

CLASS:13th RENEET

SUBJECT: CHEMISTRY
DPP: CHEMICAL EQUILIBRIUM

EXERCISE-I (Conceptual Questions)

BUILD UP YOUR UNDERSTANDING

INTRODUCTION

- Which of the following is a characteristic of a reversible reaction :
 - Number of moles of reactants and products are equal.
 - It can be influenced by a catalyst
 - It can never proceed to completion
 - None of the above
- All reactions which have chemical disintegration
 - Is reversible
 - Is reversible and endothermic
 - is exothermic
 - is reversible or irreversible and endothermic or exothermic
- Select the endothermic reaction :
 - $2\text{H}_2 + \text{O}_2 \rightarrow 2\text{H}_2\text{O}$
 - $\text{N}_2 + \text{O}_2 \rightarrow 2\text{NO}$
 - $2\text{NaOH} + \text{H}_2\text{SO}_4 \rightarrow \text{Na}_2\text{SO}_4 + 2\text{H}_2\text{O}$
 - $3\text{O}_2 + \text{C}_2\text{H}_5\text{OH} \rightarrow 2\text{CO}_2 + 3\text{H}_2\text{O}$
- Which of the following reaction goes in forward direction :-
 - $\text{Fe}_2\text{O}_3 + 6\text{HCl} \rightarrow 2\text{FeCl}_3 + 3\text{H}_2\text{O}$
 - $\text{NH}_3 + \text{H}_2\text{O} + \text{NaCl} \rightleftharpoons \text{NH}_4\text{Cl} + \text{NaOH}$
 - $\text{SnCl}_4 + \text{Hg}_2\text{Cl}_2 \rightleftharpoons \text{SnCl}_2 + 2\text{HgCl}_2$
 - $2\text{Cu} + 2\text{I}_2 + 4\text{K}^+ \rightleftharpoons 2\text{Cu}^{+2} + 4\text{KI}$
- An example of reversible reaction is :
 - $\text{Pb}(\text{NO}_3)_2 + 2\text{NaI} \rightarrow \text{PbI}_2 + 2\text{NaNO}_3$
 - $\text{AgNO}_3 + \text{HCl} \rightarrow \text{AgCl} + \text{HNO}_3$
 - $2\text{Na} + 2\text{H}_2\text{O} \rightarrow 2\text{NaOH} + \text{H}_2$
 - $\text{KNO}_3 + \text{NaCl} \rightarrow \text{KCl} + \text{NaNO}_3$

FACTORS AFFECTING RATE OF REACTION

- Increase in temperature in a reversible equilibrium reaction favours :
 - Forward reaction only
 - Backward reaction only
 - Either forward or backward reaction
 - Neither forward nor backward reaction

- The role of catalyst in a chemical reaction is :
 - To help attain equilibrium in a shorter time.
 - To lower the activation energy.
 - To shift the equilibrium in such a way as to increase the concentration of the product
 - Both 1 & 2
- In the reaction $\text{A} + 2\text{B} \rightarrow 2\text{C} + \text{D}$. If the concentration of A is increased four times and B is decreased to half of its initial concentration then the rate becomes :
 - Twice
 - Half
 - Unchanged
 - One fourth of the rate
- $$2\text{A}_{(g)} + \text{B}_{(g)} \rightleftharpoons \text{Product}$$

If pressure is increased three times of the initial pressure, the velocity of forward reaction will be ----- of the previous velocity :

 - 9 times
 - 27 times
 - $\frac{1}{9}$ times
 - $\frac{1}{27}$ times
- Which of the following example shows effect of catalyst on reversible reaction
 - It gives new reaction path with low activation energy.
 - It shifts equilibrium right side.
 - It decrease kinetic energy of activated molecules.
 - It decrease rate of backward reaction.

ACTIVE MASS AND LAW OF MASS ACTION

- $\text{x} \rightleftharpoons \text{y}$ reaction is said to be in equilibrium, when :
 - Only 10% conversion of x to y has taken place
 - Complete conversion of x to y has taken place
 - Conversion of x to y is only 50% complete
 - The rate of change of x to y is just equal to the rate of change of y to x in the system

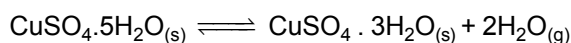
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12. Active mass of 5 g CaO :
 (1) 56 (2) 1 (3) 3.5 (4) 2
13. Ratio of active masses of 22g CO₂, 3g H₂ and 7g N₂ in a gaseous mixture :
 (1) 22 : 3 : 7 (2) 0.5 : 3 : 7
 (3) 1 : 3 : 1 (4) 1 : 3 : 0.5
14. Select the correct statement from the following:
 (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 change by catalyst
 (4) Catalyst are active only in solution.
15. For a reversible reaction, the rate constants for the forward and backward reactions are 2.38×10^{-4} and 8.15×10^{-5} respectively. The equilibrium constant for the reaction is :
 (1) 0.342 (2) 2.92 (3) 0.292 (4) 3.42
16. The equilibrium concentration of x, y and yx₂ are 4, 2 and 2 respectively for the equilibrium $2x + y \rightleftharpoons yx_2$. The value of equilibrium constant, K_c is
 (1) 0.625 (2) 6.25 (3) 0.0625 (4) 62.5
17. 4 mole of A are mixed with 4 mole of B when 2 mole of C are formed at equilibrium, according to the reaction, $A + B \rightleftharpoons C + D$ the equilibrium constant is :
 (1) $\sqrt{2}$ (2) 2 (3) 1 (4) 4
18. For the following reaction at 250°C,
 $PCl_3(g) + Cl_2(g) \rightleftharpoons PCl_5(g)$ the value of K_c is 26 then the value of K_p at same temperature will be:
 (1) 0.57 (2) 0.61 (3) 0.83 (4) 0.91
19. The equilibrium constant for a reaction $A + B \rightleftharpoons C + D$ is 1×10^{-2} at 298 K and is 2 at 273 K. The chemical process resulting in the formation of C and D is :
 (1) exothermic
 (2) endothermic
 (3) unpredictable
 (4) there is no relationship between ΔH and K
20. The equilibrium constant for the reaction, $N_2(g) + O_2(g) \rightleftharpoons 2NO(g)$ is 4.0×10^{-4} at 2000 K. In the presence of a catalyst the equilibrium is attained ten times faster. Therefore, the equilibrium constant in presence of the catalyst at 2000 K is –
 (1) 4×10^{-4}
 (2) 40×10^{-4}
 (3) 4×10^{-2}
 (4) difficult to compute without more data
21. For the reaction :
 $2A(g) + B(g) \rightleftharpoons 3C(g) + D(g)$
 two mole each of A and B were taken into a flask. The following must always be true when the system attained equilibrium :
 (1) [A] = [B] (2) [A] < [B]
 (3) [B] = [C] (4) [A] > [B]
22. For the reactions,
 $A \rightleftharpoons B, K_c = 1, \quad B \rightleftharpoons C, K_c = 3;$
 $C \rightleftharpoons D, K_c = 5$
 K_c for the reaction $A \rightleftharpoons D$ is :
 (1) 15 (2) 5 (3) 3 (4) 1
23. 1.0 g mole of ethyl alcohol and 1.0 g mole of acetic acid are mixed. At equilibrium 0.666 g mole of the ester is present. The value of equilibrium constant is :
 (1) $\frac{1}{4}$ (2) $\frac{1}{2}$ (3) 2 (4) 4
24. Which one of the following oxides is most stable? The equilibrium constants are given at the same temperature:
 (1) $2N_2O_5(g) \rightleftharpoons 2N_2(g) + 5O_2(g); K = 1.2 \times 10^{34}$
 (2) $2N_2O(g) \rightleftharpoons 2N_2(g) + O_2(g); K = 3.5 \times 10^{35}$
 (3) $2NO(g) \rightleftharpoons N_2(g) + O_2(g); K = 2.2 \times 10^{30}$
 (4) $2NO_2(g) \rightleftharpoons N_2(g) + 2O_2(g); K = 6.71 \times 10^{16}$
25. Which of the following statements is not correct about the equilibrium constant ?
 (1) Its value does not depend upon the initial conc. of the reactants
 (2) Its value does not depend upon the initial conc. of the products
 (3) Its value does not depend upon nature of the reactants.
 (4) Its value does not depend upon presence of catalyst.

26. In a chemical reaction K_p is greater than K_c when
- (1) the number of molecules entering into the chemical reaction is more than the number of molecules produced.
 - (2) the number of molecules entering into the chemical reaction is the same as the number of molecules produced.
 - (3) the number of molecules entering into the chemical reaction is less than the number of molecules produced.
 - (4) None of these

27. In a flask colourless N_2O_4 is in equilibrium with brown coloured NO_2 . At equilibrium, when the flask is heated to $100^\circ C$ the brown colour deepens and on cooling, the brown colour became less coloured. The change in enthalpy ΔH for the system is:
- (1) negative
 - (2) positive
 - (3) zero
 - (4) not defined

28. For the reaction



Which one is correct representation :-

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

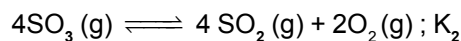
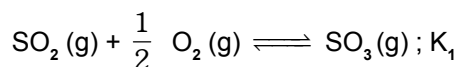
29. For which reaction at 298 K, the value of $\frac{K_p}{K_c}$ is maximum and minimum respectively:-

- $N_2O_4 \rightleftharpoons 2NO_2$
 - $2SO_2 + O_2 \rightleftharpoons 2SO_3$
 - $X + Y \rightleftharpoons 4Z$
 - $A + 3B \rightleftharpoons 7C$
- (1) d, c (2) d, b (3) c, b (4) d, a

30. $\log \frac{K_p}{K_c} + \log RT = 0$ is true relationship 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

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



The value of the equilibrium constant are related by :-

$$(1) K_2 = \frac{1}{(K_1)^4} \quad (2) K_2 = K_1^4$$

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

32. 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

33. 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

34. 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

35. 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

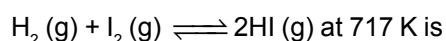
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36. A reaction in equilibrium is represented by the following equation –
 $2A_{(s)} + 3B_{(g)} \rightleftharpoons 3C_{(g)} + D_{(g)} + Q$ if the pressure on the system is reduced to half of its original value :
 (1) The amounts of C and D decreases
 (2) The amounts of C and D increases
 (3) The amount of D decreases
 (4) All the amounts remain constant
37. If some He gas is 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
38. HI was heated in a sealed tube at 400°C till the equilibrium was reached. HI was found to be 22% decomposed. The equilibrium constant for dissociation is :
 (1) 1.99 (2) 0.0199
 (3) 0.0796 (4) 0.282
39. 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
40. 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
41. 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) $5 \times 10^{-5} \times R^{-1}$
42. For the reaction : $2HI_{(g)} \rightleftharpoons H_{2(g)} + I_{2(g)}$; the degree of dissociation (α) of HI(g) is related to equilibrium constant K_p by the expression
 (1) $\frac{1+2\sqrt{K_p}}{2}$ (2) $\sqrt{\frac{1+2K_p}{2}}$
 (3) $\sqrt{\frac{2K_p}{1+2K_p}}$ (4) $\frac{2\sqrt{K_p}}{1+2\sqrt{K_p}}$
43. In an experiment the equilibrium constant for the reaction $A + B \rightleftharpoons C + D$ 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) $\frac{1}{K}$
44. 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) $\left[\frac{1}{T_2} - \frac{1}{T_1} \right] = \text{positive}$
 (2) $\log K_2 > \log K_1$
 (3) $\Delta H = \text{positive}$
 (4) $K_2 > K_1$
45. Equilibrium constant of some reactions are given as under :
 (a) $x \rightleftharpoons y$ $K = 10^{-1}$
 (b) $y \rightleftharpoons z$ $K = 2 \times 10^{-2}$
 (c) $P \rightleftharpoons Q$ $K = 3 \times 10^{-4}$
 (d) $R \rightleftharpoons S$ $K = 2 \times 10^{-3}$
 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

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57. 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 of 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
58. $X_2 + Y_2 \rightleftharpoons 2XY$ 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 $[XY] = 0.6 \text{ mol L}^{-1}$).
- (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) $(1 - 0.6), (2 - 0.6)$
59. 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 $2 \text{NO} \rightleftharpoons \text{N}_2 + \text{O}_2$ is :
- (1) $\frac{1}{(18)^2}$ (2) $\frac{1}{(8)^2}$
 (3) $\frac{1}{16}$ (4) $\frac{1}{32}$
60. 'a' mol of PCl_5 , undergoes, thermal dissociation as : $\text{PCl}_5 \rightleftharpoons \text{PCl}_3 + \text{Cl}_2$, the mole 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
61. In the reaction $\text{PCl}_5 \rightleftharpoons \text{PCl}_3 + \text{Cl}_2$ the partial pressure of PCl_3 , Cl_2 and PCl_5 are 0.3, 0.2 and 0.6 atm respectively. If partial pressure of PCl_3 and Cl_2 was increased twice, what will be the partial pressure of PCl_5 is in atm:-
- (1) 0.3 (2) 1.2
 (3) 2.4 (4) 0.15
62. 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 K_p will be equal to:-
- (1) $P/30$ (2) $P/15$
 (3) $2/3P$ (4) $3/2P$
63. In a 13 L vessel initially following reaction occur $\text{C(s)} + \text{S}_2(\text{g}) \rightleftharpoons \text{CS}_2(\text{g})$ by 12 g C, 64 g S_2 , 76 g CS_2 at 1027°C temperature then total pressure is.
- (1) 200R (2) 158R
 (3) 100R (4) 79R
64. Two moles of ammonia is introduced in a evacuated 500 mL vessel at high temperature. The decomposition reaction is :
- $$2\text{NH}_3(\text{g}) \rightleftharpoons \text{N}_2(\text{g}) + 3\text{H}_2(\text{g})$$
- At the equilibrium NH_3 becomes 1 mole then the K_c would be :-
- (1) 0.42 (2) 6.75
 (3) 1.7 (4) 1.5
65. 4.5 mol each of hydrogen and iodine heated in a sealed ten litre vessel. At equilibrium, 3 mol of HI were found. The equilibrium constant for $\text{H}_{2(\text{g})} + \text{I}_{2(\text{g})} \rightleftharpoons 2\text{HI}_{(\text{g})}$ is:-
- (1) 1 (2) 10 (3) 5 (4) 0.33
66. 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) 2.25 (4) $\frac{4}{9}$
67. 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) $\sqrt{4}$

68. 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



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

69. AB dissociates as $2\text{AB}(\text{g}) \rightleftharpoons 2\text{A}(\text{g}) + \text{B}_2(\text{g})$
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) 500 (2) 125 (3) 750 (4) 375

70. If the pressure of N_2/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

71. In a 20 litre vessel initially 1 - 1 mole CO , H_2O , CO_2 is present, then for the equilibrium of $\text{CO} + \text{H}_2\text{O} \rightleftharpoons \text{CO}_2 + \text{H}_2$ following is true:-

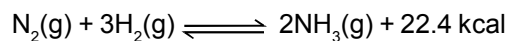
- (1) H_2 , more than 1 mole
(2) CO , H_2O , H_2 less than 1 mole
(3) CO_2 & H_2O both more than 1 mole
(4) All of these

LE-CHATelier PRINCIPLE

72. The yield of product in the reaction,
 $\text{A}_2(\text{g}) + 2\text{B}(\text{g}) \rightleftharpoons \text{C}(\text{g}) + \text{Q} \text{ kJ}$
would be higher at :

- (1) low temperature and high pressure
(2) high temperature and high pressure
(2) low temperature and low pressure
(4) high temperature and low pressure

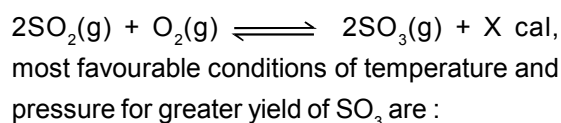
73. Manufacture of ammonia from the elements is represented by



the maximum yield of ammonia will be obtained when the process is made to take place -

- (1) at low pressure and high temperature
(2) at low pressure and low temperature
(3) at high pressure and high temperature
(4) at high pressure and low temperature

74. In the reaction,



- (1) low temperature and low pressure
(2) high temperature and low pressure
(3) high temperature and high pressure
(4) low temperature and high pressure

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

- (1) increases
(2) decreases
(3) remains unaltered
(4) change unpredictably

76. The equilibrium

$\text{SO}_2\text{Cl}_2(\text{g}) \rightleftharpoons \text{SO}_2(\text{g}) + \text{Cl}_2(\text{g})$ is attained at 25°C in a closed container and an inert gas, helium, is introduced. Which of the following statements is correct ?

- (1) concentrations of SO_2Cl_2 , SO_2 and Cl_2 do not change
(2) more Cl_2 is formed
(3) concentration of SO_2 is reduced
(4) more SO_2Cl_2 is formed

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- 77.** A cylinder provided with a piston has some PCl_5 which is in equilibrium with PCl_3 and Cl_2 . The system is compressed with the help of piston. Indicate the correct statement :
- (1) some more PCl_5 will decompose
 - (2) the system remains unaffected
 - (3) PCl_3 and Cl_2 will combine to form PCl_5
 - (4) explosion occurs
- 78.** In the melting of ice, which one of the conditions will be more favourable ?
- (1) high temperature and high pressure
 - (2) low temperature and low pressure
 - (3) low temperature and high pressure
 - (4) high temperature and low pressure
- 79.** 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
- 80.** When solid NaNO_3 is heated in a closed vessel, O_2 is liberated and solid NaNO_2 is left behind. At equilibrium –
- (1) Addition of NaNO_3 favours forward reaction
 - (2) Addition of NaNO_2 favours reverse reaction
 - (3) Increasing pressure favours reverse reaction.
 - (4) Decreasing temperature favours forward reaction.
- 81.** In which of the following equilibrium reactions, the equilibrium would shift to right side, if total pressure is decreased :-
- (1) $\text{N}_2 + 3\text{H}_2 \rightleftharpoons 2\text{NH}_3$
 - (2) $\text{H}_2 + \text{I}_2 \rightleftharpoons 2\text{HI}$
 - (3) $\text{N}_2\text{O}_4 \rightleftharpoons 2\text{NO}_2$
 - (4) $\text{H}_2 + \text{Cl}_2 \rightleftharpoons 2\text{HCl}$
- 82.** Match list –I (equilibrium) with List –II (conditions for reaction) and select the correct answer using the codes given below the lists :-
- | | List-1
(Equilibrium) | List-2
(Conditions) |
|----|---------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------|
| P. | $\text{A}_2(\text{g}) + \text{B}_2(\text{g}) \rightleftharpoons 2\text{AB}(\text{g})$
Endothermic | 1. High temperature |
| Q. | $2\text{AB}_2(\text{g}) + \text{B}_2(\text{g}) \rightleftharpoons 2\text{AB}_3(\text{g})$
Exothermic | 2. Low temperature |
| R. | $2\text{AB}_3(\text{g}) \rightleftharpoons \text{A}_2 + 3\text{B}_2(\text{g})$
Endothermic | 3. High Pressure
4. Low Pressure
5. Independent of Pressure |
- CODE :
- | | P | Q | R |
|-----|-------|-------|-------|
| (1) | 1 & 3 | 2 & 3 | 2 & 4 |
| (2) | 2 & 3 | 1 & 4 | 1 & 3 |
| (3) | 1 & 5 | 2 & 3 | 1 & 4 |
| (4) | 2 & 4 | 1 & 5 | 1 & 3 |
- 83.** In the reaction $2\text{A}_{(\text{g})} + \text{B}_{(\text{g})} \rightleftharpoons \text{C}_{(\text{g})} + 362$ 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

<p>84. $aA \rightleftharpoons bB + cC$, $\Delta H = -x \text{ kcal}$.</p> <p>If high pressure and low temperature are the favourable condition for the formation of the product in above reaction, hence:-</p> <p>(1) $a > b + c$ (2) $a < b + c$ (3) $a = b + c$ (4) None of them</p>	<p>89. Does Le chatelier's principle predict a change of equilibrium concentration for the following reaction if the gas mixture is compressed</p> $N_2O_{4(g)} \rightleftharpoons 2NO_{2(g)}$ <p>(1) Yes, backward reaction is favoured (2) Yes, forward reaction is favoured (3) No change (4) No information</p>
<p>85. $aA + bB \rightleftharpoons cC + dD$</p> <p>in above reaction low pressure and high temperature, conditions are shift equilibrium in back direction so correct set :-</p> <p>(1) $(a + b) > (c + d)$, $\Delta H > 0$ (2) $(a + b) < (c + d)$, $\Delta H > 0$ (3) $(a + b) < (c + d)$, $\Delta H < 0$ (4) $(a + b) > (c + d)$, $\Delta H < 0$</p>	<p>90. On cooling of following system at equilibrium</p> $CO_{2(s)} \rightleftharpoons CO_{2(g)} :-$ <p>(1) There is no effect on the equilibrium state (2) More gas is formed (3) More gas is solidifies (4) None of above</p>
<p>86. For reaction $aA \rightleftharpoons \ell L + mM$. In condition of suddenly volume increase, degree of dissociation is decrease it represent that.</p> <p>(1) $a < (\ell + m)$ (2) $a = (\ell + m)$ (3) $a = (\ell - m)$ (4) $a > (\ell + m)$</p>	<p>91. Following equilibrium is present in a closed container at the temperature of 25° C.</p> $SO_2Cl_2(g) \rightleftharpoons SO_2(g) + Cl_2(g)$ <p>When Cl_2 is added to the equilibrium mixture, the following statements will be correct for the system.</p> <p>(a) Concentrations of SO_2, Cl_2 and SO_2Cl_2 change. (b) Cl_2 is formed in more amount. (c) Concentration of SO_2 decreases and that of SO_2Cl_2 increases.</p> <p>(1) a, c (2) a, b (3) b, c (4) a, b, c</p>
<p>87. For the reaction, $PCl_5(g) \rightleftharpoons PCl_3(g) + Cl_2(g)$ the forward reaction at constant temperature is favoured by :-</p> <p>(a) Introducing an inert gas at constant volume (b) Introducing chlorine gas at constant volume (c) Introducing an inert gas at constant pressure (d) Increasing volume of the container (e) Introducing PCl_5 at constant volume</p> <p>(1) a, b, c (2) b, c, d (3) c, d, e (4) a, c, d, e</p> <p>88. For the equilibrium reaction,</p> $H_2O(\ell) \rightleftharpoons H_2O(g)$ <p>What happens, if pressure is applied:-</p> <p>(1) More water evaporates (2) The boiling point of water is increased (3) No effect on boiling point (4) None of the above</p>	

CHEMICAL EQUILIBRIUM

92. A reaction mixture containing H_2 , N_2 and NH_3 has partial pressures 2 atm, 1 atm and 3 atm respectively at 725K. If the value of K_p for the reaction, $N_2 + 3H_2 \rightleftharpoons 2NH_3$ is $4.28 \times 10^{-5} \text{ atm}^{-2}$ at 725K, in which direction the net reaction will go
- (1) Forward
 (2) Backward
 (3) No net reaction
 (4) Direction of reaction cannot be predicted

DEGREE OF DISSOCIATION FROM VAPOUR DENSITY METHOD

93. Vapour density of PCl_5 is 104.25 at $T^\circ C$. Then degree of dissociation of PCl_5 is. (Mw = 208.5)
- (1) 20% (2) 0%
 (3) 30% (4) 15%
94. Vapour density of PCl_5 is 104.16 but when heated to $230^\circ C$ 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%

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

96. The equation $\alpha = \frac{D-d}{(n-1)d}$ is correctly matched for Where D = Theoretical vapour density

d = Observed vapour density

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

ANSWER KEY [EXERCISE-I]

Que.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Ans.	3	4	2	1	4	3	4	3	2	1	4	2	4	3	2
Que.	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Ans.	3	3	2	1	1	2	1	4	4	3	3	2	4	2	2
Que.	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
Ans.	1	1	2	3	4	2	3	2	4	1	4	4	2	1	2
Que.	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
Ans.	3	1	3	4	3	1	2	1	2	2	4	1	1	1	3
Que.	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75
Ans.	3	2	1	2	1	4	2	2	2	2	2	1	4	4	3
Que.	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90
Ans.	1	3	1	2	3	3	3	3	1	4	4	3	2	1	3
Que.	91	92	93	94	95	96									
Ans.	1	2	2	2	1	2									