHSO_4$

(C) NH_4NO_3 (D) $NaOCl$

140. Which of the following is the weakest base

(A) $NaOH$ (B) $Ca(OH)_2$

(C) NH_4OH (D) KOH

141. The aqueous solution of aluminium chloride is acidic due to

(A) Cation hydrolysis

(B) Anion hydrolysis

(C) Hydrolysis of both anion and cation

(D) Dissociation

142. HSO_4^- is the conjugate base of

(A) H^+ (B) H_2SO_3

(C) SO_4^{2-} (D) H_2SO_4

143. An acid is a compound which furnishes (Bronsted-Lowry concept)

(A) An electron

(B) A proton

(C) An electron and a proton

(D) None of the above

144. The conjugate base of sulphuric acid is

(A) Sodium hydroxide

(B) Hydrochloric acid

(C) Bisulphate ion

(D) Barium hydroxide

145. Which is strongest Lewis base

(A) SbH_3 (B) AsH_3

(C) PH_3 (D) NH_3

146. Which is not example of Bronsted Lowry theory

(A) $AlCl_3$ (B) H_2SO_4

(C) SO_2 (D) HNO_3

147. An aqueous solution of sodium carbonate is alkaline because sodium carbonate is a salt of

(A) Weak acid and weak base

(B) Strong acid and weak base

(C) Weak acid and strong base

(D) Strong acid and strong base

148. The acid that results when a base accepts a proton is called

(A) Conjugate base of the acid

(B) Conjugate protonated base

(C) Lewis base

(D) Conjugate acid of the base

149. Ammonia gas dissolves in water to form NH_4OH. In this reaction water acts as

(A) A conjugate base

(B) A non-polar solvent

(C) An acid

(D) A base

150. The conjugate base in the following reaction

$$H_2SO_4 + H_2O \rightleftharpoons H_3O^+ + HSO_4^-$$

(A) H_2O (B) HSO_4^-

(C) H_3O^+ (D) SO_2

Common ion effect, Isohydric solutions, Solubility product, Ionic product of water and Salt hydrolysis

151. What is the pH value of $\frac{N}{1000} KOH$ solution

(A) 10^{-11} (B) 3

(C) 2 (D) 11

152. Mohr's salt is a
(A) Normal salt (B) Acid salt
(C) Basic salt (D) Double salt

153. Aqueous solution of sodium acetate is
(A) Neutral (B) Weakly acidic
(C) Strongly acidic (D) Alkaline

154. Which is the correct alternate for hydrolysis constant of NH_4CN
(A) $\sqrt{\frac{K_w}{K_a}}$ (B) $\frac{K_w}{K_a \times K_b}$
(C) $\sqrt{\frac{K_b}{c}}$ (D) $\frac{K_a}{K_b}$

155. Which of the following salts undergoes hydrolysis
(A) CH_3COONa (B) KNO_3
(C) $NaCl$ (D) K_2SO_4

156. The solubility of $AgCl$ in $0.2\,M\ NaCl$ solution (K_{sp} for $AgCl = 1.20 \times 10^{-10}$) is
(A) $0.2\ M$ (B) $1.2 \times 10^{-10}\ M$
(C) $0.2 \times 10^{-10}\ M$ (D) $0.2 \times 10^{-10}\ M$

157. The solubility of AgI in NaI solution is less than that in pure water because
(A) AgI forms complex with NaI
(B) Of common ion effect
(C) Solubility product of AgI is less than that of NaI
(D) The temperature of the solution decreases

158. The solubility product of $BaSO_4$ is 1.5×10^{-9}. The precipitation in a 0.01 $M\ Ba^{2+}$ solution will start, on adding H_2SO_4 of concentration
(A) $10^{-9}\,M$ (B) $10^{-8}\,M$
(C) $10^{-7}\,M$ (D) $10^{-6}\,M$

159. At $20^o\,C$, the Ag^+ ion concentration in a saturated solution of Ag_2CrO_4 is $1.5 \times 10^{-4}\ mole/litre$. At $20^o\,C$, the solubility product of Ag_2CrO_4 would be
(A) 3.3750×10^{-12} (B) 1.6875×10^{-10}
(C) 1.6875×10^{-12} (D) 1.6875×10^{-11}

160. The solubility of $PbCl_2$ is
(A) $\sqrt{K_{sp}}$ (B) $\sqrt[3]{K_{sp}}$
(C) $\sqrt[3]{\frac{K_{sp}}{4}}$ (D) $\sqrt{8K_{sp}}$

161. K_{sp} for sodium chloride is $36\ mol^2/litre^2$. The solubility of sodium chloride is
(A) $\frac{1}{36}$ (B) $\frac{1}{6}$
(C) 6 (D) 3600

162. Sodium chloride is purified by passing hydrogen chloride gas in an impure solution of sodium chloride. It is based on
(A) Buffer action
(B) Common ion effect
(C) Association of salt
(D) Hydrolysis of salt

163. If the concentration of lead iodide in its saturated solution at $25^o\,C$ be 2×10^{-3} moles per litre, then its solubility product is
(A) 4×10^{-6} (B) 8×10^{-12}
(C) 6×10^{-9} (D) 32×10^{-9}

164. The precipitate of CaF_2 ($K_{sp} = 1.7 \times 10^{-10}$) is obtained when equal volumes of the following are mixed
(A) $10^{-4}M\ Ca^{2+} + 10^{-4}M\ F^-$
(B) $10^{-2}M\ Ca^{2+} + 10^{-3}M\ F^-$
(C) Both
(D) None of these

165. In the reaction: $H_2S \rightleftharpoons 2H^+ + S^{--}$, when NH_4OH is added, then
(A) S^{--} is precipitate
(B) No action takes places
(C) Concentration of S^{--} decreases
(D) Concentration of S^{--} increases

166. Which one of the following salt is most acidic in water
(A) $NiCl_2$ (B) $BeCl_2$
(C) $FeCl_3$ (D) $AlCl_3$

167. Which of the following aqueous solution will have a pH less than 7.0

(A) KNO_3 (B) $NaOH$

(C) $FeCl_3$ (D) 1×10^{-15}

168. Hydrolysis constant for a salt of weak acid and weak base would be

(A) $K_h=\frac{K_w}{K_a}$ (B) $K_h=\frac{K_w}{K_b}$

(C) $K_h=\frac{K_w}{K_aK_b}$ (D) None of these

169. Which salt will give basic solution on hydrolysis

(A) KCN (B) KCl

(C) NH_4Cl (D) CH_3COONH_4

170. Which of the following sulphides has the lowest solubility product

(A) FeS (B) MnS

(C) PbS (D) ZnS

Hydrogen ion concentration- *p*H scale and Buffer solution

171. On adding solid potassium cyanide to water

(A) pH will increase

(B) pH will decrease

(C) pH will not change

(D) Electrical conductance will not change

172. A is an aqueous acid; B is an aqueous base. They are diluted separately, then

(A) pH of A increases and pH of B decreases

(B) pH of A increases and pH of B decreases till pH in each case is 7

(C) pH of A and B increase

(D) pH of B and A decrease

173. The compound whose 0.1 M solution is basic is

(A) Ammonium acetate

(B) Calcium carbonate

(C) Ammonium sulphate

(D) Sodium acetate

174. The following reaction is known to occur in the body $CO_2+H_2O \rightleftharpoons H_2CO_3 \rightleftharpoons H^+ + HCO_3^-$. If CO_2 escapes from the system

(A) pH will decrease

(B) Hydrogen ion concentration will decrease

(C) H_2CO_3 concentration will be unaltered

(D) The forward reaction will be promoted

175. 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 $(K_a=10^{-5})$

(A) 1 : 10 (B) 10 : 1

(C) 100 : 1 (D) 1 : 100

176. The hydrogen ion concentration of $0.1\,N$ solution of CH_3COOH, which is 30% dissociated, is

(A) 0.03 (B) 3.0

(C) 0.3 (D) 30.0

177. What is the pH of $0.1\,M\ NH_3$

(A) 11.27 (B) 11.13

(C) 12.0 (D) 9.13

178. By adding a strong acid to the buffer solution, the pH of the buffer solution

(A) Remains constant (B) Increases

(C) Decreases (D) Becomes zero

179. The pH of $0.1\,M\ NaOH$ is

(A) 11 (B) 12

(C) 13 (D) 14

180. pH of human blood is 7.4. Then H^+ concentration will be

(A) 4×10^{-8} (B) 2×10^{-8}

(C) 4×10^{-4} (D) 2×10^{-4}

181. The pH of a 0.02 M solution of hydrochloric acid is

(A) 2.0 (B) 1.7

(C) 0.3 (D) 2.2

182. A sample of $Na_2CO_3.H_2O$ weighing $0.62\ g$ is added to 100 *ml* of $0.1N\ (NH_4)_2SO_4$ solution. What will be the resulting solution

(A) Acidic (B) Neutral
(C) Basic (D) None of these

183. The *pH* of the solution is 4. The hydrogen ion concentration of the solution in *mol/litre* is

(A) 9.5 (B) 10^{-4}
(C) 10^4 (D) 10^{-2}

184. $NaOH_{(aq)}, HCl_{(aq)}$ and $NaCl_{(aq)}$ concentration of each is $10^{-3}M$. Their pH will be respectively

(A) 10, 6, 2 (B) 11, 3, 7
(C) 10, 2, 6 (D) 3, 4, 7

185. The pH of $10^{-5}M$ aqueous solution of $NaOH$ is

(A) 5 (B) 7
(C) 9 (D) 11

186. In a solution of $pH = 5$, more acid is added in order to reduce the $pH = 2$. The increase in hydrogen ion concentration is

(A) 100 times (B) 1000 times
(C) 3 times (D) 5 times

187. Which solution contains maximum number of H^+ ion

(A) 0.1 M HCl (B) 0.1 M NH_4Cl
(C) 0.1 M $NaHCO_3$ (D) 0.1 M

188. A certain buffer solution contains equal concentration of 3.9×10^{-5} and HX. The K_b for H^- is 10^{-10}. The pH of the buffer is

(A) 4 (B) 7
(C) 10 (D) 14

189. The defination of pH is

(A) $pH = \log\frac{1}{[H^+]}$ (B) $pH = \log[H^+]$
(C) $pH = -\log\frac{1}{[H^+]}$ (D) $pH = -\log^{[H^+]}$

190. Which of the following does not make any change in pH when added to 10 *ml* dilute HCl

(A) 5 *ml* pure water
(B) 20 *ml* pure water
(C) 10 *ml* HCl
(D) Same 20 *ml* dilute HCl

191. The pOH of beer is 10.0. The hydrogen ion concentration will be

(A) 10^{-2} (B) 10^{-10}
(C) 10^{-8} (D) 10^{-4}

192. When a buffer solution of sodium acetate and acetic acid is diluted with water

(A) Acetate ion concentration increases
(B) H^+ ion concentration increases
(C) OH^- ion concentration increases
(D) H^+ ion concentration remain unaltered

193. What is the pH of $Ba(OH)_2$ if normality is 10

(A) 4 (B) 10
(C) 7 (D) 9

194. What will be the pH of a solution formed by mixing 40 *ml* of 0.10 M HCl with 10 *ml* of 0.45 M $NaOH$

(A) 12 (B) 10
(C) 8 (D) 6

195. The pH of a solution having $[H^+] = 10 \times 10^{-4}$ $moles/litre$ will be

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

196. The H^+ ion concentration is 1.0×10^{-6} *mole/litre* in a solution. Its *pH* value will be

(A) 12 (B) 6
(C) 18 (D) 24

197. The *pH* of a solution is the negative logarithm to the base 10 of its hydrogen ion concentration in

(A) Moles per litre
(B) Millimoles per litre
(C) Micromoles per litre
(D) Nanomoles per litre

198. When 10^{-8} mole of HCl is dissolved in one litre of water, the pH of the solution will be

(A) 8 (B) 7

(C) Above 8 (D) Below 7

199. The pH of the solution containing 10 ml of 0.1 N $NaOH$ and 10 ml of 0.05 N H_2SO_4 would be

(A) 0 (B) 1

(C) > 7 (D) 7

200. The pH of 0.001 molar solution of HCl will be

(A) 0.001 (B) 3

(C) 2 (D) 6

201. If the pH of a solution of an alkali metal hydroxide is 13.6, the concentration of hydroxide is

(A) Between 0.1 M and 1 M

(B) More than 1 M

(C) Less than 0.001 M

(D) Between 0.01 M and 1 M

202. The pK_a of acetylsalicylic acid (aspirin) is 3.5. The pH of gastric juice in human stomach is about 2-3 and the pH in the small intestine is about 8. Aspirin will be

(A) Unionized in the small intestine and in the stomach

(B) Completely ionized in the small intestine and in the
stomach

(C) Ionized in the stomach and almost unionized in the small intestine

(D) Ionized in the small intestine and almost unionized in the stomach

203. The concentration of hydrogen ion in water is

(A) 8 (B) 1×10^{-7}

(C) 7 (D) $1/7$

204. pH of a 10 M solution of HCl is

(A) Less than 0 (B) 2

(C) 0 (D) 1

205. The pH of 1 N H_2O is

(A) 7 (B) >7

(C) <7 (D) 0

206. The concentration of hydrogen ion $[H^+]$ in 0.01 M HCl is

(A) 10^{12} (B) 10^{-2}

(C) 10^{-1} (D) 10^{-12}

207. A solution of weak acids is diluted by adding an equal volume of water. Which of the following will not change

(A) Strength of the acid

(B) The value of $[H_3O^+]$

(C) pH of the solution

(D) The degree of dissociation of acid

208. Ka of H_2O_2 is of the order of

(A) 10^{-12} (B) 10^{-14}

(C) 10^{-16} (D) 10^{-10}

209. Equivalent weight of an acid

(A) Depends on the reaction involved

(B) Depends upon the number of oxygen atoms present

(C) Is always same

(D) None of the above

210. pH scale was introduced by

(A) Arrhenius (B) Sorensen

(C) Lewis (D) Lowry