INTRODUCTION

1. All reactions which have chemical disintegration
(1) Is reversible
(2) Is reversible and endothermic
(3) Is exothermic
(4) Is reversible or irreversible and endothermic or exothermic

2. Which of the following is a characteristic of a reversible reaction :
(1) Number of moles of reactants and products are equal
(2) It can be influenced by a catalyst
(3) It can be influenced by a catalyst
(4) None of the above

3. Which of the following is a characteristic of a reversible reaction :
(1) $Fe_2O_3 + 6HCl \rightarrow 2FeCl_3 + 3H_2O$
(2) $NH_3 + H_2O + NaCl \rightleftharpoons NH_4Cl + NaOH$
(3) $SnCl_4 + Hg_2Cl_2 \rightleftharpoons SnCl_2 + 2HgCl_2$
(4) $2Cu + 2I_2 + 4K^+ \rightleftharpoons 2Cu^{+2} + 4KI$

4. Select the endothermic reaction :-
(1) $2H_2 + O_2 \rightarrow 2H_2O$
(2) $N_2 + O_2 \rightarrow 2NO$
(3) $2NaOH + H_2SO_4 \rightarrow Na_2SO_4 + 2H_2O$
(4) $3O_2 + C_2H_5OH \rightarrow 2CO_2 + 3H_2O$

FACTORS AFFECTING RATEOF REACTION

5. In an elementary reaction $A + 2B \rightarrow 2C + D$. If the concentration of A is increased four times and B is decreased to half of its initial concentration then the rate becomes
(1) Twice (2) Half (3) Unchanged (4) One fourth of the rate

6. $2A_{(g)} + B_{(g)} \rightleftharpoons$ Product is an elementary reaction, If pressure is increased three times of the initial pressure, the velocity of forward reaction will be …… of the previous velocity :-
(1) 9 times (2) 27 times (3) $\frac{1}{9}$ times (4) $\frac{1}{27}$ times

7. The role of catalyst in a chemical reaction is :-
(1) To help attain equilibrium in a shorter time
(2) To lower the activation energy
(3) To shift the equilibrium in such a way as to increase the concentration of the product
(4) Both 1 & 2

EQUILIBRIUM AND CHEMICAL PROCESS

8. $x \rightleftharpoons y$ reaction is said to be in equilibrium, when :-
(1) Only 10% conversion x to y takes place.
(2) Complete conversion of x to y takes place
(3) Conversion of x to y is only 50% complete
(4) The rate of change of x to y is just equal to the rate of change of y to x in the system

9. In the chemical reaction $N_2 + 3H_2 \rightleftharpoons 2NH_3$ at equilibrium, state whether :-

(1) Equal volumes of N_2 & H_2 are reacting
(2) Equal masses of N_2 & H_2 are reacting
(3) The reaction has stopped
(4) The same amount of ammonia is formed as is decomposed into N_2 and H_2

10. Active mass of 5 g CaO :-
(1) 56 (2) 1 (3) 3.5 (4) 2

11. Ratio of active masses of 22g CO_2, 3g H_2 and 7g N_2 in a gaseous mixture :-
(1) 22 : 3 : 7 (2) 0.5 : 3 : 7 (3) 1 : 3 : 1 (4) 1 : 3 : 0.5

12. Which of the following example shows effect of catalyst on reversible reaction
(1) It gives new reaction path with low activation energy.
(2) It shifts equilibrium right side.
(3) It decrease kinetic energy of activated molecules.
(4) It decrease rate of backward reaction.

13. Select the correct statement from the following :-
(1) Equilibrium constant changes with addition of catalyst.
(2) Catalyst increases the rate of forward reaction.
(3) The ratio of mixture at equilibrium does not changed by catalyst.
(4) Catalyst are active only in solution.

14. In reversible chemical reaction equilibrium will be establish when :-
(1) Reactant completely converted into product
(2) Rate of forward and backward reaction is equal
(3) Minimum yiled of product
(4) Concentration of reactant and product is equal

LAW OF MASS ACTION

15. In a chemical equilibrium, the rate constant for the backward reaction is 7.5×10^{-4} and the equilibrium constant is 1.5. The rate constant for the forward reaction is :-
(1) 2×10^{-3} (2) 5×10^{-4} (3) 1.12×10^{-3} (4) 9.0×10^{-4}

16. The equilibrium concentration of $[B]_e$ for the reversible reaction $A \rightleftharpoons B$ can be evaluated by the expression :-
(1) $K_C[A]_e^{-1}$ (2) $\frac{k_f}{k_b}[A]_e^{-1}$ (3) $k_f k_b^{-1}[A]_e$ (4) $k_f\, k_b\, [A]^{-1}$

17. In this reaction $Ag^+ + 2NH_3 \rightleftharpoons Ag(NH_3)_2^+$ at 298K molar concentration of Ag^+, $Ag(NH_3)_2^+$ and NH_3 is 10^{-1}, 10^{-1} and 10^3. The value of K_C at 298K for this equilibrium :-
(1) 10^{-6} (2) 10^6 (3) 2×10^{-3} (4) 2×10^6

18. Equilibrium constant of some reactions are given as under :-

(1) $x \rightleftharpoons y$ $\quad K = 10^{-1}$ (2) $y \rightleftharpoons z$ $\quad K = 2 \times 10^{-2}$

(3) $P \rightleftharpoons Q$ $\quad K = 3 \times 10^{-4}$ (4) $R \rightleftharpoons S$ $\quad K = 2 \times 10^{-3}$

Initial concentration of the reactants for each reaction was taken to be equal :
Review the above reaction and indicate the reactions in which the reactants and products respectively were of highest concentration :-

(1) d, c (2) c, a (3) a, d (4) b, c

19. At 1000 K, the value of K_p for the reaction :

$A(g) + 2B(g) \rightleftharpoons 3C(g) + D(g)$

is 0.05 atm the value of K_c in terms of R would be :

(1) 20000 R (2) 0.02 R (3) 5×10^{-5} R (4) $5 \times 10^{-5} \times R^{-1}$

20. For the reaction $C(s) + CO_2(g) \rightleftharpoons 2CO(g)$ the partial pressure of CO and CO_2 are 2.0 and 4.0 atm. respectively at equilibrium. The K_p for the reaction is

(1) 0.5 (2) 4.0 (3) 8.0 (4) 1

21. For which reaction is $K_p = K_c$:-

(1) $2NOCl(g) \rightleftharpoons 2NO(g) + Cl_2(g)$ (2) $N_2(g) + 3H_2(g) \rightleftharpoons 2NH_3(g)$

(3) $H_2(g) + Cl_2(g) \rightleftharpoons 2HCl(g)$ (4) $2SO_2(g) + O_2(g) \rightleftharpoons 2SO_3(g)$

22. For the reaction

$CuSO_4.5H_2O_{(s)} \rightleftharpoons CuSO_4 . 3H_2O_{(s)} + 2H_2O_{(g)}$

Which one is correct representation :-

(1) $K_p = p^2_{H_2O}$ (2) $K_c = [H_2O]^2$ (3) $K_p = K_c(RT)^2$ (4) All

23. $\log \dfrac{K_p}{K_c} + \log RT = 0$ is true relation ship for the following reaction :-

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

(3) $N_2 + 3H_2 \rightleftharpoons 2NH_3$ (4) (2) and (3) both

24. For which reaction at 298 K, the value of $\dfrac{K_p}{K_c}$ is maximum and minimum respectively :-

(a) $N_2O_4 \rightleftharpoons 2NO_2$ (b) $2SO_2 + O_2 \rightleftharpoons 2SO_3$

(c) $X + Y \rightleftharpoons 4Z$ (d) $A + 3B \rightleftharpoons 7C$

(1) d, c (2) d, b (3) c, b (4) d, a

25. Consider the two gaseous equilibrium involving SO_2 and the corresponding equilibrium constants at 299 K

$SO_2\,(g) + \rightleftharpoons \frac{1}{2} O_2\,(g) \rightleftharpoons SO_3\,(g)$; K_1

$4SO_3(g) \rightleftharpoons 4SO_2(g) + 2O_2(g)$; K_2

(1) $K_2 = \dfrac{1}{(K_1)^4}$ (2) $K_2 = K_1^4$ (3) $K_2 = \left(\dfrac{1}{K_1}\right)^{\frac{1}{2}}$ (4) $K_2 = \dfrac{1}{K_1}$

26. For the reactions ;- $A \rightleftharpoons B$; $K_C = 2$, $B \rightleftharpoons C$; $K_C = 4$, $C \rightleftharpoons D$; $K_C = 6$

K_C for the reaction $A \rightleftharpoons D$:-

(1) 12 (2) 4 / 3 (3) 24 (4) 48

27. If $A \rightleftharpoons B$ ($K_c = 3$), $B \rightleftharpoons C$ ($K_c = 5$), $C \rightleftharpoons D$ ($K_c = 2$)

The value of equilibrium constant for the above reaction are given, the value of equilibrium constant for $D \rightleftharpoons A$ will be :-

(1) 15 (2) 0.3 (3) 30 (4) 0.03

28. Which Oxide of Nitrogen is most stable :-

(1) $2NO_{2(g)} \rightleftharpoons N_{2(g)} + 2O_{2(g)}$ $K = 6.7 \times 10^{16}$ mol L^{-1}

(2) $2NO_{(g)} \rightleftharpoons N_{2(g)} + O_{2(g)}$ $K = 2.2 \times 10^{30}$

(3) $2N_2O_{5(g)} \rightleftharpoons 2N_{2(g)} + 5O_{2(g)}$ $K = 1.2 \times 10^{34}$ mol^5 L^{-5}

(4) $2N_2O_{(g)} \rightleftharpoons 2N_{2(g)} + O_{2(g)}$ $K = 3.5 \times 10^{33}$ mol L^{-1}

29. The equilibrium constant in a reversible reaction a given temperature :-

(1) Depends on initial concentration of the reactants.
(2) Depends on the concentration of the products at equilibrium
(3) Does not depend on the initial concentrations
(4) It is not characteristic of the reaction

30. Which one of the following statements is correct about equilibrium constant :-

(1) Equilibrium constant of a reaction changes with temperature
(2) Equilibrium constant of a reaction depends upon the concentration of reactants with which we start.
(3) Equilibrium constant of a reaction, $3Fe(s) + 4H_2O(g) \rightleftharpoons Fe_3O_4(s) + 4H_2(g)$ is same whether, the reaction is carried out in an open vessel or a closed vessel.
(4) Equilibrium constant of a reaction becomes double if the reaction is multiplied by 2 throughtout.

31. For a reaction $N_2 + 3H_2 \rightleftharpoons 2NH_3$, the value of K_C does not depends upon :-

(a) Initial concentration of the reactants
(b) Pressure
(c) Temperature
(d) Catalyst

(1) Only c (2) a, b, c (3) a, b, d (4) a, b, c, d

32. For any reversible reaction if concentration of reactants increases then effect on equilibrium constant :-

(1) Depends on amount of concentration (2) Unchange

(3) Decrease (4) Increase

33. Effect of increasing temperature on equilibrium constant is given by $\log K_2 - \log K_1 = \frac{-\Delta H}{2.303R}\left[\frac{1}{T_2} - \frac{1}{T_1}\right]$. Then for an endothermic reaction the false statement is :-

(1) $\left[\frac{1}{T_2} - \frac{1}{T_1}\right]$ = positive (2) $\log K_2 > \log K_1$

(3) ΔH = positive (4) $K_2 > K_1$

34. The equilibrium constant for the reaction $Br_2 \rightleftharpoons 2Br$ at 500 K and 700 K are 1×10^{-10} and 1×10^{-5} respectively. The reaction is :-

(1) Endothermic (2) Exothermic (3) Fast (4) Slow

35. In an experiment the equilibrium constant for the reaction $A + B \rightleftharpoons V + D$ is K when the initial concentration of A and B each is 0.1 mol L^{-1} Under the similar conditions in an another Experiment if the initial concentration of A and B are taken 2 and 3 mol L^{-1} respectively then the value of equilibrium constant will be :-

(1) $\frac{K}{2}$ (2) K (3) K^2 (4) $\frac{1}{K}$

36. In system $A(s) \rightleftharpoons 2B\,(g) + 3C\,(g)$ at equilibrium if concentration of 'C' is doubled then concentration of B at equilibrium.

(1) Double its original concentration (2) Half its original concentration

(3) $2\sqrt{2}$ its original concentration (4) $\frac{1}{2\sqrt{2}}$ its original concentration

37. For the reaction, $H_2\,(g) + I_2(g) \rightleftharpoons 2HI\,(g)$ equilibrium constant, K_P changes with :-

(1) Temperature (2) Total pressure

(3) Catalyst (4) Amount of H_2 and I_2 present

38. The equilibrium constant (K_P) for the reaction $PCl_5\,(g) \rightleftharpoons PCl_3(g) + Cl_2(g)$ 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 :-

(1) 32 (2) 64 (3) 16 (4) 4

39. The equilibrium constant for the reaction :

$N_2 (g) + O_2(g) \rightleftharpoons 2NO (g)$ at 2000 K is 4×10^4. In presence of catalyst the equilibrium is established ten times faster at the same temperature. What is the value of equilibrium constant in presence of catalyst :-

(1) 40×10^{-4} (2) 4×10^{-4} (3) 4×10^4 (4) None

40. The equilibrium constant of the reaction $H_2(g) + I_2(g) \rightleftharpoons 2HI (g)$ is 64. If the volume of the container is reduced to one fourth of its original volume, the value of the equilibrium constant will be

(1) 16 (2) 32 (3) 64 (4) 128

41. If some He gas in introduced into the equilibrium $PCl_5 \rightleftharpoons PCl_3 + Cl_2$ at constant pressure and temperature then equilibrium constant of reaction :

(1) Increase (2) Decrease (3) Unchange (4) Nothing can be said

42.

List X	**List Y**
(A) Active mass	(i) $\Delta n = 0$
(B) Dynamic nature	(ii) Molar concentration
(C) $A + \text{heat} \rightleftharpoons B$	(iii) Vant hoff's equation
(D) $\log(K_{P_2}/K_{P_1}) = \frac{\Delta H}{2.303R}\left[\frac{1}{T_1}-\frac{1}{T_2}\right]$	(iv) adaptation if temperature increases
(E) $2A(g) + B(g) \rightleftharpoons 3C(g)$	(v) Chemical equilibrium

Correct match list X and Y

(1) A-(v), B-(ii), C-(iii), D-(i), E-(iv) (2) A-(v), B-(iv), C-(iii), D-(ii), E-(i)
(3) A-(ii), B-(v), C-(iv), D-(iii), E-(i) (4) None of these

DEGREE OF DISSOCIATION AND APPLICATION OF LAW OF MASS ACTION

43. For the reaction : $P \rightleftharpoons Q + R$. Initially 2 mol of P was taken. Up to equilibrium 0.5 mol of P was dissociated. What would be the degree of the dissociation :-

(1) 0.5 (2) 1 (3) 0.25 (4) 4.2

44. The dissociation of CO_2 can be expressed as $2CO_2 \rightleftharpoons 2CO + O_2$. If the 2 mol of CO_2 is taken initially and 40% of the CO_2 is dissociated completely. What is the total number of moles at equilibrium :-

(1) 2.4 (2) 2.0 (3) 1.2 (4) 5

45. In $A_3(g) \rightleftharpoons 3A (g)$ reaction, the initial concentration of A_3 is "a" mol L^{-1}. If x is degree of dissociation of A_3. The total number of moles at equilibrium will be :-

(1) $a - \frac{ax}{3}$ (2) $\frac{a}{3} - x$

(3) $\left(\frac{a - ax}{2}\right)$ (4) None of these

46. In the reaction $2P(g) + Q(g) \rightleftharpoons 3R(g) + S(g)$. If 2 mol each of P and Q taken initially in a 1L flask. At equilibrium which is true :-

(1) [P] < [Q] (2) [P] = [Q] (3) [Q] = [R] (4) None of these

47. In a 13 L vessel initially following reaction occur $C(s) + S_2(g) \rightleftharpoons CS_2(g)$ by 12 g C, 64 g S_2, 76 g CS_2 at 1027°C temperature then total pressure is.

(1) 200 (2) 158 R (3) 100 R (4) 79 R

48. The reaction $A + B \rightleftharpoons C + D$ is studied in a one litre Vessel at 250°C. The initial concentration of A was 3n and of B was n. After equilibrium was attained then equilibrium concentration of C was found to be equal to equilibrium concentration B. What is the concentration of D at equilibrium :-

(1) $\frac{n}{2}$ (2) $\left(3n - \frac{n}{2}\right)$ (3) $\left(n + \frac{n}{2}\right)$ (4) n

49. $X_2 + Y_2 \rightleftharpoons 2XY$ reaction was studied at a certain temperature. In the beginning 1 mole of X_2 was taken in a one litre flask and 2 moles of Y_2 was taken in another 2 litre flask. What is the equilibrium concentration of X_2 and Y_2? (Given equilibrium concentration of [XY] = 0.6 mol L^{-}).

(1) $\left(\frac{1}{3} - 0.3\right), \left(\frac{2}{3} - 0.3\right)$ (2) $\left(\frac{1}{3} - 0.6\right), \left(\frac{2}{3} - 0.6\right)$

(3) (1 – 0.3), (2 – 0.3 (4) (1 – 0.3), (2 – 0.3)

50. If the pressure of N_2 and H_2 mixture in a closed apparatus is 100 atm and 20 % of the mixture reacts then the pressure at the same temperature would be -

(1) 100 (2) 90 (3) 85 (4) 80

51. In a 20 litre vessel initially 1 – 1 mole CO, H_2O, CO_2 is present, then for the equilibrium of $CO + H_2O \rightleftharpoons CO_2 + H_2$ following is true :-

(1) H_2, more then 1 mole (2) CO, H_2O, H_2 less than 1 mole

(3) CO_2 & H_2O both more than 1 mole (4) All of these

52. If 340 g of mixture of N_2 and H_2 in the correct ratio gave a 20% yield of NH_3. The produced mass of NH_3 would be :-

(1) 16 g (2) 17 g (3) 20 g (4) 68 g

53. 4 mol of PCl_5 are heated at constant temperature in closed container. If degree of dissociation for PCl_5 is 0.5 then calculate total number of moles at equilibrium

(1) 4.5 (2) 6 (3) 3 (4) 4

54. $PCl_5(g) \rightleftharpoons PCl_3(g) + Cl_2(g)$

In above reaction, at equilibrium condition mole fraction of PCl_5 is 0.4 and mole fraction of Cl_2 is 0.3. Then find out mole fraction of PCl_3

(1) 0.3 (2) 0.7 (3) 0.4 (4) 0.6

55. If 8 g mol of PCl_5 heated in a closed vessel of 10 L capacity and 25% of its dissociates into PCl_3 and Cl_2 at the equilibrium then value of Kp will be equal to :-

(1) P/30 (2) P/15 (3) 2/3P (4) 3/2P

56. In the reaction $PCl_5 \rightleftharpoons PCl_3 + Cl_2$ the partial pressure of PCl_3, Cl_2 and PCl_5 are 0.3, 0.2 and partial pressure of PCl_3 and Cl_2 was increased twice, what will be the partial pressure of PCl_5 is in atm at new equilibrium condition :-

(1) 0.3 (2) 1.2 (3) 2.4 (4) 0.15

57. 'a' mol of PCl_5, undergoes, thermal dissociation as : $PCl_5 \rightleftharpoons PCl_3 + Cl_2$, the fraction of PCl_3 at equilibrium is 0.25 and the total pressure is 2.0 atm. The partial pressure of Cl_2 at equilibrium is :-

(1) 2.5 (2) 1.0 (3) 0.5 (4) None

58. In a 0.25 L tube dissociation of 4 mol of No is take place. If its degree of dissociation is 10%. The value of K_P for reaction $2NO \rightleftharpoons N_2 + O_2$ is :-

(1) $\frac{1}{(18)^2}$ (2) $\frac{1}{(8)^2}$ (3) $\frac{1}{16}$ (4) $\frac{1}{32}$

59. In a chemical equilibrium $A + B \rightleftharpoons C + D$ when one mole each of the two reactants are mixed 0.4 mol each of the products are formed. The equilibrium constant is :-

(1) 1 (2) 0.36 (3) 0.36 (4) $\frac{4}{9}$

60. K_C for the esterification reaction :

$CH_3COOH + C_2H_5OH \rightleftharpoons CH_3COOC_2H_5 + H_2O$ is 4. If 4 mol each of acid and alcohol are taken initially, what is the equilibrium concentration of the acid :-

(1) $\frac{2}{3}$ (2) $\frac{4}{3}$ (3) $\frac{3}{4}$ (4) $\frac{3}{2}$

61. Evaluate K_P for the reaction : $H_2 + I_2 \rightleftharpoons 2HI$. If 2 moles each of H_2 and I_2 are taken initially. At equilibrium moles of HI are 2.

(1) 2.5 (2) 4 (3) 0.25 (4) 1.0

62. 4 moles of A are mixed with 4 moles of B, when 2 mol of C are formed at equilibrium, according to the reaction, $A + B \rightleftharpoons C + D$. The equilibrium constant is :-

(1) 4 (2) 1 (3) $\sqrt{2}$ (4) $\sqrt{4}$

63. Two moles of ammonia is introduced in a evacuated 500 mL vessel at high temperature. The decomposition reaction is :

$2NH_3(g) \rightleftharpoons N_2(g) + 3H_2(g)$

At the equilibrium NH_3 becomes 1 mole then the K would be :-

(1) 0.42 (2) 6.75 (3) 1.7 (4) 1.5

64. 4.5 mol each of hydrogen and iodine heated in a sealed 10 litre vessel. At equilibrium, 3 mol of HI were found. The equilibrium constant for $H_2(g) + I_2(g) \rightleftharpoons 2HI(g)$ is :-

(1) 1 (2) 10 (3) 5 (4) 0.33

65. 1.50 mol each of hydrogen and iodine were placed in a sealed 10 L container maintained at 717 K. At equilibrium 1.25 mol each of hydrogen and iodine were left behind. The equilibrium constant , K_C for the reaction

$H_2(g)\ I_2(g) \rightleftharpoons 2HI(g)$ at 717 K is

(1) 0.4 (2) 0.16 (3) 25 (4) 50

66. AB dissociates as $2AB(g) \rightleftharpoons 2A(g) + B_2(g)$ When the initial pressure of AB is 500 mm, the total pressure becomes 625 mm when the equilibrium is attained. Calculate K_P for the reaction assuming volume remains constant.

(1) 0.4 (2) 0.16 (3) 25 (4) 50

LE-CHATLIER'S PRINCIPLE

67. Cis-2-pentene $\rightleftharpoons$ Trans-2-pentene for the above equilibrium the value of standard free energy change at 400 K is –3.67 kJ/mol. If excess of trans-2-pentene is added to the system then :-

(1) Additional trans-2-pentene will form

(2) Excess of cis-2-pentene will form

(3) Equilibrium will proceed in the forward

(4) Equilibrium will remain unaffected

68. When $NaNO_3$ is heated in a closed vessel, O_2 is liberated and $NaNO_3$ is left behind. At equilibrium -

(1) Addition of $NaNO_3$ favours forward reaction

(2) Addition of $NaNO_2$ fovours reverse reaction

(3) Increasing pressure fovours reverse reaction

(4) Decreasing temperature favours forward reaction

69. The equilibrium $2SO_2(g) + O_2(g) \rightleftharpoons 2SO_3(g)$ shifts forward if :-

(1) A catalyst is used

(2) An adsorbent is used to remove SO_3 as soon as it is formed

(3) Small amounts of reactants are used

(4) None

70. In manufacture of NO, the reaction N_2 and $O_2$to form NO is favourable if :-

(1) Pressure is increased (2) Pressure is decreased

(3) Temperature is increased (4) Temperature is decreased

71. In which of the following equilibrium reactions, the equilibrium would shift to right side, if total pressure is decreased :-

(1) $N_2 + 3H_2 \rightleftharpoons 2NH_3$　　(2) $H_2 + I_2 \rightleftharpoons 2HI$

(3) $N_2O_4 \rightleftharpoons 2NO_2$　　(4) $H_2 + Cl_2 \rightleftharpoons 2HCl$

72. The oxidation of SO_2 by O_2 to SO_3 is exothermic reaction, the yield of SO_2 will be minimum if:-

(1) Temperature is increased and pressure is kept constant
(2) Temperature is reduced and pressure is increased
(3) Both temperature and pressure are increased
(4) Both temperature and pressure are decreased

73. For the manufacture of ammonia by the reaction $N_2 + 3H_2 \rightleftharpoons 2NH_3 + 21.9$ K cal, the favourable conditions are :-

(1) Low temperature, low pressure & catalyst
(2) Low temperature, high pressure & catalyst
(3) High temperature, low pressure & catalyst
(4) High temperature, high pressure & catalyst

74. In the reaction 2A (g) + B (g) $\rightleftharpoons$ C(g) + 362 kcal. Which combination of pressure and temperature gives the highest yield of C at equilibrium :-

(1) 1000 atm and 500°C　　(2) 500 atm and 500°C
(3) 1000 atm and 50°C　　(4) 500 atm and 100°C

75. Does Le chatelier's principle predict a change of equilibrium concentration for the following reaction if the gas mixture is compressed

$N_2O_4\,(g) \rightleftharpoons 2NO_2\,(g)$

(1) Yes, backward reaction is favoured　　(2) Yes, forward reaction is favoured
(3) No change　　(4) No information

76. $aA \rightleftharpoons bB + cC$, $\Delta H = -x$ kcal.

If high pressure and low temperature are the favourable condition for the formation of the product in above reaction, hence :-

(1) $a > b + c$　　(2) $a < b + c$　　(3) $a = b + c$　　(4) None of them

77. The reaction in which yield of production cannot be increased by the application of high pressure is :-

(1) $PCl_3\,(g) + Cl_2\,(g) \rightleftharpoons PCl_5\,(g)$　　(2) $N_2\,(g) + O_2\,(g) \rightleftharpoons 2NO\,(g)$

(3) $N_2\,(g) + 3H_2\,(g) \rightleftharpoons 2NH_3\,(g)$　　(4) $2SO_2\,(g) + O_2\,(g) \rightleftharpoons 2SO_3\,(g)$

78. 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.

(1) Increases
(2) Decreases
(3) Remains unaltered
(4) None of these

PHYSICAL EQUILIBIUM

79. For the equilibrium reaction, $H_2O\ (\lambda) \rightleftharpoons H_2O\ (g)$. What happen, if pressure is applied :-

(1) More water evaporates
(2) The boiling point of water is increased
(3) No effect on boiling point
(4) None of the above

80. On cooling of following system at equilibrium $CO_2\ (s) \rightleftharpoons CO_2\ (g)$

(1) There is no effect on the equilibrium state
(2) More gas is formed
(3) More gas is solidifies
(4) None of above

CALCULATION OF DEGREE OF DISSOCIATION BY V.D. METHOD

81. Vapour density of PCl_5 is 104.25 at t°C. Then degree of dissociation of PCl_5 is (Mw = 208.5)
(1) 20 %
(2) 0 %
(3) 30 %
(4) 15 %

82. When heating PCl_5 then it decompose PCl_3 and Cl_2 in form of gas, the vapour density of gas mixture is 70.2 and 57.9 at 200°C and 250°C. The degree of dissociation of PCl_5 at 200°C and 250°C is
(1) 48.50% & 80%
(2) 60% & 70 %
(3) 70 % & 80%
(4) 80% & 90%

83. Vapour density of PCl_5 is 104.16 but when heated to 230°C its vapour density is reduced to 62. The degree of dissociation of PCl_5 at this temperature will be :
(1) 6.8 %
(2) 68 %
(3) 46 %
(4) 64 %

84. The equation $\alpha = \dfrac{D-d}{(n-1)d}$ is correctly matched for

Where D = Theoretical vapour density,
d = Observed vapour density

(1) $A \rightleftharpoons \dfrac{nB}{2} + \dfrac{nC}{3}$
(2) $A \rightleftharpoons \dfrac{nB}{3} + \left(\dfrac{2n}{3}\right)C$
(3) $A \rightleftharpoons \left(\dfrac{n}{2}\right)B + \left(\dfrac{n}{4}\right)C$
(4) $A \rightleftharpoons \left(\dfrac{n}{2}\right)B + C$

ANSWER KEY

EXERCISE-I (Conceptual Questions)

1.	(4)	**2.**	(3)	**3.**	(1)	**4.**	(2)	**5.**	(3)	**6.**	(2)	**7.**	(4)
8.	(4)	**9.**	(4)	**10.**	(2)	**11.**	(4)	**12.**	(1)	**13.**	(2)	**14.**	(3)
15.	(3)	**16.**	(3)	**17.**	(1)	**18.**	(2)	**19.**	(4)	**20.**	(4)	**21.**	(3)
22.	(4)	**23.**	(2)	**24.**	(2)	**25.**	(1)	**26.**	(4)	**27.**	(4)	**28.**	(1)
29.	(3)	**30.**	(1)	**31.**	(3)	**32.**	(2)	**33.**	(1)	**34.**	(1)	**35.**	(2)

36.	(4)	**37.**	(1)	**38.**	(3)	**39.**	(3)	**40.**	(3)	**41.**	(3)	**42.**	(3)
43.	(3)	**44.**	(1)	**45.**	(4)	**46.**	(1)	**47.**	(1)	**48.**	(1)	**49.**	(1)
50.	(2)	**51.**	(2)	**52.**	(4)	**53.**	(2)	**54.**	(1)	**55.**	(2)	**56.**	(3)
57.	(3)	**58.**	(1)	**59.**	(4)	**60.**	(2)	**61.**	(2)	**62.**	(2)	**63.**	(2)
64.	(1)	**65.**	(2)	**66.**	(2)	**67.**	(2)	**68.**	(3)	**69.**	(2)	**70.**	(3)
71.	(3)	**72.**	(2)	**73.**	(2)	**74.**	(3)	**75.**	(1)	**76.**	(1)	**77.**	(2)
78.	(3)	**79.**	(2)	**80.**	(3)	**81.**	(2)	**82.**	(1)	**83.**	(2)	**84.**	(2)