ALLEN CAREER INSTITUTE KOTA (RAJASTHAN)

path to success

PRE-MEDICAL

PHYSICAL CHEMISTRY

ENTHUSIAST | LEADER | ACHIEVER

EXERCISE

Chemical Equilibrium

ENGLISH MEDIUM

EXERCISE-I (Conceptual Questions) — Build Up Your Understanding

FACTORS AFFECTING RATE OF REACTION

1. In an elementary reaction A + 2B → 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

CE0001

2. 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

CE0002

EQUILIBRIUM AND CHEMICAL PROCESS

3. 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

CE0003

4. 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 in the same time

CE0004

5. Active mass of 5 g CaO is :-

(1) 56 (2) 1 (3) 3.5 (4) 2

CE0005

6. Ratio of active masses of 22g CO_2, 3g H_2 and 7g N_2 in a gaseous mixture is :-

(1) 22 : 3 : 7 (2) 0.5: 3 : 7

(3) 1 : 3 : 1 (4) 1 : 3 : 0.5

CE0006

7. 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 decreases kinetic energy of activated molecules.

(4) It decreases rate of backward reaction.

CE0007

8. In reversible chemical reaction equilibrium will establish when –

(1) Reactant is completely converted into product

(2) Rate of forward and backward reaction is equal

(3) Minimum yield of product

(4) concentration of reactant and product is equal

CE0009

LAW OF MASS ACTION

9. 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}

CE0010

10. The equilibrium concentration of B 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) $k_f k_b[A]_e^{-1}$

CE0011

11. 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

CE0012

12. 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) $5 \times 10^{-5} \times R^{-1}$

CE0014

13. 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

CE0015

14. 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) $2SO_2(g) + O_2(g) \rightleftharpoons 2SO_3(g)$

CE0016

15. 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 of these

CE0017

16. $\log \frac{K_p}{K_c} + \log RT = 0$ is true relationship for the following gaseous 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

CE0018

17. For which reaction at 298 K, the value $\frac{K_p}{K_c}$ of 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

CE0019

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

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

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

The value of the equilibrium constants are related by :-

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

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

CE0020

19. 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

CE0021

20. 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}

CE0023

21. The equilibrium constant in a reversible reaction at 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.

CE0024

22. 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 throughout.

CE0025

23. 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

CE0026

24. For any reversible reaction if concentration of reactants increases then value of equilibrium constant :-
(1) Depends on amount of concentration
(2) Unchanged
(3) Decreases
(4) Increases

CE0027

25. 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) $K_2 > K_1$

CE0028

26. 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

CE0029

27. 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) $\frac{1}{K}$

CE0030

28. In system $A(s) \rightleftharpoons 2B(g) + 3C(g)$ at equilibrium if concentration of 'C' is doubled then concentration of B at equilibrium will be :-
(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

CE0031

29. 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

CE0032

30. 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

CE0033

31. 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

CE0035

32. 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) Increases (2) Decreases

(3) Unchanged (4) Nothing can be said

CE0036

33.

List X	**List Y**
(A) Active mass	(I) $\Delta n = 0$
(B) Dynamic nature	(II) Molar concentration
(C) A + heat $\rightleftharpoons$ B	(III) Vant hoff's equation
(D) $\log (K_{p2}/K_{p1}) = \frac{\Delta H}{2.303R}\left[\frac{1}{T_1}-\frac{1}{T_2}\right]$	(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

CE0037

DEGREE OF DISSOCIATION AND APPLICATION OF LAW OF MASS ACTION

34. 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 dissociation :-

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

CE0038

35. 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

CE0039

36. 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) a + 2 ax

CE0040

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

(1) [P] < [Q] (2) [P] = [Q]

(3) [Q] = [R] (4) None of these

CE0041

38. 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

CE0043

39. $X_2 + Y_2 \rightleftharpoons 2XY$ 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}).

(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)

CE0044

40. 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 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

CE0046

41. 4 mole 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

CE0047

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

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

CE0048

43. If 8 mole of PCl_5 is heated in a closed vessel of 10 L capacity and 25% of it dissociates into PCl_3 and Cl_2 at the equilibrium then value of Kp will be [Given : Total equilibrium pressure is P]

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

CE0049

44. 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 0.6 atm respectively at equilibrium. If partial pressure of PCl_3 and Cl_2 was twice at new equilibrium, 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

CE0050

45. 'a' mol of PCl_5, undergoes, thermal dissociation as: $PCl_5 \rightleftharpoons PCl_3 + Cl_2$, 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

CE0051

46. In a 0.25 L tube dissociation of 4 mol of NO takes place. If its degree of dissociation is 10%. The value of K_p for reaction $2\,NO \rightleftharpoons N_2 + O_2$ is :-

(1) $\frac{1}{(18)^2}$ (2) $\frac{1}{(8)^2}$

(3) $\frac{1}{16}$ (4) $\frac{1}{32}$

CE0052

47. 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) $\frac{4}{9}$

CE0053

48. K_c for the esterification reaction :

$CH_3COOH(\ell) + C_2H_5OH(\ell) \rightleftharpoons CH_3COOC_2H_5(\ell) + H_2O(\ell)$ 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) $\frac{3}{2}$

CE0054

49. 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

CE0055

50. 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) $\sqrt{4}$

CE0056

51. 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

CE0057

52. 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

CE0058

53. 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) 500 (2) 125 (3) 750 (4) 375

CE0060

LE-CHATLIER'S PRINCIPLE

54. 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^{-1}. 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

CE0061

55. When $NaNO_3(s)$ is heated in a closed vessel, O_2 is liberated and $NaNO_2(s)$ 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.

CE0062

56. In manufacture of NO, the reaction of 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

CE0064

57. In which of the following gaseous 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) $H_2 + Cl_2 \rightleftharpoons 2HCl$

CE0065

58. The oxidation of SO_2 by O_2 to SO_3 is exothermic reaction. The concentration 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

CE0066

59. 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

CE0067

60. 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

CE0068

61. 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

CE0069

62. 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) $2SO_2(g) + O_2(g) \rightleftharpoons 2SO_3(g)$

CE0071

63. 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

CE0072

PHYSICAL EQUILIBRIUM

64. For the equilibrium reaction, $H_2O(\ell) \rightleftharpoons H_2O(g)$,

What happens, 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

CE0073

65. 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

CE0074

CALCULATION OF DEGREE OF DISSOCIATION BY V.D. METHOD

66. 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%

CE0075

67. 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%

CE0076

68. 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) $A \rightleftharpoons \left(\frac{n}{2}\right)B + C$

CE0078

EXERCISE-I (Conceptual Questions) ANSWER KEY

Que.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Ans.	**3**	**4**	**4**	**4**	**2**	**4**	**1**	**2**	**3**	**3**	**1**	**4**	**4**	**3**	**4**
Que.	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Ans.	**2**	**2**	**1**	**4**	**1**	**3**	**1**	**3**	**2**	**1**	**1**	**2**	**4**	**1**	**3**
Que.	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
Ans.	**3**	**3**	**3**	**3**	**1**	**4**	**1**	**1**	**1**	**2**	**2**	**1**	**2**	**3**	**3**
Que.	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
Ans.	**1**	**4**	**2**	**2**	**2**	**2**	**1**	**2**	**2**	**3**	**3**	**3**	**2**	**2**	**3**
Que.	61	62	63	64	65	66	67	68							
Ans.	**1**	**2**	**3**	**2**	**3**	**2**	**1**	**2**							

EXERCISE-II (Previous Year Questions) AIPMT/NEET

AIPMT-Pre 2010

1. The reaction :

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

is start with the concentrations of A and B both at an initial value of 1.00 M. When equilibrium is reached, the concentration of D is measured and found to be 0.25 M. The value for the equilibrium constant for this reaction is given by the expression.

(1) $[(0.75)^3\ (0.25)] \div [(0.50)^2\ (0.75)]$
(2) $[(0.75)^3\ (0.25)] \div [(0.50)^2\ (0.25)]$
(3) $[(0.75)^3\ (0.25)] \div [(0.75)^2\ (0.25)]$
(4) $[(0.75)^3\ (0.25)] \div [(1.00)^2\ (1.00)]$

CE0085

AIPMT-Mains 2010

2. In which of the following equilibrium K_c and K_p are not equal ?

(1) $2C(s) + O_2(g) \rightleftharpoons 2CO_2(g)$

(2) $2NO(g) \rightleftharpoons N_2(g) + O_2(g)$

(3) $SO_2(g) + NO_2(g) \rightleftharpoons SO_3(g) + NO(g)$

(4) $H_2(g) + I_2(g) \rightleftharpoons 2HI(g)$

CE0086

AIPMT-Pre 2011

3. For the reaction $N_2(g) + O_2(g) \rightleftharpoons 2NO(g)$, the equilibrium constant is K_1. The equilibrium constant is K_2 for the reaction $2NO(g) + O_2(g) \rightleftharpoons 2NO_2(g)$. What is K for the reaction $NO_2(g) \rightleftharpoons \frac{1}{2}N_2(g) + O_2(g)$?

(1) $1/(2K_1K_2)$ (2) $1/(4K_1K_2)$
(3) $[1/K_1K_2]^{1/2}$ (4) $1/(K_1K_2)$

CE0088

AIPMT-Mains 2012

4. Given that the equilibrium constant for the reaction

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

has a value of 278 at a particular temperature. What is the value of the equilibrium constant for the following reaction at the same temperature ?

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

(1) 6.0×10^{-2} (2) 1.3×10^{-5}
(3) 1.8×10^{-3} (4) 3.6×10^{-3}

CE0090

5. Given the reaction between 2 gases represented by A_2 and B_2 to give the compound AB(g)

$A_2(g) + B_2(g) \rightleftharpoons 2AB(g)$

At equilibrium, the concentration

of $A_2 = 3.0 \times 10^{-3}$ M

of $B_2 = 4.2 \times 10^{-3}$ M

of AB = 2.8×10^{-3} M

If the reaction takes place in a sealed vessel at 527°C, then the value of K_c will be :-

(1) 0.62 (2) 4.5
(3) 2.0 (4) 1.9

CE0091

AIPMT 2014

6. For the reversible reaction :

$N_2(g) + 3H_2(g) \rightleftharpoons 2NH_3(g) + \text{Heat}$

The equilibrium shifts in forward direction :

(1) By increasing the concentration of $NH_3(g)$
(2) By decreasing the pressure
(3) By decreasing the concentrations of $N_2(g)$ and $H_2(g)$
(4) By increasing pressure and decreasing temperature

CE0094

7. For a given exothermic reaction, K_p and K'_p are the equilibrium constants at temperatures T_1 and T_2, respectively. Assuming that heat of reaction is constant in temperature range between T_1 and T_2, it is readily observed that :-

(1) $K_p > K'_p$ (2) $K_p < K'_p$
(3) $K_p = K'_p$ (4) $K_p = \frac{1}{K'_p}$

CE0095

AIPMT-2015

8. If the value of an equilibrium constant for a particular reaction is 1.6×10^{12}, then at equilibrium the system will contain :-
(1) mostly reactants
(2) mostly products
(3) similar amounts of reactants and products
(4) all reactants

CE0097

Re-AIPMT-2015

9. If the equilibrium constant for
$N_2(g) + O_2(g) \rightleftharpoons 2NO(g)$ is K, the equilibrium constant for $\frac{1}{2}N_2(g) + \frac{1}{2}O_2(g) \rightleftharpoons NO(g)$ will be:-
(1) K (2) K^2 (3) $K^{1/2}$ (4) $\frac{1}{2}K$

CE0098

NEET(UG) 2017

10. The equilibrium constant of the following are :

$N_2 + 3H_2 \rightleftharpoons 2NH_3$; K_1

$N_2 + O_2 \rightleftharpoons 2NO$; K_2

$H_2 + \frac{1}{2}O_2 \rightarrow H_2O$; K_3

The equilibrium constant (K) of the reaction :
$2NH_3 + \frac{5}{2}O_2 \overset{K}{\rightleftharpoons} 2NO + 3H_2O$, will be :
(1) $K_2 K_3^3 / K_1$ (2) K_2K_3/K_1
(3) $K_2^3K_3 / K_1$ (4) $K_1K_3^3 / K_2$

CE0100

11. A 20 litre container at 400 K contains $CO_2(g)$ at pressure 0.4 atm and an excess of SrO (neglect the volume of solid SrO). The volume of the container is now decreased by moving the movable piston fitted in the container. The maximum volume of the container, when pressure of CO_2 attains its maximum value, will be :-

(Given that : $SrCO_3(s) \rightleftharpoons SrO(s) + CO_2(g)$, Kp = 1.6atm)
(1) 10 litre (2) 4 litre (3) 2 litre (4) 5 litre

CE0101

NEET(UG) 2018

12. Which one of the following conditions will favour maximum formation of the product in the reaction,

$A_2(g) + B_2(g) \rightleftharpoons X_2(g)$ $\Delta_rH = -X$ kJ ?

(1) Low temperature and high pressure
(2) Low temperature and low pressure
(3) High temperature and high pressure
(4) High temperature and low pressure

CE0104

NEET(UG) 2021 (Paper-2)

13. Equivalent amounts of H_2 and I_2 are heated in a closed container till equilibrium is obtained. If 80% of the hydrogen can be converted to HI, then K_c at this temperature
(1) 64 (2) 16
(3) 0.25 (4) 4

CE0105

NEET (UG) 2022

14. Which one is **not** correct mathematical equation for Dalton's Law of partial pressure ?
Here p = total pressure of gaseous mixture
(1) $p = n_1\frac{RT}{V} + n_2\frac{RT}{V} + n_3\frac{RT}{V}$
(2) $p_i = \chi_i p$, where p_i=partial pressure of i^{th} gas, χ_i=mole fraction of i^{th} gas in gaseous mixture
(3) $p_i = \chi_i p_i^\circ$, where χ_i, = mole fraction of i^{th} gas in gaseous mixture, p_i° = pressure of i^{th} gas in pure state
(4) $p = p_1 + p_2 + p_3$

CE0106

15. $3O_2(g) \rightleftharpoons 2O_3(g)$
for the above reaction at 298 K, K_c is found to be 3.0×10^{-59}. If the concentration of O_2 at equilibrium is 0.040 M then concentration of O_3 in M is
(1) 1.9×10^{-63} (2) 2.4×10^{31}
(3) 1.2×10^{21} (4) 4.38×10^{-32}

CE0107

NEET (UG) 2022 (OVERSEAS)

16. Consider the following reaction taking place in 1 L capacity container at 300 K.

$A + B \rightleftharpoons C + D$

If one mole each of A and B are present initially and at equilibrium 0.7 mol of C is formed, then equilibrium constant (K_c) for the reaction is

(1) 1.2 (2) 6.2

(3) 5.4 (4) 9.7

CE0108

Re-NEET (UG) 2022

17. K_p for the following reaction is 3.0 at 1000 K.

$$CO_2(g) + C(s) \rightleftharpoons 2CO(g)$$

What will be the value of K_c for the reaction at the same temperature ?

(Given - R = 0.083 L bar $K^{-1} mol^{-1}$)

(1) 0.36 (2) 3.6×10^{-2}

(3) 3.6×10^{-3} (4) 3.6

CE0109

EXERCISE-II (Previous Year Questions) ANSWER KEY

Que.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Ans.	1	1	3	1	1	4	1	2	3	1	4	1	1	3	4
Que.	16	17													
Ans.	3	2													

EXERCISE-III (Analytical Questions) Master Your Understanding

1. For which of the following reaction the degree of dissociation (α) and equilibrium constant (K_p) are related as $K_p = \frac{4\alpha^2 P}{(1-\alpha^2)}$:-

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

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

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

(4) $PCl_3(g) + Cl_2(g) \rightleftharpoons PCl_5(g)$

CE0109

2. Pure ammonia is placed in a vessel at a temperature where its dissociation constant is appreciable. At equilibrium:-

(1) K_p does not change significantly with pressure

(2) Degree of dissociation does not change with pressure

(3) concentration of NH_3 does not change with pressure

(4) concentration of H_2 is less than that of N_2

CE0110

3. For the reaction $PCl_5 \rightleftharpoons PCl_3 + Cl_2$, the degree of dissociation varies inversely as the square root of pressure of the system. Supposing at constant temperature If the volume is increased 16 times the intial volume, the degree of dissociation for this reaction will becomes

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

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

CE0111

4. 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

CE0112

5. The effect of adding krypton (Kr) gas on position of equilibrium, keeping the volume of the system constant is :-

(1) If $\Delta n = 0$, backward reaction is favoured.

(2) If Δn = +ve, forward reaction is favoured

(3) If Δn = –ve , forward reaction is favoured

(4) No effect whatever be the value of Δn

CE0114

6. Match list –I with List –II and select the correct answer using the codes given below the lists :-

List–I (Equilibrium)	List–II (Product formation favourable Conditions)
P. $A_2(g) + B_2(g) \rightleftharpoons 2AB(g)$ Endothermic	1. High temperature
Q. $2AB_2(g)+B_2(g) \rightleftharpoons 2AB_3(g)$ Exothermic	2. Low temperature
R. $2AB_3(g) \rightleftharpoons A_2(g) + 3B_2(g)$ 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

CE0115

7. For reaction $aA \rightleftharpoons \ell L + mM$. In condition of suddenly volume increase, degree of dissociation decreases it represents that.

(1) $a < (\ell + m)$

(2) $a = (\ell + m)$

(3) $a = (\ell - m)$

(4) $a > (\ell + m)$

CE0117

8. Following equilibrium is present in a closed container at the temperature of 25° C.

$SO_2Cl_2(g) \rightleftharpoons SO_2(g) + Cl_2(g)$

When Cl_2 is added to the equilibrium mixture, the following statements will be correct for the system.

(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.

(1) a, c (2) a, b

(3) b, c (4) a, b, c

CE0119

9. 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 10^{-5} 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

CE0120

10. For reaction $2NOCl(g) \rightleftharpoons 2NO(g) + Cl_2(g)$, K_C at 427°C is 3×10^{-6} L^{-1} mol. The value of K_P is nearly :–

(1) 7.50×10^{-5} (2) 2.50×10^{-5}

(3) 2.50×10^{-4} (4) 1.72×10^{-4}

CE0121

11. Equilibrium constants K_1 and K_2 for the following equilibrium :

$NO(g) + \frac{1}{2}O_2(g) \overset{K_1}{\rightleftharpoons} NO_2(g)$ and

$2NO_2(g) \overset{K_2}{\rightleftharpoons} 2NO(g) + O_2(g)$

are related as :-

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

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

CE0122

12. For the reversible reaction

$N_2(g) + 3H_2(g) \rightleftharpoons 2NH_3(g)$ at 500°C, the value of K_P is 1.44×10^{-5} when partial pressure is measured in atmospheres. The corresponding value of K_C, with concentration in mol L^{-1} is:-

(1) $1.44 \times 10^{-5} / (0.082 \times 500)^{-2}$

(2) $1.44 \times 10^{-5} / (8.314 \times 773)^{-2}$

(3) $1.44 \times 10^{-5} / (0.082 \times 773)^{2}$

(4) $1.44 \times 10^{-5} / (0.082 \times 773)^{-2}$

CE0123

13. For the reaction, $A + B \rightleftharpoons C + D$, $K_c = 9$. If A and B are taken 1 mole each, then amount of C at equilibrium is :-

(1) 1 (2) 0.25

(3) 0.75 (4) None of these

CE0124

14. In which reaction equilibrium moves in left hand side when pressure is increased :-

(1) $H_2(g) + Cl_2(g) \rightleftharpoons 2HCl(g)$

(2) $2Mg(s) + O_2(g) \rightleftharpoons 2MgO(s)$

(3) $2H_2O(g) \rightleftharpoons 2H_2(g) + O_2(g)$

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

CE0125

15. $K_p \rightarrow 10^{-2}$ 10^{-3}

Temperature $\rightarrow$ 400K 450K

What would you consider by above information :-

(1) Equilibrium constant increases with increase in concentration

(2) more molecules form on left hand side

(3) Heat is released

(4) None

CE0126

16. For the reaction $N_2 + O_2 \rightleftharpoons 2NO$, K_C is 100 then K_C for reaction $2NO \rightleftharpoons N_2 + O_2$ will be :-

(1) 0.01 (2) 0.1 (3) 10 (4) 100

CE0127

17. 3.1 mol of $FeCl_3$ and 3.2 mol of NH_4SCN are added to one litre of water. At equilibrium 3.0 mol of $FeSCN^{2+}$ are formed. The equilibrium constant K_C of the reacion $Fe^{3+} + SCN^- \rightleftharpoons FeSCN^{2+}$ will be

(1) $6.66\ 10^{-3}$ (2) 0.30
(3) 3.30 (4) 150

CE0128

18. 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 yield of product
(4) concentration of reactant and product is equal

CE0130

19. In the manufacture of NH_3 by Haber's process which condition give maximum yield–

(1) High temperature, High pressure and high concentration of reactants
(2) High temperature, low pressure and low concentration of reactants
(3) Low temperature, high pressure and high concentration of reactants
(4) Low temperature, low pressure and low concentration of reactants

CE0131

20. Increase in temperature in a reversible equilibrium reaction favours –

(1) Forward reaction only
(2) Backward reaction only
(3) Either forward or backward reaction
(4) Neither forward nor backward reaction

CE0132

21. For which of the following reaction $K_P=K_C$

(1) $H_2 + I_2 \rightleftharpoons 2HI$
(2) $PCl_5 \rightleftharpoons PCl_3 + Cl_2$
(3) $2NH_3 \rightleftharpoons 3H_2 + N_2$
(4) $2SO_2 + O_2 \rightleftharpoons 2SO_3$

CE0133

22. K for the synthesis of HI is 50. What is K for its dissociation

(1) 50 (2) 5 (3) 0.2 (4) 0.02

CE0134

23. Which of the following is in favour of forward reaction

(1) Q = Kc (2) Q > Kc
(3) Q < Kc (4) None

CE0135

24. At equilibrium 500mL vessel contains 1·5 M of each A, B, C, D. If 0·5M of C and D expelled out than what would be the K_C :–

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

(1) 1 (2) $\frac{1}{9}$ (3) $\frac{4}{9}$ (4) $\frac{5}{9}$

CE0136

25. If K_C is 41 for, $N_2 + 3H_2 \rightleftharpoons 2NH_3$ then for $NH_3 \rightleftharpoons \frac{1}{2}N_2 + \frac{3}{2}H_2$ K_C will be :–

(1) 41 (2) $\sqrt{41}$ (3) 20·5 (4) $\sqrt{\frac{1}{41}}$

CE0137

26. For which of the following gaseous reaction value of K_P and K_C is equal :–

(1) $2NOCl \rightleftharpoons 2NO + Cl_2$
(2) $PCl_5 \rightleftharpoons PCl_3 + Cl_2$
(3) $H_2 + Cl_2 \rightleftharpoons 2HCl$
(4) $N_2 + 3H_2 \rightleftharpoons 2NH_3$

CE0138

27. In a reaction, equilibrium proceeds towards reactants then K will be :-

(1) K > > 1 (2) K < < 1
(3) K = 0 (4) K = 1

CE0139

28. For following reaction $N_2 + 3H_2 \rightleftharpoons 2NH_3$ value of K_C depends on

(1) Initial concentration of reactant
(2) Pressure
(3) Temperature (4) All of these

CE0140

29. $N_2 + O_2 \rightleftharpoons 2NO$ – Heat

reaction shift in right hand direction on :-

(1) On decreasing pressure
(2) On increasing pressure
(3) On decreasing temperature
(4) On increasing temperature

CE0141

30. For the reaction $2HBr \rightleftharpoons H_2 + Br_2$ which relation is true :-

(1) $2K_p = K_C$ (2) $\frac{1}{K_p} = K_C$
(3) $K_p = K_C$ (4) None of these

CE0143

31. For the process A(g) $\rightleftharpoons$ 2B(g). If pressure is doubled then which is true information about A:-
(1) Increase in A
(2) Decrease in A
(3) No effect
(4) can't say because data is insufficient

CE0144

32. For the reaction $2A + 3B \rightleftharpoons 2C$ the expression for K_C is :

(1) $\frac{[A]^2[B]^3}{[C]^2}$ (2) $\frac{[C]}{[A][B]}$

(3) $\frac{[C]^2}{[A]^2[B]^3}$ (4) $\frac{[C]^2}{[A]^3[B]^2}$

CE0145

33. For the equation $2A + B \rightleftharpoons BA_2$, the equilibrium concentration of A, B, BA_2 is 4, 2 and 2 respectively. The value of K_c will be :-
(1) 0.0625 (2) 0.625 (3) 6.280 (4) 6.250

CE0146

34. A vessel at 1000 K contains CO_2 with a pressure of 0.5 atm. Some of the CO_2 is converted into CO on the addition of graphite. If the total pressure at equilibrium is 0.8 atm, the value of K is :-
(1) 0.3 atm (2) 0.18 atm
(3) 1.8 atm (4) 3 atm

CE0147

35. The equilibrium constant (K_C) for the reaction $N_2(g) + O_2(g) \rightleftharpoons 2NO(g)$ at temperature T is 4×10^{-4}. The value of K_C for the reaction. $NO(g) \rightleftharpoons \frac{1}{2} N_2(g) + \frac{1}{2} O_2(g)$ at the same temperature is :-
(1) 50.0 (2) 0.02
(3) 2.5×10^2 (4) 4×10^{-4}

CE0148

36. For the reaction $SO_2(g) + \frac{1}{2}O_2(g) \rightleftharpoons SO_3(g)$, if $K_p = K_C(RT)^x$ where the symbols have usual meaning then the value of x is (assuming ideality)

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

CE0149

37. How many moles per litre of PCl_5 has to be taken to obtain 0.1 mol of Cl_2, if the value of equilibrium constant K_c is 0.04 ?
(1) 0.15 (2) 0.25 (3) 0.35 (4) 0.05

CE0151

38. For the reaction, $N_2O_3 \rightleftharpoons NO + NO_2$, the value of equilibrium constant K_p at fixed temperature is 4. What will be the amount of dissociation at same temperature and 5 atmospheric pressure ?

(1) $\frac{1}{3}$ (2) $\frac{2}{3}$ (3) $\frac{7}{9}$ (4) $\frac{2}{4}$

CE0152

39. One mole of PCl_5 is heated in a closed container of one litre capacity. At equilibrium, 20% PCl_5 is not dissociated. What should be the value of K_c ?
(1) $(3.2)^{-1}$ (2) 3.2 (3) 2.4 (4) 42

CE0153

40. For $N_2O_3 \rightleftharpoons NO + NO_2$, if total pressure is P atm and amount of dissociation is 50%, the value of K_p will be

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

CE0154

41. 1.1 mol of A mixed with 2.2 mol of B and the mixture is kept in a 1 L flask and the equilibrium, $A + 2B \rightleftharpoons 2C + D$ is reached. If at equilibrium 0.2 mol of C is formed then the value of K_C will be.
(1) 0.1 (2) 0.01
(3) 0.001 (4) 0.0001

CE0156

42. For the reaction :

$CH_4(g) + 2O_2(g) \rightleftharpoons CO_2(g) + 2H_2O(\ell)$

$\Delta_r H = -170.8$ kJ mol^{-1}

Which of the following statements is not true:-

(1) At equilibrium, the concentrations of $CO_2(g)$ and $H_2O(\ell)$ are not equal

(2) The equilibrium constant for the reaction is given by $K_P = \frac{[CO_2]}{[CH_4][O_2]}$

(3) Addition of $CH_4(g)$ or $O_2(g)$ at equilibrium will cause a shift to the right

(4) The reaction is exothermic

CE0079

43. The following equilibrium are given

$N_2 + 3H_2 \rightleftharpoons 2NH_3$ ---------- K_1

$N_2 + O_2 \rightleftharpoons 2NO$ ---------- K_2

$H_2 + \frac{1}{2}O_2 \rightleftharpoons H_2O$ ---------- K_3

The equilibrium constant of the reaction

$2NH_3 + \frac{5}{2}O_2 \rightleftharpoons 2NO + 3\,H_2O$, in terms of K_1, K_2 and K_3 is :

(1) $\frac{K_1K_2}{K_3}$ (2) $\frac{K_1K_3^2}{K_2}$

(3) $\frac{K_2K_3^3}{K_1}$ (4) $K_1K_2K_3$

CE0080

44. The dissociation equilibrium of a gas AB_2 can be represented as : $2AB_2\,(g) \rightleftharpoons 2AB\,(g) + B_2\,(g)$

The degree of dissociation is 'x' and is small compared to 1. The expression relating the degree of dissociation (x) with equilibrium constant K_p and total pressure P is :

(1) $(2K_p/P)^{1/3}$ (2) $(2K_p/P)^{1/2}$

(3) (K_p/P) (4) $(2K_p/P)$

CE0081

45. The value of equilibrium constant of the reaction

$HI\,(g) \rightleftharpoons \frac{1}{2}H_2(g) + \frac{1}{2}I_2$ is 8.0

The equilibrium constant of the reaction

$H_2(g) + I_2(g) \rightleftharpoons 2HI\,(g)$ will be :

(1) $\frac{1}{64}$ (2) 16 (3) $\frac{1}{8}$ (4) $\frac{1}{16}$

CE0082

46. Which of the following statement is incorrect ?

(1) On addition of catalyst the equilibrium constant value is not affected.

(2) Equilibrium constant for a reaction with negative ΔH value decreases as the temperature increases.

(3) In equilibrium mixture of ice and water kept in perfectly insulated flask, mass of ice and water does not change with time

(4) All the measurable properties of the system are variable at equilibrium state

CE0170

47. Which of the following statement(s) is/are correct ?

(1) The value of equilibrium constant is independent of initial concentrations of the reactants and products.

(2) The equilibrium constant for the reverse reaction is equal to the inverse of the equilibrium constant for the forward reaction.

(3) Expression for equilibrium constant is applicable only when concentrations of the reactants and products have attained constant value at equilibrium state.

(4) All of these

CE0171

48. A sample of pure PCl_5 was introduced into an evacuated vessel at 473 K. After equilibrium was attained, concentration of PCl_5 was found to be 0.5×10^{-1} mol L^{-1}. If value of K_c is 8.0×10^{-3}, what are the concentrations of PCl_3 and Cl_2 at equilibrium

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

(1) 0.01 mol L^{-1}

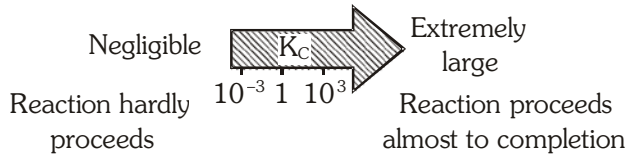
(2) 0.02 mol L^{-1}

(3) 0.03 mol L^{-1}

(4) 0.04 mol L^{-1}

CE0172

49. Consider the following figure which shows dependence of extent of reaction on K_c.



Point out the correct statement(s) for the above diagram.

(1) If $K_c > 10^3$, products predominate over reactants.

(2) If $K_c < 10^{-3}$ reactants predominate over products.

(3) If K_c is in the range of 10^{-3} to 10^3, appreciable concentrations of both reactants and products are present.

(4) All of the above

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EXERCISE-III (Analytical Questions) ANSWER KEY

Que.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Ans.	**1**	**1**	**1**	**2**	**4**	**3**	**4**	**1**	**2**	**4**	**3**	**4**	**3**	**3**	**3**
Que.	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Ans.	**1**	**4**	**2**	**3**	**3**	**1**	**4**	**3**	**1**	**4**	**3**	**2**	**3**	**4**	**3**
Que.	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
Ans.	**1**	**3**	**1**	**3**	**1**	**4**	**3**	**2**	**2**	**3**	**3**	**2**	**3**	**1**	**1**
Que.	46	47	48	49											
Ans.	**4**	**4**	**2**	**4**											