DPP–4 [Factors affecting Equilibrium Constant]

Chapter: Chemical Equilibrium

"Tu smart hai? Prove kar. Assignment se. — Weird Chemist."

GROUP–1: Reverse / Half / Double / Multiple Reactions (K → 1/K, K, K²)

Q1. $2HCl(g) \rightleftharpoons H_2(g) + Cl_2(g)$; $K = 4 \times 10^{-34}$ Find K for $\frac{1}{2}H_2 + \frac{1}{2}Cl_2 \rightleftharpoons HCl$:-

(1) 2×10^{-17}
(2) 2.5×10^{33}
(3) 5×10^{6}
(4) None

Q2. $HI \rightleftharpoons \frac{1}{2}H_2 + \frac{1}{2}I_2$; $K = 8$ Find K for $H_2 + I_2 \rightleftharpoons 2HI$:-

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

Q3. For reaction $N_2 + O_2 \rightleftharpoons 2NO$; K Find K for $\frac{1}{2}N_2 + \frac{1}{2}O_2 \rightleftharpoons NO$:-

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

Q4. For reaction $\frac{1}{2}H_2 + \frac{1}{2}I_2 \rightleftharpoons HI$; K Find K for $2HI \rightleftharpoons H_2 + I_2$:-

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

Q5. K for synthesis of HI is 50. Find K for its dissociation :-

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

Q6. If K_c is 41 for $N_2 + 3H_2 \rightleftharpoons 2NH_3$, Find K_c for $NH_3 \rightleftharpoons \frac{1}{2}N_2 + \frac{3}{2}H_2$:-

(1) 41
(2) $\sqrt{41}$
(3) 20.5
(4) $\frac{1}{\sqrt{41}}$

Q7. For reaction $N_2 + O_2 \rightleftharpoons 2NO$; $K_c = 100$ Find K_c for $2NO \rightleftharpoons N_2 + O_2$:-

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

Q8. The equilibrium constant (K_c) for $NO \rightleftharpoons \frac{1}{2}N_2 + \frac{1}{2}O_2$ at T is 4×10^{-4}. Find K_c for $N_2 + O_2 \rightleftharpoons 2NO$:-

(1) 5.0
(2) 0.02
(3) 2.5×10^2
(4) 4×10^{-4}

Q9. **Equilibrium constants K_1 and K_2 for $NO + \frac{1}{2}O_2 \rightleftharpoons NO_2$ and $2NO + O_2 \rightleftharpoons 2NO_2$ 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) $K_2 = K_1^2$

GROUP–2: Combining Equilibrium Constants (K from K_1, K_2, K_3)

Q10. **$XeF_6 + H_2O \rightleftharpoons XeOF_4 + 2HF$; K_1 $XeO_4 + XeF_6 \rightleftharpoons XeOF_4 + XeO_3F_2$; K_2 Find equilibrium constant for $XeO_4 + 2HF \rightleftharpoons XeO_3F_2 + H_2O$:-**

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

Q11. Find K for $2NH_3 + \frac{5}{2}O_2 \rightleftharpoons 2NO + 3H_2O$:

(1) $K_1K_2K_3$
(2) $\frac{K_1K_2}{K_3}$
(3) $\frac{K_1K_3^2}{K_2}$
(4) $\frac{K_2K_3^3}{K_1}$

Q12. **$CoO(s) + H_2(g) \rightleftharpoons Co(s) + H_2O(g)$; $K_1 = 60$ $CoO(s) + CO(g) \rightleftharpoons Co(s) + CO_2(g)$; $K_2 = 180$ Find K for $CO_2(g) + H_2(g) \rightleftharpoons CO(g) + H_2O(g)$:-**

(1) 0.44
(2) 0.11
(3) 0.22
(4) 0.33

Q13. **Given :- $SO_2 + \frac{1}{2}O_2 \rightleftharpoons SO_3$; K_1 $4SO_3 \rightleftharpoons 4SO_2 + 2O_2$; K_2 Relation between K_1 and K_2 :-**

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

Q14. **For reactions: $A \rightleftharpoons B$; $K = 2$ $B \rightleftharpoons C$; $K = 4$ $C \rightleftharpoons D$; $K = 6$ K for $A \rightleftharpoons D$:-**

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

Q15. **If $A \rightleftharpoons B$ ($K = 3$), $B \rightleftharpoons C$ ($K = 5$), $D \rightleftharpoons C$ ($K = 2$) Find K for $D \rightleftharpoons A$:-**

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

Q16. Find K for $2NH_3 + \frac{5}{2}O_2 \rightleftharpoons 2NO + 3H_2O$:

(1) $\frac{K_2K_3^3}{K_1}$

(2) $\frac{K_2K_3}{K_1}$

(3) $\frac{K_2^2K_3^3}{K_1}$

(4) $\frac{K_1K_3^3}{K_2}$

GROUP–3: Conceptual Theory MCQs on Equilibrium Constant

Q17. 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

Q18. For reversible reaction if concentration of reactants increases, effect on equilibrium constant :-

(1) Depends on amount

(2) Unchanged

(3) Decrease

(4) Increase

Q19. The equilibrium constant in a reversible reaction :-

(1) Depends on initial concentration

(2) Depends on concentration at equilibrium

(3) Does not depend on initial concentration

(4) Is not characteristic of the reaction

Q20. Which one of the following statements is correct about equilibrium constant :-

(1) K changes with temperature

(2) K depends on starting concentration

(3) For reaction $3Fe(s)+4H_2O(g) \rightleftharpoons Fe_3O_4(s)+4H_2(g)$ K is same in open or closed vessel

(4) K doubles if reaction is multiplied by 2

Q21. For reaction $N_2 + 3H_2 \rightleftharpoons 2NH_3$, value of K_c does depend on :-

(1) Initial concentration

(2) Pressure

(3) Temperature

(4) Catalyst

GROUP–4: Effect of Pressure, Volume, Inert Gas on K

Q22. The equilibrium constant (K_p) for $PCl_5(g) \rightleftharpoons PCl_3(g) + Cl_2(g)$ is 16. If volume of the container is reduced to one-half, the value of K_p at same temperature will be :-

(1) 32

(2) 64

(3) 16

(4) 4

Q23. The equilibrium constant for $H_2 + I_2 \rightleftharpoons 2HI$ is 64. If volume is reduced to one-fourth, value of equilibrium constant will be :-

(1) 16

(2) 32

(3) 64

(4) 128

Q24. If some He gas is introduced into the equilibrium $PCl_5 \rightleftharpoons PCl_3 + Cl_2$ at constant pressure and temperature, equilibrium constant will :-

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

Q25. In experiment equilibrium constant for A + B ⇌ C + D is K when initial conc. = 0.1 M each. Another experiment with initial conc. = 2 M and 3 M gives K value :-

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

GROUP–5: Effect of Catalyst on Equilibrium

Q26. 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.

Q27. 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.

Q28. The equilibrium constant for the reaction $N_2 + O_2 \rightleftharpoons 2NO(g)$ at 2000 K is 4×10^4. In presence of catalyst equilibrium is established faster. Value of K in presence of catalyst will be :-

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

Q29. For the reaction $H_2 + I_2 \rightleftharpoons 2HI(g)$ equilibrium constant K_p changes with :-

(1) Temperature
(2) Total pressure
(3) Catalyst
(4) Amount of H_2 and I_2

Q30. Assertion:- In the presence of catalyst, the value of equilibrium constant K increases. Reason:- Catalysts increases the rate of forward and backward reaction to same extent. Choose:

(A) A and R are true; R is the correct explanation of A
(B) A and R are true; R is not the correct explanation of A
(C) A is true, R is false
(D) A is false, R is true

Q31. Assertion :- Catalyst affects the final state of the equilibrium. Reason :- It enables the system to attain a new equilibrium state by complexing with the reagents. Choose:

(A) A and R are true; R is the correct explanation of A
(B) A and R are true; R is not the correct explanation of A
(C) A is true, R is false
(D) A is false, R is true

GROUP–6: Effect of Temperature on K (van't Hoff, H, Exo/Endo)

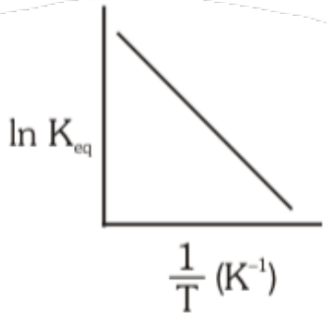
Q32. **If temperature is increased then equilibrium constant will be :-**

(1) Increased
(2) Decreased
(3) Remains constant
(4) May increase or decrease depending on exo/endothermic

Q33. **What will be the equilibrium constant at 127°C if at 27°C K = 4 for $N_2 + 3H_2 \rightleftharpoons 2NH_3$; H = –46.06 kJ ?**

(1) 4×10^{-2}
(2) 2×10^{-3}
(3) 10^2
(4) 4×10^2

Q34. **According to given lnK vs (1/T) graph the reaction will be :-**



(1) Endothermic
(2) Exothermic
(3) Spontaneous at room temperature
(4) H negligible

Q35. **Effect of increasing temperature on equilibrium constant is** $\log K_2 - \log K_1 = \frac{-\Delta H}{2.303R}\left[\frac{1}{T_2} - \frac{1}{T_1}\right]$. **For endothermic reaction false statement is :-**

(1) $\left(\frac{1}{T_2} - \frac{1}{T_1}\right)$ is positive
(2) $\log K_2 > \log K_1$
(3) H positive
(4) K_2 ¿ K_1

Q36. **Assertion :- Effect of temperature on K depends on enthalpy change. Reason :- Increasing T shifts equilibrium in exothermic direction. Choose:**
(A) A and R are true; R is the correct explanation of A
(B) A and R are true; R is not the correct explanation of A
(C) A is true, R is false
(D) A is false, R is true

Q37. **$Br_2 \rightleftharpoons 2Br$; K at 500 K = 1×10^{-10} and at 700 K = 1×10^{-5}. Reaction is :-**

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

Q38. **For exothermic reaction, K_p and K'_p at T_1 and T_2 satisfy :-**
(1) $K_p > K'_p$
(2) $K_p < K'_p$
(3) $K_p = K'_p$
(4) $K_p = \frac{1}{K'_p}$

Group 1: Reverse / Fractional / Manipulated Equilibrium Constants

Q39. Consider the following reversible chemical reactions : **[JEE-MAINS (Jan)-19]**

$$A_2(g) + B_2(g) \overset{K_1}{\rightleftharpoons} 2AB(g) \quad ...(1)$$

$$6AB(g) \overset{K_2}{\rightleftharpoons} 3A_2(g) + 3B_2(g) \quad ...(2)$$

(1) $K_1K_2 = 3$
(2) $K_2 = K_1^{-3}$
(3) $K_2 = K_1^3$
(4) $K_1K_2 = \frac{1}{2}$

Q40. K for the synthesis of HI is 50. K for dissociation of HI is :

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

Q41. If the equilibrium constant for the reaction $P_4(g) + 6Cl_2(g) \rightleftharpoons 4PCl_3(g)$ is 0.125. The value of equilibrium constant for this reaction $4PCl_3(g) \rightleftharpoons P_4(g) + 6Cl_2(g)$ is : [NSEC–2000]

(1) 0.25
(2) 8
(3) 0.125
(4) 6

Q42. The relationship between equilibrium constants K_p and K_c for a gaseous reaction is : **[NSEC–2001]**

(1) $K_p = K_c \cdot R(T)^{\Delta n}$
(2) $K_c = K_p(RT)^{\Delta n}$
(3) $K_p = K_c(RT)^{\Delta n}$
(4) $K_p = K_c/RT^{\Delta n}$

Q43. The equilibrium constant for the reaction $H_2 + Br_2 \rightleftharpoons 2HBr$ is 67.8 at 300°K. The equilibrium constant for the dissociation of HBr is : **[NSEC–2001]**

(1) 0.0147
(2) 67.80
(3) 33.90
(4) 8.349

Q44. The equilibrium constant for the reaction $N_2 + 3H_2 \rightleftharpoons 2NH_3$ is 70 at a certain temperature. Hence, equilibrium constant for the reaction $NH_3 \rightleftharpoons \frac{1}{2}N_2 + \frac{3}{2}H_2$ at the same temperature will be approximately : **[NSEC–2004]**

(1) 1.4×10^{-2}
(2) 1.2×10^{-1}
(3) 2.0×10^{-4}
(4) 2.9×10^{-2}

Q45. The equilibrium constants for the reactions
$NO(g) + \frac{1}{2}O_2(g)$ $[K_1]$ $NO_2(g)$
$2NO_2(g)$ $[K_2]$ $2NO(g) + O_2(g)$
are related as :

(1) $K_1 = 2K_2$
(2) $K_1 = 1/K_2$
(3) $K_1 = \sqrt{K_2}$
(4) $K_1 = 1/\sqrt{K_2}$

Q46. **The equilibrium constant for the given reaction : $SO_3(g) \rightleftharpoons SO_2(g) + \frac{1}{2}O_2(g)$; $K = 5 \times 10^{-2}$ The value of K_c for the reaction $2SO_2(g) + O_2(g) \rightleftharpoons 2SO_3(g)$ will be :-**

(1) 400
(2) 2.40×10^{-3}
(3) 9.8×10^{-2}
(4) 4.9×10^{-2}

Q47. **The equilibrium constant for the reaction:**

$$SO_3(g) \rightleftharpoons SO_2(g) + \tfrac{1}{2}O_2(g) \qquad K_C = 4.9 \times 10^{-2}$$

The value of K_C for the reaction:

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

[AIEEE–2006]

(1) 2.40×10^{-3}
(2) 9.8×10^{-2}
(3) 4.9×10^{-2}
(4) 416

Q48. **The equilibrium constant (K_C) for the reaction:**

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

$$K_C = 4 \times 10^{-4}$$

The value of K_C for the reaction:

$$NO(g) \rightleftharpoons \tfrac{1}{2}N_2(g) + \tfrac{1}{2}O_2(g)$$

[AIEEE–2012]

(1) 50.0
(2) 0.02
(3) 2.5×10^{2}
(4) 4×10^{-4}

Q49. **K_1, K_2 and K_3 are the equilibrium constants of the reactions (I), (II) and (III): [JEE-MAINS (Online)–12]**

$$\text{(I)} \quad N_2 + 2O_2 \rightleftharpoons 2NO_2 \qquad K_1$$

$$\text{(II)} \quad 2NO_2 \rightleftharpoons N_2 + 2O_2 \qquad K_2$$

$$\text{(III)} \quad NO_2 \rightleftharpoons \tfrac{1}{2}N_2 + O_2 \qquad K_3$$

The correct relation is:

(1) $K_1 = \sqrt{K_2} = K_3$
(2) $K_1 = \frac{1}{K_2} = \frac{1}{K_3}$
(3) $K_1 = \frac{1}{K_2} = K_3$
(4) $K_1 = \frac{1}{K_2} = \frac{1}{K_3^2}$

Q50. At 700 K, for the reaction $2SO_2(g) + O_2(g) \rightleftharpoons 2SO_3(g)$, the K_p is 3.2×10^4. At the same temperature the K_p for the reaction $SO_3(g) \rightleftharpoons SO_2(g) + 0.5\ O_2(g)$ is : [NSEC–2014]

(1) 3.125×10^{-5}
(2) 5.59×10^{-3}
(3) 1.79×10^4
(4) 1.79×10^{-2}

Q51. The equilibrium constant 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 : [AIEEE-2003]

(1) 2.5×10^2 **(2) 50** **(3)** 4×10^{-4} **(4) 0.02**

Group 2: Combined / Added / Manipulated Equilibrium Equations

Q52. If the equilibrium constants of the reactions,
$2SO_3 \rightleftharpoons 2SO_2 + O_2$ and
$SO_2 + \frac{1}{2}O_2 \rightleftharpoons SO_3$
are K_1 and K_2 respectively, the correct relation between the two equilibrium constants is : [NSEC–2009]

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

Q53. The formation of ammonia from nitrogen and hydrogen gases can be written by the following two equations
(a) $\frac{1}{2}N_2(g) + \frac{3}{2}H_2(g) \rightleftharpoons NH_3(g)$
(b) $\frac{1}{3}N_2(g) + H_2(g) \rightleftharpoons \frac{2}{3}NH_3(g)$
The two equations have equilibrium constants K_1 and K_2, respectively. The relationship between the equilibrium constants is : [NSEC–2010]

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

Q54. The equilibrium constant for the reaction $SO_3(g) \rightleftharpoons SO_2(g) + \frac{1}{2}O_2(g)$; $K = 5 \times 10^{-2}$ The value of K_c for the reaction $2SO_2(g) + O_2(g) \rightleftharpoons 2SO_3(g)$ will be :-

(1) 400
(2) 2.40×10^{-3}
(3) 9.8×10^{-2}
(4) 4.9×10^{-2}

Q55. For the following three reactions 1, 2 and 3, equilibrium constants are given : (1) $CO(g) + H_2O(g) \rightleftharpoons CO_2(g) + H_2(g)$; K_1 (2) $CH_4(g) + H_2O(g) \rightleftharpoons CO(g) + 3H_2(g)$;

K_2 (3) $CH_4(g) + 2H_2O(g) \rightleftharpoons CO_2(g) + 4H_2(g)$; K_3 Which of the following relations is correct ?

(1) $K_1\sqrt{K_2} = K_3$

(2) $K_2K_3 = K_1$

(3) $K_3 = K_1K_2$

(4) $K_3^2K_2K_1^2$

Q56. Equilibrium constant for following reactions respectively K_1, K_2 and K_3 :

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

$N_2 + O_2 \rightleftharpoons 2NO$; K_2

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

$2NH_3 + \frac{5}{2}O_2 \rightleftharpoons 2NO + 3H_2O$; K_4

Which of the following relation is incorrect.

(1) $K_1 = \frac{K_2 \times (K_3)^3}{K_4}$

(2) $K_4 = \frac{K_1 \times K_2}{(K_3)^3}$

(3) $K_2 = \frac{K_4 \times K_1}{(K_3)^3}$

(4) $K_4 = \frac{K_2 \times (K_3)^3}{K_1}$

Q57. For the following three reactions 1, 2 and 3, equilibrium constants are given :

(1) $CO(g) + H_2O(g) \rightleftharpoons CO_2(g) + H_2(g)$; K_1

(2) $CH_4(g) + H_2O(g) \rightleftharpoons CO(g) + 3H_2(g)$; K_2

(3) $CH_4(g) + 2H_2O(g) \rightleftharpoons CO_2(g) + 4H_2(g)$; K_3

Which of the following relations is correct ?

(A) $K_1\sqrt{K_2} = K_3$

(B) $K_2K_3 = K_1$

(C) $K_3 = K_1K_2$

(D) $K_3K_2^3K_1^2$

Q58. If $Ag^+ + NH_3 \rightleftharpoons [Ag(NH_3)]^+$; $K_1 = 1.6 \times 10^3$ and $[Ag(NH_3)]^+ + NH_3 \rightleftharpoons [Ag(NH_3)_2]^+$; $K_2 = 6.8 \times 10^3$. The formation constant of $[Ag(NH_3)_2]^+$ is : [JEE 2006]

(A) 6.08×10^{-6}

(B) 6.8×10^{-6}

(C) 1.6×10^3

(D) 1.088×10^7

Q59. Consider the following equilibrium :

$H_2O(g) + CO(g) \rightleftharpoons H_2(g) + CO_2(g)$; $K_1 = 2$

$FeO(s) + CO(g) \rightleftharpoons Fe(s) + CO_2(g)$; $K_2 = 4$

Then K for reaction $Fe(s) + H_2O(g) \rightleftharpoons FeO(s) + H_2(g)$ is :

(A) 2

(B) 1

(C) $\frac{1}{2}$

(D) $\sqrt{2}$

Group 3: Relation Between ΔG° and K

Q60. Calculate ΔG° for conversion of oxygen to ozone $\frac{3}{2}O_2(g) \rightarrow O_3(g)$ at 298 K, if K_p for this conversion is 2.47×10^{-29}.

(1) 163 kJ mol^{-1}
(2) 2.4×10^2 kJ mol^{-1}
(3) 1.63 kJ mol^{-1}
(4) 2.38×10^6 kJ mol^{-1}

Q61. The value of ΔG° for the phosphorylation of glucose in glycolysis is 15 kJ/mole. Find the value of K_c at 300 K.

(1) e^6
(2) $10^{\frac{6}{2.303}}$
(3) e^{-6}
(4) $10^{\frac{1}{6}}$

Q62. Which of the following statements is correct for a reversible process in a state of equilibrium ?

(1) $\Delta G = 2.30\, RT \log K$
(2) $\Delta G^\circ = -2.30\, RT \log K$
(3) $\Delta G^\circ = 2.30\, RT \log K$
(4) $\Delta G = -2.30\, RT \log K$

Q63. Find out $\ln K_{eq}$ for the formation of NO_2 from NO and O_2 at 298 K.
$NO(g) + \frac{1}{2}O_2(g) \rightarrow NO_2(g)$
Given : $\Delta G_f^\circ(NO_2) = 52.0$ kJ/mole, $\Delta G_f^\circ(NO) = 87.0$ kJ/mole, $\Delta G_f^\circ(O_2) = 0$ kJ/mole

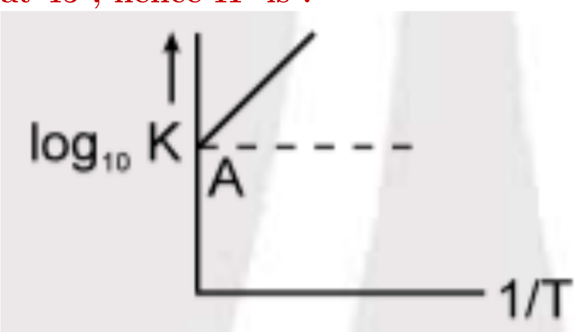
(1) $\dfrac{35 \times 10^3}{8.314 \times 298}$
(2) $-\dfrac{35 \times 10^3}{8.314 \times 298}$
(3) $\dfrac{35 \times 10^3}{2.303 \times 8.314 \times 298}$
(4) $\dfrac{35 \times 10^3}{2 \times 298}$

Group 4: Temperature / H Relation

Q64. At room temperature, the equilibrium constant for the reaction $P + Q \rightleftharpoons R + S$ was calculated to be 4.32. At 425°C the equilibrium constant became 1.24×10^{-2}. This indicates that the reaction

(1) is exothermic
(2) is endothermic
(3) is difficult to predict
(4) no relation between ΔH and K

Q65. Variation of $\log_{10}K$ with $\frac{1}{T}$ is shown by the following graph in which straight line is at 45°, hence H° is :

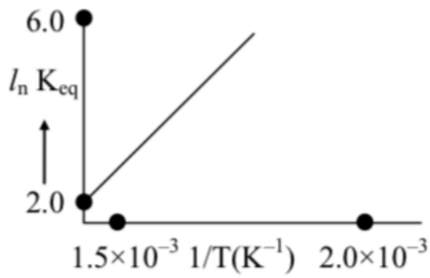


(1) +4.606 cal
(2) –4.606 cal
(3) 2 cal
(4) –2 cal

Q66. For the following reaction, the value of K changes with
$N_2(g) + O_2(g) \rightleftharpoons 2NO(g) \quad \Delta H = +180 \text{ kJ mol}^{-1}$ [NSEC–2010]

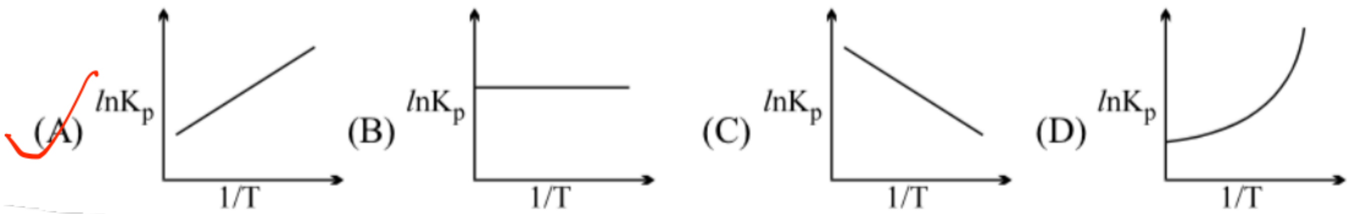
(1) change in pressure
(2) change in concentration of oxygen
(3) introduction of NO(g)
(4) change in temperature

Q67. A schematic plot of $\ln K_{eq}$ versus inverse of temperature for a reaction is shown below. The reaction must be [AIEEE-2005]



(1) endothermic (2) exothermic (3) highly spontaneous at ordinary temperature
(4) one with negligible enthalpy change

Q68. An exothermic reaction is represented by the graph :



Group 5: Factors That Do NOT Change Equilibrium Constant

Q69. In equilibrium $CH_3COOH + H_2O \rightleftharpoons CH_3COO^- + H_3O^+$. The equilibrium constant may change when

(1) CH_3COOH is removed
(2) CH_3COOH is added
(3) Catalyst is added
(4) Mixture is heated

Q70. The free energy change for a reversible reaction at equilibrium is : [NSEC–2000]

(1) very large positive
(2) positive
(3) zero
(4) negative

Q71. Which of the following changes the value of the equilibrium constant? [NSEC–2007]

(1) change in concentration
(2) change in pressure
(3) change in volume
(4) none of these

Q72. For the following reaction, the value of K changes with
$N_2(g) + O_2(g) \rightleftharpoons 2NO(g)$ (Already asked — K changes only with temperature.)

(1) change in pressure
(2) change in concentration
(3) introduction of NO(g)
(4) change in temperature

Q73. For a reaction $N_2 + 3H_2 \rightleftharpoons 2NH_3$, the value of K_c does not depends upon :-

(1) Initial concentration of the reactants
(2) Pressure
(3) Temperature
(4) Catalyst

Q74. 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

Q75. If some He gas is introduced into the equilibrium $PCl_5(g) \rightleftharpoons PCl_3(g) + Cl_2(g)$ at constant pressure and temperature then equilibrium constant of reaction :-

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

Q76. 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 a 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

Q77. 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

Q78. 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

Q79. The equilibrium constant for the reaction $N_2(g) + O_2(g) \rightleftharpoons 2NO(g)$ is 5×10^{-4} at 1500 K. In the presence of a catalyst the equilibrium is attained 8 times faster. Therefore the equilibrium constant in presence of catalyst at 1500 K is :

(A) $\frac{5}{8} \times 10^{-4}$ **(B)** 4×10^{-3} **(C)** 5×10^{-4} **(D) Unpredictable**