CHEMISTRY

BOOKS - S DINESH & CO CHEMISTRY (HINGLISH)

PHYSICAL AND CHEMICAL EQUILIBRIA

Multiple Choice Questions

1. What is wrong equilibrium state ?

A. $\Delta G_{\text{equi.}} = 0$

B. The reaction ceases at equilibrium.

C. Equilibrium constant is independent of initial concentrations of reactants.

D. Catalyst has no effect on equilibrium state.

Answer: B

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2. In the dissociation of PCl_5 as

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

If the degree of dissociation is α at equilibrium pressure P, then the equilibrium constant for the reaction is

A. $K_p = \frac{\alpha^2}{1 + \alpha^2 P}$

B. $K_p = \frac{\alpha P^2}{1 - \alpha^2}$

C. $K_p = \frac{\alpha^2 P^2}{1 - \alpha^2}$

D. $K_p = \frac{\alpha^2 P}{1 - \alpha^2}$

Answer: D

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3. The equilibrium constant for the reaction $NH_4NO_2(s) \Leftrightarrow N_2(g) + 2H_2O(g)$, is given by

A. $\frac{[NH_4NO_2]}{[N_2][H_2O]^2}$

B. $[N_2][H_2O]^2$

C. $\frac{[N_2][H_2O]}{[NH_4NO_2]}$

D. $\frac{[N_2][2H_2O]^2}{[NH_4NO_2]^2}$

Answer: B

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4. In which of the following reactions, the equilibrium constant will have no units of concentration ?

A. $NO(g) \Leftrightarrow \frac{1}{2}N_2(g) + \frac{1}{2}O_2(g)$

B. $H_2(g) + I_2(g) \Leftrightarrow 2HI(g)$

C. $CO(g) + H_2O(g) \Leftrightarrow CO_2(g) + H_2(g)$

D. In all of the above reactions.

Answer: D

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5. The equilibrium constant for a reaction

$A + 2B \Leftrightarrow 2C$ is 40. The equilibrium constant for reaction $C \Leftrightarrow B + 1/2A$ is

A. $1/40$

B. $(1/40)^{1/2}$

C. $(1/40)^2$

D. 40

Answer: B

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6. The equilibrium constant, K for the reaction :

$2HI(g) \Leftrightarrow H_2(g) + I_2(g)$ at room temperature is 2.85 and that of at 698 K is 1.4×10^{-2} . This implies that the forward reaction is

A. Exothermic

B. Endothermic

C. Exergonic

D. Unpredictable

Answer: A

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7. For the reaction

$2A(g) + B(g) \Leftrightarrow 3C(g) + 4D(g)$,brgt Two moles each of A and B were taken into a 1L flask. The following must always be true when the system attained equilibrium

A. $[A] = [B]$

B. $[A] < [B]$

C. $[B] = [C]$

D. $[A] + [B] < [C] + [D]$

Answer: B

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8. For reaction $H_2(g) + I_2(g) \Leftrightarrow 2HI(g)$

The value of K_p changes with

A. Catalyst

B. Temperature

C. Amounts of H_2 and I_2

D. All of the above factors

Answer: B

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9. The equilibrium constant for the reaction $CaSO_4.5H_2O(s) \Leftrightarrow CaSO_4.3H_2O(s) + 2H_2O(g)$ is equal to

A. $\frac{[CaSO_4.3H_2O][H_2O]^2}{[CaSO_4.5H_2O]}$

B. $\frac{[CaSO_4.3H_2O]}{[CaSO_4.5H_2O]}$

C. $[H_2O]^2$

D. $[H_2O]$

Answer: C

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10. Consider the equilibrium reactions,

$H_3PO_4 \overset{K_1}{\Longleftrightarrow} H^+ + H_2PO_4^-$

$H_2PO_4^- \overset{K_2}{\Longleftrightarrow} H^+ + HPO_4^{-2}$

$HPO_4^{-2} \overset{K_3}{\Longleftrightarrow} H^+ + PO_4^{-3}$

The equilibrium constant K for the following dissociation

$H_3PO_4 \Leftrightarrow 3H^+ + PO_4^-$ is

A. K_1 / K_2K_3

B. $K_1K_2K_3$

C. K_2 / K_1K_3

D. $K_1 + K_2 + K_3$

Answer: B

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11. The equilibrium constant for a reaction $A + B \Leftrightarrow C + D$ is 1×10^{-2} at $298K$ and is 2 at $273K$. The chemical process resulting in the formation of C and D is

A. exothermic

B. Endothermic

C. unpredictable

D. There is no relationship between K and ΔH.

Answer: B

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12. The equilibrium constant in terms of pressure (K_p) and concentration (K_c) are related as (Δn is change in number of gas moles)

A. $K_p = K_c \times (RT)^{1-\Delta n}$

B. $K_p = \left(\frac{K_c}{RT}\right)^{\Delta n}$

C. $K_p = K_c(RT)^{\Delta n}$

D. $K_p = \frac{(RT)^{\Delta n}}{K_c}$

Answer: C

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13. In which of the following reaction K_p and K_c are equal

A. $N_2(g) + 3H_2(g) \Leftrightarrow 2NH_3(g)$

B. $2SO_2(g) + O_2(g) \Leftrightarrow 2SO_3(g)$

C. $N_2(g) + O_2(g) \Leftrightarrow 2NO(g)$

D. $2NO(g) + O_2(g) \Leftrightarrow 2NO_2(g)$

Answer: C

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14. For the reaction

$2NH_3(g) \Leftrightarrow N_2(g) + 3H_2(g)$ the units of K_p will be

A. atm

B. $(atm)^3$

C. $(atm)^{-2}$

D. $(atm)^2$

Answer: D

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15. For a hypothetical reaction

$4A + 5B \Leftrightarrow 4P + 6Q$. The equilibrium constant K_c has units.

A. $molL^{-1}$

B. $mol^{-1}L$

C. $\left(molL^{-1}\right)^{-2}$

D. unit less

Answer: A

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16. For the equilibrium

$2NO(g) + Cl_2(g) \Leftrightarrow 2NOCl(g)$

K_p is related to K_c by the reaction

A. $K_p = K_c(RT)$

B. $K_p = K_c(RT)^2$

C. $K_p = K_c / RT$

D. $K_p = K_c / (RT)^2$

Answer: C

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17. For a gaseous reaction

$xA + yB \Leftrightarrow lC + mD$

A. $K_p = Kc$

B. $K_p = (K_c)^{l+m}$

C. $K_p = K_c(RT)^{(l+m)-(x+y)}$

D. $K_p = 1/K_c.$

Answer: C

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18. "Whenever a stress is applied to a system at equilibrium, the equilibrium shifts in such a way so as to undo the effect of the stress imposed." This is the statement of

A. Rate law

B. Law of mass action

C. Le-Chatelier principle

D. Dilution law

Answer: C

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19. Which among the following reactions is favoured in forward direction by increase of temperature?

A. $N_2 + 3H_2 \Leftrightarrow 2NH_3 + 22.9kcal$

B. $N_2(g) + O_2(g) \Leftrightarrow 2NO(g) - 42.8kcal$

C. $2SO_2(g) + O_2(g) \Leftrightarrow SO_3(g)45.3kcal$

D. $H_2(g) + Cl_2(g) - 44.0kcal \Leftrightarrow 2HCl(g)$

Answer: B

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20. For a hypothetical reaction of kind

$$AB_2(g) + \frac{1}{2}B_2(g) \Leftrightarrow AB_3(g), \Delta H = -xkJ$$

More AB_3 could be produceed at equilibrium by

A. using a catalyst

B. removing some of B_2

C. increasing the temperature

D. increasing the pressure.

Answer: D

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21. Le-Chatelier principle is not, applicable to

A. $H_2(g) + I_2(g) \Leftrightarrow 2HI(g)$

B. $N_2(g) + 3H_2(g) \Leftrightarrow 2NH_3(g)$

C. $PCl_5(g) \Leftrightarrow PCl_3(g) + Cl_2(g)$

D. $Fe(s) + S(s) \Leftrightarrow FeS(s)$

Answer: D

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22. The solubility of CO_2 in water increases with

A. increase in temperature

B. reduction of gas pressure

C. increase in gas pressure

D. increase in volume.

Answer: C

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23. Inert gas has been added to the following equilibrium system at constant volume

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

To which direction will the equilibrium shift?

A. Forward

B. Backward

C. No effect

D. Unpredictable

Answer: C

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Multiple Choice Questions Based On Numerical Problems

1. The decomposition of N_2O_4 to NO_2 is carried out at $280^\circ C$ in chloroform. When equilibrium is reached, 0.2 mol of N_2O_4 and 2×10^{-3} mol of NO_2 are present in a $2L$ solution. The equilibrium constant for the reaction

$N_2O_4 \Leftrightarrow 2NO_2$ is

A. 1×10^{-2}

B. 2×10^{-3}

C. 1×10^{-5}

D. 2×10^{-5}

Answer: c

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2. The value of the equilibrium constant for the reaction, $2NO + O_2 \Leftrightarrow 2NO_2$ is 0.25, then the value of equilibrium constant for $2NO_2 \Leftrightarrow 2NO + O_2$ is

A. 1.25

B. 0.25

C. 4.0

D. 0.4

Answer: C

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3. For the reaction $N_2O_4(g) \Leftrightarrow 2NO_2(g)$ the degree of dissociation at equilibrium is 0.2 at 1 atmospheric pressure. The equilibrium constant K_p will be

A. $1/2$

B. $1/4$

C. $1/6$

D. $1/8$

Answer: C

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4. 4 mol of carbon dioxide was heated in $1dm^3$ vessel under conditions which produced at equilibrium $25\,\%$ dissociation into carbon monoxide and oxygen. The number of moles of carbon monoxide produced

A. 0.5

B. 1

C. 2

D. 4

Answer: B

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5. 1 mol of N_2 is mixed with 3 mol of H_2 in a litre container. If 50% of N_2 is converted into ammonia by the reaction $N_2(g) + 3H_2(g) \Leftrightarrow 2NH_3(g)$, then the total number of moles of gas at the equilibrium are

A. 1.5

B. 4.5

C. 3.0

D. 6.0

Answer: C

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6. For reaction : $H_2(g) + I_2(g) \Leftrightarrow 2HI(g)$ at certain temperature, the value of equilibrium constant is 50. If the volume of the vessel is reduced to half of its original volume, the value of new equilibrium constant will be

A. 25

B. 50

C. 100

D. Unpredictable

Answer: B

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7. When ethanol and acetic acid are mixed together in equimolar proportions, equilibrium is attained when $2/3rd$ of acid and alcohol are consumed. The equilibrium constant for the reaction is

A. 0.4

B. 40

C. 4×10^2

D. $4 \times 10^{\circ}$

Answer: D

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8. For the reaction $I_2(g) \Leftrightarrow 2I(g), K_c 37.6 \times 10^{-6}$ at 1000K . If 1.0 mole of I_2 is introduced into a 1.0 litre flask at 1000K, at equilibrium

A. $[I_2] > > [I]$

B. $[I_2] = [I]$

C. $[I_2] < [I]$

D. Unpredictable

Answer: A

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9. The system $PCl_5(g) \Leftrightarrow PCl_3(g) + Cl_2(g)$ attains equilibrium. If the equilibrium concentration of $PCl_3(g)$ is doubled, the concentration of $Cl_2(g)$ would become

A. $1/4$ of its original value

B. $1/2$ of its original value

C. twice its original value

D. Unpredictable

Answer: D

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10. XY_2 dissociates $XY_2(g) \Leftrightarrow XY(g) + Y(g)$. When the initial pressure of XY_2 is 600 mm Hg, the total equilibrium pressure is 800 mm Hg.

Calculate K for the reaction assuming that the volume of the system remains unchanged.

A. 50

B. 100

C. 166.6

D. 400

Answer: B

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11. Consider the reaction

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

Which occurs in one step. The specific rate constant are 0.25 and 5000 for the forward and reverse reaction, respectively. The equilibrium constant is

A. 2.0×10^{-4}

B. 4.0×10^{2}

C. 5.0×10^{-5}

D. 2.5×10^{-6}

Answer: C

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12. For the equilibrium system $2HX(g) \Leftrightarrow H_2(g) + X_2(g)$ the equilibrium constant is 1.0×10^{-5}. What is the equilibrium concentration of HX if the equilibrium concentrations of H_2 and X_2 are $1.2 \times 10^{-3}M$ and $1.2 \times 10^{-4}M$ respectively ?

A. $12 \times 10^{-4}M$

B. $12 \times 10^{-3}M$

C. $12 \times 10^{-2}M$

D. $12 \times 10^{-6}M$

Answer: C

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13. For the reactions

$A \Leftrightarrow B, K_c = 1$

$B \Leftrightarrow C, K_c = 2$

$C \Leftrightarrow D, K_c = 3$

K_c for the reaction $A \Leftrightarrow D$ is

A. 5

B. 6

C. 15

D. 1

Answer: B

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14. The rate constans of forward and backward reactions are 8.5×10^{-5} and 2.38×10^{-4} respectively. The equilibrium constant if

A. 0.35

B. 0.42

C. 12.92

D. 0.292

Answer: A

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15. The vapour density of N_2O_4 at a certain temperature is 30. Calculate the percentage dissociation of N_2O_4 this temperature.

A. $53.3\ \%$

B. $106.6\ \%$

C. $26.7\ \%$

D. None

Answer: A

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16. The 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 $230^\circ C$ is .....

A. $6.8\ \%$

B. $68\ \%$

C. $46\ \%$

D. $64\ \%$

Answer: B

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17. The rate of the elementary reaction

$H_2(g) + I_2(g) \Leftrightarrow 2HI(g)$ at $25^\circ C$ is given by :

Rate $= 1.7 \times 10^{-18}[H_2][I_2]$

The rate of decomposition of gaseous HI to $H_2(g)$ and $I_2(g)$ at $25^\circ C$ is

Rate $= 2.4 \times 10^{-21}[HI]^2$

Equilibrium constant for the formation of one mole of gaseous HI from the $H_2(g)$ and $I_2(g)$ is :

A. 708

B. 354

C. 0.0014

D. 26.6

Answer: D

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18. In the following equilibria

$I: A + 2B \Leftrightarrow C, K_{eq} = K_1$

$II: C + D \Leftrightarrow 3A, K_{eq} = K_2$

$III, 6B + D \Leftrightarrow 2C, K_{eq} = K_3$

Hence,

A. $3K_1 + K_2 = K_3$

B. $K_1^3 . K_2^2 = K_3$

C. $3K_1 + K_2^2 = K_3$

D. $K_1^3 . K_2 = K_3$

Answer: D

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19. Consider following reactions is equilibrium with equilibrium concentration 0.01M of every species :

$I: PCl_5 \Leftrightarrow PCl_3 + Cl_2$

$II: H_2 + I_2 \Leftrightarrow 2HI$

$III: N_2 + 3H_2 \Leftrightarrow 2NH_3$

Extent of the reactions taking place is :

A. $I = II = III$

B. $Il < II < III$

C. $III < II < I$

D. $II < I < III$

Answer: B

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20. The equlibrium constant K_c for the reaction of H_2 with I_2 is 57.0 at 700K

$H_2(g) + I_2(g) \underset{k_b}{\overset{k_f}{\Longleftrightarrow}} 2HI$, $K_c = 57$ at 700K Select correct statement :

A. rate constant k_f for the formation of HI is smaller than that of rate constant k_b f for the dissociation of HI

B. $k_f > k_b$

C. addition of catalyst increases value of K_c

D. addition of catalyst decreases value of K_c.

Answer: B

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21. Naphthalene, a white solid used to make mothballs, has a vapour pressure of 0.10 mm Hg at $27^\circ C$. Hence K_p and K_c for the equilibruim are : $C_{10}Hg(s) \Leftrightarrow C_{10}Hg(g)$

A. 0.10,1.10

B. $0.10, 4.1 \times 10^{-3}$

C. $1.32 \times 10^{-4} \times 10^{-3}$

D. $5.34 \times 10^{-6}, 1.32 \times 10^{-4}$

Answer: C

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22. For the following equilibrium

$N_2O_4(g) \Leftrightarrow 2NO_2(g)$

K_p is found to be equal to K_c. This is attained when :

A. $T = 1K$

B. $T = 12.18K$

C. $T = 27.3K$

D. $T = 273K$

Answer: B

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23. For the following gaseous equilibria X,Y and Z at 300K

$X : 2SO_2(g) + O_2(g) \Leftrightarrow 2SO_3(g)$

$Y : PCl_5(g) \Leftrightarrow PCl_3(g) + Cl_2(g)$

$Z : 2HI(g) \Leftrightarrow H_2(g) + I_2(g)$

ratio of K_p and K_c in the increasing order is :

A. $X = Y = Z$

B. $X < Y < Z$

C. $X < Z < Y$

D. $Z < Y < X$

Answer: C

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24. For the following equilibrium

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

K_p is formed to be equal to K_x. This is attained at

A. 1 atm

B. 0.5 atm

C. 2 atm

D. 4 atm

Answer: A

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25. For the reactions :

$I: CaCO_3(s) \Leftrightarrow CaO(s) + CO_2(g), P_{CO_2} = 2\text{atm}$

$II: CO_2(g) + C(s) \Leftrightarrow 2CO_g, K = 6\text{atm}$

Hence, equilibrium constnat, K_p (in the same units) for the reaction

$CaCO_3(s) + C(s) \Leftrightarrow CaO(s) + 2CO(g)$ is

A. 8

B. 4

C. 12

D. 3

Answer: C

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26. For the equilibrium :

$I: C_6H_5COOH + H_2O \Leftrightarrow C_6H_5COO^- + H_3O^+, K_1 = 6.30 \times 10^{-5}$

$II: C_6H_5COOH + OH^- \Leftrightarrow C_6H_5COO^- + H_2O, K_2 = 6.30 \times 10^9$

$III: H_2O + H_2O \Leftrightarrow H_3O^+ + OH^-, K_3 = ?$

K_3 using above equilibria is :

A. $(6.30)^2 \times 10^4$

B. 1.0×10^{-14}

C. 1×10^{14}

D. $(6.30)^{-2} \times 10^{-4}$

Answer: B

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27. If β_1, β_2 and β_3 are stepwise formation constants of MCl, MCl_2, MCl_3 and K is the overall formation constant of MCl_3, then (charges omitted) :

A. $K = \beta a_1 + \beta_2 + \beta_3$

B. $\frac{1}{K} = \frac{1}{\beta a_1} + \frac{1}{\beta_2} + \frac{1}{\beta_3}$

C. $\log K = \log \beta_1 + \log \beta_2 + \log \beta_3$

D. $p_K = \log \beta_1 + \log \beta_2 + \log \beta_3$

Answer: C

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28. $N_2 + 3H_2 \Leftrightarrow 2NH_3$. This is gaseous phase reaction taking place in 1L flask at $127^\circ C$. Starting with 1 mole N_2 and 3 moles H_2, equilibrium required 500mL of 1M HCl. Hence K_c is approximately

A. 0.06

B. 0.08

C. 0.03

D. 2.05

Answer: C

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29. For the reaction $A + B \Leftrightarrow C + D$ taking place in a 1 L vessel, equilibrium concentration of $[C] = [D] = 0.5M$ if we start with 1 mole each A and B. Percentage of A converted into C if we start with 2 moles of A and 1 mole of B, is

A. $25\ \%$

B. $40\ \%$

C. $66.66\ \%$

D. $33.33\ \%$

Answer: D

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30. Equilibrium constant, K changes with temperature. At 300 K, equilibrium constant is 25 and at 400 K it is 10. Hence, backward reaction will have energy of activation

A. equal to that of forward reaction

B. less than that of forward reaction

C. greater than that of forward reaction

D. given values are not sufficient to explain given statement.

Answer: C

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31. For the reaction

$NH_2COONH_4(g) \Leftrightarrow 2NH_3(g) + CO_2(g)$ the equilibrium constant $K_p = 2.92 \times 10^{-5} atm^3$. The total pressure of the gaseous products when 1 mole of reactant is heated, will be

A. 0.0194 atm

B. 0.0388 atm

C. 0.0582 atm

D. 0.0667 atm

Answer: C

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32. $I_2 + I^{\ominus} \Leftrightarrow I_3^{\ominus}$

This reaction is set-up in aqueous medium. We start with 1 mol of I_2 and 0.5 mol of $I^{\ominus}$ in $1L$ flask. After equilibrium reached, excess of $AgNO_3$ gave 0.25 mol of yellow precipitate. Equilibrium constant is

A. 1.33

B. 2.66

C. 2

D. 3

Answer: A

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33. Volume of the flask in which species are transferred is double of the earlier flask. In which of the following cases, equilibrium will be shifted in the forward direction ?

A. $N_2(g) + 3H_2(g) \Leftrightarrow 2NH_3(g)$

B. $N_2(g) + O_2(g) \Leftrightarrow 2NO(g)$

C. $PCl_5(g) \Leftrightarrow PCl(g) + Cl_2(g)$

D. $2NO(g) \Leftrightarrow N_2(g) + O_2(g)$

Answer: C

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34. One mole each of A and B and 3 moles each of C and D are placed in 11L flask, if equilibrium constant is 2.25 for $A + B \Leftrightarrow C + D$ equilibrium concentration of A and C will be in the ratio :

A. $2:3$

B. $3:2$

C. $1:2$

D. $2:1$

Answer: A

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35. $2SO_2 + O_2 \Leftrightarrow 2SO_3$. Starting with 2 moles SO_2 and 1 mole O_2 in 1L flask, mixture required 0.4 mole MnO_4^- in acidic medium. Hence, $K_9c)$ is

A. 2

B. 0.4

C. 1.6

D. 2.6

Answer: A

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36. For the reaction $PCl_5 \Leftrightarrow PCl_3 + Cl_2$ in gaseous phase, $K_c = 4$. In a 2L flask, there are 2 moles each of PCl_3 and Cl_2 and 0.5 mole of PCl_5 . Equilibrium concentration of PCl_5 is

A. 0.25 mol L^{-1}

B. 0.125 mol L^{-1}

C. 0.75 mol L^{-}

D. 1.00 mol L^{-1}

Answer: A

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37. For $N_2 + 3H_2 \Leftrightarrow 2NH_3$, 1 mole N_2 and 3 mol H_2 are at 4 atm. Equilibrium pressure is found to be 3 atm. Hence, K_p is

A. $\frac{1}{(0.5)(0.15)^3}$

B. $\frac{1}{(0.5)(0.15)^3}$

C. $\frac{3 \times 3}{(0.5)(0.15)^3}$

D. None of these

Answer: B

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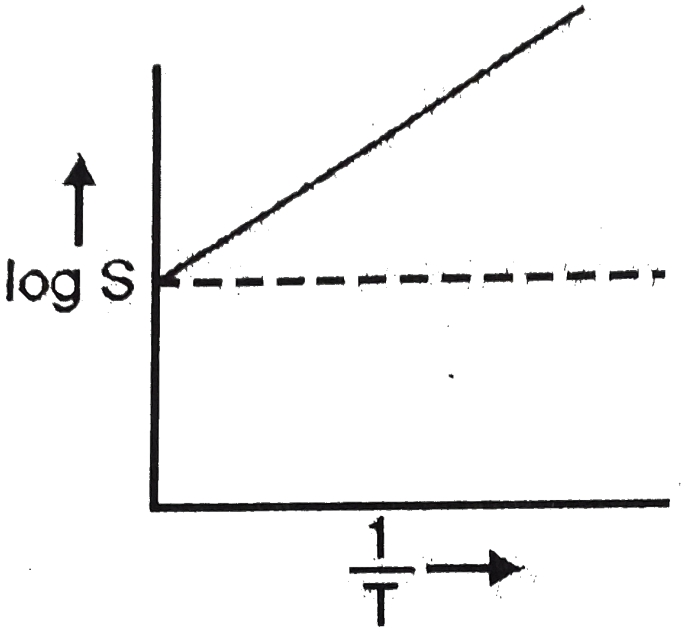
38. Solubility (S) of a solution in a solvent (say H_2) is dependent on temperature as given by $S = Ae^{-\Delta/RT}$ where ΔH is enthalpy of solution, Solute $+ H_2O \Leftrightarrow$ solution, $\Delta H = \pm x$

For a given solution, variation of log S with temperature is shown

graphically. Hence, solute is



A. $CuSO_4.5H_2O$

B. $NaCl$

C. Sucrose

D. CaO

Answer: D

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39. $Hg_2Cl_2(g)$ in saturated aqeous solution has equilibrium constant equal to :

A. $\left[Hg^+\right]^2\left[Cl^-\right]^2$

B. $\left[Hg_2^{2+}\right]\left[Cl^-\right]^2$

C. $\left[Hg^+\right]^2\left[Cl_2^-\right]$

D. $\left[2Hg^+\right]\left[2Cl^-\right]$

Answer: B

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40. The binding of oxygen by haemoglobin (Hb) giving oxy-haemoglobin (HbO_2), is partially regulated by the concentration of H_3O^+ and dissolved CO_2 in blood

$HbO_2 + H_2O^+ + CO_2 \Leftrightarrow H^+Hb - CO_2 + O_2 + H_2O$ If there is production of lactive acid and CO_2 in a muscle during exertion, then :

A. more O_2 is released

B. more HbO_2 is formed

C. Both (A) and (B)

D. None of these

Answer: A

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41. For the reversible reaction equilibrium is $N_2(g) + O_2(g) \underset{k_2}{\overset{k_1}{\rightleftharpoons}} 2NO(g)$ $C_0 = Ce^{-2.1 \times 10^3}$ for the forward and $C_0' = C'e^{-4.2 \times 10^{-4}t}$ for the backward reaction, hence, K_c for the above equilibrium is (both forward and backward reactions are first order reactions)

A. 5

B. 2

C. 0.5

D. 2

Answer: A

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42. For the equilibrium in a closed vessel

$$PCl_5(g) \Leftrightarrow PCl_3(g) + Cl_2(g),$$

K_p is found to be double of K_e . This is attained when :

A. $T = 2K$

B. $T = 12.18K$

C. $T = 24.36K$

D. $T = 27.3K$

Answer: C

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43. For the equilibrium $2H_2O(g) \Leftrightarrow 2H_2(g) + O_2(g)$, equilibrium constant is K_1

For the equilibrium $2CO_2 \Leftrightarrow 2CO(g) + O_2(g)$, equilibrium constant is K_2

The equilibrium constant for :

$CO_2(g) + H_2(g) \Leftrightarrow CO(s) + H_2O(g)$ is :

A. K_1K_2

B. $\frac{K_1}{K_2}$

C. $\sqrt{\frac{K_1}{K_2}}$

D. $\sqrt{\frac{K_2}{K_1}}$

Answer: D

Watch Video Solution

44. For the following equilibrium reaction $N_2O_4(g) \Leftrightarrow 2NO_2(g)$, NO_2 is 50% of the total volume at a given temperature. Hence, vapour density of

the equilibrium mixture is :

A. 34.5

B. 25

C. 23

D. 20

Answer: A

Watch Video Solution

45. There is 50% dimer formation of benzoic acid $(C_6H_5COOH)_2$ in benzene solution. $2C_6H_5COOH \Leftrightarrow (C_6H_5COOH)_2$. Hence abnormal molecular weight of benzoic acid (theorectical value $= 122gmol^{-1}$) is

A. 61 g mol^{-1}

B. 244 g mol^{-1}

C. 163 g mol^{-1}

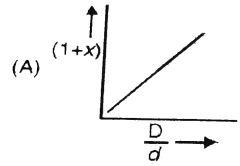
D. 81 g mol^{-1}

Answer: C

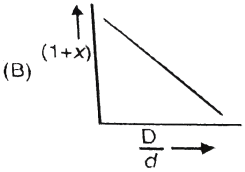
Watch Video Solution

46. In the dissociation of N_2O_4 into NO_2. $(1+x)$ values with the vapour densities ratio $\left(\frac{D}{d}\right)$ is given by :

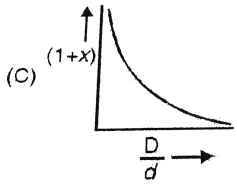
A.



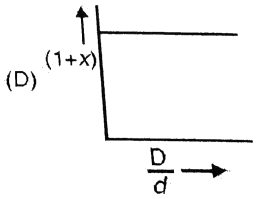
B.



C.



D.

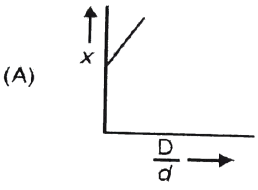


Answer: A

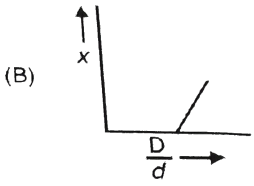
Watch Video Solution

47. For the dissociation of PCl_5 into PCl_3 and Cl_2 in gaseous phase reaction , if d is the observed vapour density and D the theoretical vapour density with $'\alpha'$ as degree of dissociation ,variaton of D/d with $'\alpha'$ is given by ?

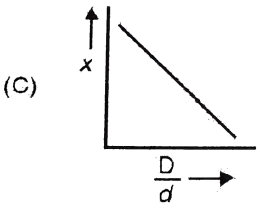
A.



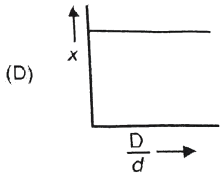
B.



C.



D.



Answer: B

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48. For a very small extent of dissociation of PCl_5 into PCl_3 and Cl_2 is a gaseous phase reaction then degree of dissociation , x :

A. $x \propto P$

B. $x \propto \frac{1}{P}$

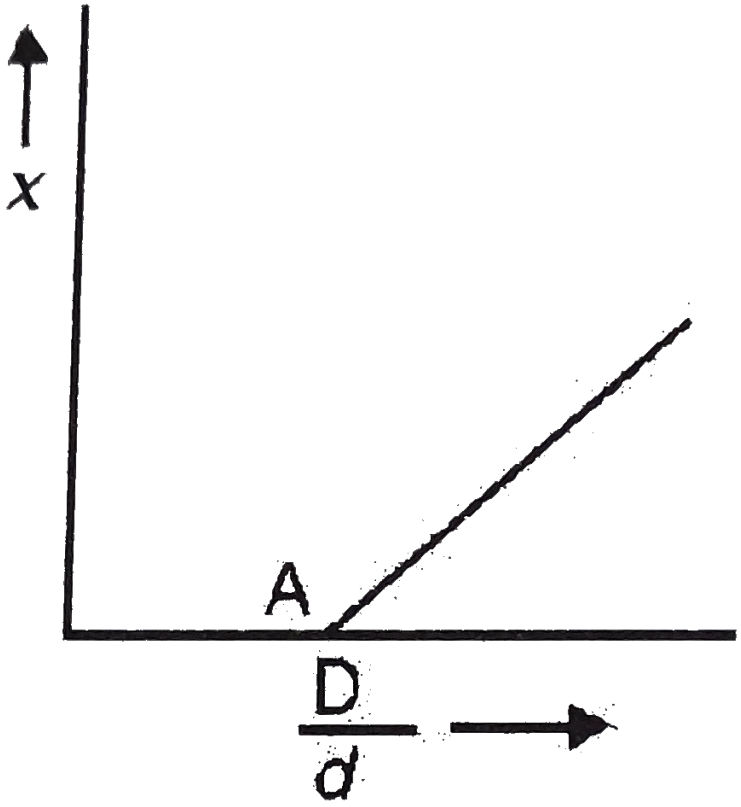
C. $x \propto \sqrt{P}$

D. $x \propto \sqrt{\frac{1}{P}}$

Answer: D

Watch Video Solution

49. Before equilibrium is set-up for the chemical reaction, $N_2O_4 \Leftrightarrow 2NO_2$, vapour density of the gaseous mixture was measured. If D is the theoretical value of vapour density, variation of x with D/d is by the graph.



A. 0

B. 0.5

C. 1

D. 1.5

Answer: C

Watch Video Solution

50. 1 mole each of $CO(g)$, $H_2O(g)$, $H_2(g)$ and $CO_2(g)$ are placed in one placed in one litre flask at $25^\circ C$. When following equilibrium is set -up

$CO(g) + H_2O(g) \Leftrightarrow CO_2(g) + H_2(g)$

$K_p = 0$. Hence CO_2 present at equilibrium is :

A. 0.5 mol

B. 1.5mol

C. 0.25 mol

D. 3.0 mol

Answer: B

Watch Video Solution

51. 60g CH_3COOH and 46g C_2H_5OH react in 5L flask to form 44g $CH_3COOC_2H_5$ at equilibrium. On taking 120 g CH_3COOH and 46g C_2H_5OH, $CH_3COOC_2H_5$ formed at equilibrium is :

A. 44g

B. 20.33g

C. 22g

D. 58.66g

Answer: D

View Text Solution

52. One mole of $N_{20O_4(g)}$ at 300K is kept in a closed container under one atmosphere. It is heated to 600K when 20% of $N_2O_4(g)$ is converted to $NO_2(g)$

$N_2O_4 \Leftrightarrow 2NO_2(g)$ Hence resultant pressure is :

A. 1.2 atm

B. 2.4 atm

C. 2.0 atm

D. 1.0 atm

Answer: A

Watch Video Solution

53. For the equilibrium $2SO_2 + O_2 \Leftrightarrow 2SO_3$ we start with 2 moles of SO_2 and 1 mole of O_2 at 3 atm. When equilibrium is attained, pressure changes to 2.5atm. Hence, K_p is :

A. $3atm^{-1}$

B. $2.5atm^{-1}$

C. $2atm^{-1}$

D. $0.5atm^{-1}$

Answer: C

Watch Video Solution

54. Sulphide ion $\left(S^{2-}\right)$ reacts with solid sulphur forming S_2^{2-} and S_3^{2-} with formation constants 12 and 132 respectively. Formation constant of S_3^{2-} from sulphur and S_2^{2-} is :

A. 12

B. 132

C. $132x12$

D. 11

Answer: D

Watch Video Solution

55. The equilibrium constant for the reaction $H_3BO_3 +$ glycerin $\Leftrightarrow (H_3BO_3$ glycerine) is 0.90. Glycerine present per litre of 0.1 M H_3BO_3 to convert $60\,\%$ of H_3BO_3 into (H_3BO_3 glycerine) is :

A. 0.167 M

B. $1.73M$

C. 0.0167 M

D. 10.67 M

Answer: B

Watch Video Solution

56. 1 mole of PCl_5 taken at 5 atm, dissociates into PCl_3 and Cl_2 to the extent of 50%

$PCl_5(g) \Leftrightarrow PCl_3(g) + Cl_2(g)$ Thus K_p is :

A. 2.5

B. 1.67

C. 0.5

D. 2

Answer: A

Watch Video Solution

57. For the following equilibrium $N_2O_4 \Leftrightarrow 2NO_2$ $K_c = 0.67$. If we start with 3 moles of NO_2 and 1 mole of N_2O in 1L flask, then NO_2 present at equilibrium is :

A. 1.5 mol

B. 2.0 mol

C. 0.5 mol

D. 1.0 mol

Answer: B

View Text Solution

58. $CaCO_3(s) \Leftrightarrow CaO(s) + CO_2(g)$

For the equilibrium , it is found that

$\log K_p = 8 - \frac{6400(K)}{T}$

$T = 527^\circ C$ if :

A. $K_p = 7.2 \times 10^{-5}$

B. $K_p = 1$

C. $K_p = 13.04 \times 10^3$

D. $K_p = 10.$

Answer: B

Watch Video Solution

59. For the following equilibrium :

$NH_2CO_2NH_4(s) \Leftrightarrow 2NH_3(g) + CO_2(s)$

K_p is found to be 0.5 at 4400 K . Hence, partial pressure of NH_3 and CO_2 are respectively :

A. 2.0,1.0 atm

B. 1.0,2.0 atm

C. 1.0,0.5 atm

D. 0.5,1.0 atm

Answer: C

Watch Video Solution

60. In each of the following, total pressure set - up at equilibrium is assumed to be equal and is P atm with equilibrium constants K_p given :

$I: CaCO_3(s) \Leftrightarrow CaO(s) + CO_2(g), K_1$

$II: NH_4HS(s) \Leftrightarrow NH_3(g) + H_2S(g), K_2$

$III: NH_2CO_2NH_4(s) \Leftrightarrow 2NH_3(g) + CO_2(g), K_3$

In the increasing order :

A. $K_1 = K_2 = K_3$

B. $K_1 < K_2 < K_3$

C. $K_3 < K_2 < K_1$

D. None

Answer: C

Watch Video Solution

61. For the equilibrium

$CuSO_4 \times 5H_2O(s) \Leftrightarrow CuSO_4 \times 3H_2O(s) + 2H_2O(g)$

$K_p = 2.25 \times 10^{-4} atm^2$ and vapour pressure of water is 22.8 torr at 298 K. $CuSO_4 \cdot 5H_2O(s)$ is efflorescent (i.e., losses water) when relative humidity is :

A. less than 33.3%

B. above 33.3%

C. less than 66.6%

D. above 66.6%

Answer: A

Watch Video Solution

62. At what relative humidity with Na_2SO_4 be deliquescent (absorb moisture) when exposed to the air at $0^\circ C$? Given $Na_2SO_4.10H_2O(s) \Leftrightarrow Na_2SO_4(s) + 10H_2O(g), K_p = 4.08 \times 10^{-25}$ and vapour pressure of water at $0^\circ C = 4.58$ Torr ?

A. below 60.5%

B. above 60.5%

C. above 39.5%

D. below 39.5%

Answer: B

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Revision Question From Competitive Exams

1. HI was heated in a sealed tube at $400^\circ C$ till the equilibrium was reached. HI was found to be $22\,\%$ decomposed. The equilibrium constant for dissociation is

A. 0.282

B. 0.0796

C. 0.0199

D. 1.99

Answer: C

Watch Video Solution

2. For reaction,

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

the value of K_c at $250^\circ C$ is 26. The value of K_p at this temperature will be .

A. 0.6055

B. 0.57

C. 0.83

D. 0.46

Answer: A

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3. The state of equilibrium refers to

A. State of rest

B. Dynamic state

C. Stationary state

D. State of inertness.

Answer: B

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4. 4 moles of A are mixed with 4 moles of B, when 2 moles of C are formed at equilibrium according to the reaction $A + B \Leftrightarrow C + D$.

The value of equilibrium constant is

A. 4

B. 1

C. $1/2$

D. $1/4$

Answer: B

Watch Video Solution

5. Consider the reaction

$CaCO_3(s) \Leftrightarrow CaO(s) + CO_2(g)$

in closed container at equilibrium. What would be the effect of addition of $CaCO_3$ on the equilibrium concentration of CO_2?

A. Increase

B. Decreases

C. Data is not sufficient to predict it

D. Remains unaffected

Answer: D

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6. At 1000 K, the value of K_p for the reaction: $A(g) + 2B(g) \Leftrightarrow 3C(g) + D(g)$ is 0.05 atmosphere. The value of K_c in terms of R would be:

A. 20000 R

B. 0.02 R

C. $5 \times 10^{-5} R$

D. (5xx10^(-5))/(R)`

Answer: D

Watch Video Solution

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

A. 0.02

B. 0.2

C. 50

D. 25

Answer: C

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8. In which of the following cases, the reaction goes farthest to completion?

A. $K = 10^3$

B. $K = 10^{-2}$

C. $K = 10$

D. $K = 10^0$

Answer: A

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9. In an exothermic reaction, a 10° rise in temperature will

A. decrease the value of equilibrium constant

B. double the value of K_c

C. not produce any change in K_c

D. produce some increase in K_c

Answer: A

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10. The equilibrium constant for a reacton

$N_2(g) + O_2(g) = 2NO(g)$ is 4×10^{-4} at $2000K$. In the presence of catalyst, the equilibrium constant is attained 10 times faster. The equilibrium constant in the presence of catalyst, at $2000K$ is

A. 40×10^{-4}

B. 4×10^{-4}

C. 4×10^{-2}

D. Difficult to compute without more data

Answer: B

Watch Video Solution

11. The factor which changes equilibrium constant of the reaction

$A_2(g) + B_2(g) \rightarrow 2AB(g)$ is

A. Total pressure

B. Amounts of A_2 and B_2

C. Temperature

D. Catalyst.

Answer: C

Watch Video Solution

12. In which of the following reaction, the yield of the products does not increase by increase in the pressure?

A. $N_2(g) + O_2(g) \Leftrightarrow 2NO(g)$

B. $2SO_2(g) + O_2(g) \Leftrightarrow 2SO_3(g)$

C. $N_2(g) + 3H_2(g) \Leftrightarrow 2NH_3(g)$

D. $PCl_3(g) + Cl_2(g) \Leftrightarrow PCl_5(g).$

Answer: A

Watch Video Solution

13. For which of the following reaction $K_p = K_c$?

A. $N_2(g) + 3H_2(g) \Leftrightarrow 2NH_3(g)$

B. $2NOCl(g) \Leftrightarrow 2NO(g) + Cl_2(g)$

C. $H_2(g) + I_2(g) \Leftrightarrow 2HI(g)$

D. $H_2(g) + Cl_2(g) \Leftrightarrow HCl(g).$

Answer: D

Watch Video Solution

14. In which of the following system, doubling the volume of the container causes a shift to the right

A. $2CO(g) + O_2(g) \Leftrightarrow 2CO_2(g)$

B. $N_2(g) + 3H_2(g) \Leftrightarrow 2NH_3(g)$

C. $PCl_5(g) \Leftrightarrow PCl_3(g) + Cl_2(g)$

D. $H_2(g) + Cl_2(g) \Leftrightarrow 2HCl(g)$

Answer: C

Watch Video Solution

15. At certain temperature $50\,\%$ of HI is dissociated into H_2 and I_2 the equilibrium constant is

A. 1

B. 3

C. 0.5

D. 0.25

Answer: D

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16. 1.1 mole of A mixed with 2.2 mole of B and the mixture is kept in a 1 litre at the equilibrium 0.2 mole of C is formed, then the value of K_c will be:

A. 0.002

B. 0.004

C. 0.001

D. 0.003

Answer: C

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17. In which of the following reaction $K_p > K_c$

A. $N_2(g) + 3H_2(g) \Leftrightarrow 2NH_3(g)$

B. $H_2(g) + I_2(g) \Leftrightarrow 2HI(g)$

C. $PCl_3(g) + Cl_2 \Leftrightarrow PCl_5(g)$

D. $2SO_3(g) \Leftrightarrow 2SO_2(g) + O_2(g).$

Answer: D

Watch Video Solution

18. If the equilibrium constant of the reaction $2HI \Leftrightarrow H_2 + I_2$ is 0.25, then the equilibrium constant of the reaction $H_2 + I_2 \Leftrightarrow 2HI$ would be

A. 1

B. 2

C. 3

D. 4

Answer: D

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19. The law of mass action was proposed by

A. Bodenstein

B. Berthelot

C. Graham

D. Bulberg and Waage.

Answer: D

Watch Video Solution

20. The reaction $2SO_2 + 2O_2 \Leftrightarrow 2SO_3$ will be favoured by

A. high temperature and low pressure

B. low temperature and high pressure

C. low temperature and low pressure

D. high temperature and high pressure

Answer: B

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21. The standard state Gibbs's energy change for the isomerisation reaction $cis - 2 - pentence \Leftrightarrow trans - 2 - pentence$ is

$-3.67kJmol^{-1}$ at $400K$. If more $trans-2-pentence$ is added to the reaction vessel, then:

A. More cis $-2-$ pentene is formed

B. Equilibrium shifts in the forward direction

C. Equilibrium remains unaltered

D. More trans $-2-$ pentene is produced

Answer: A

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22. The equilibrium constant (K_p) for the reaction, $PCl_{5(g)} \Leftrightarrow PCl_{3(g)} + Cl_{2(g)}$ is 16. If the volume of the container is reduced to half of its original volume, the value of K_p for the reaction at the same temperature will be:

A. 32

B. 64

C. 16

D. 4

Answer: C

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23. In a reaction $A + 2B \Leftrightarrow 2C$, 2.0 moles of $'A'$ 3 moles of 'B' and 2.0 moles of 'C' are placed in a 2.0 L flask and the equilibrium concentration of 'C' is 0.5 mol $/$ L . The equilibrium constant (K) for the reaction is

A. 0.073

B. 0.147

C. 0.05

D. 0.026

Answer: C

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24. In a reversible reaction, two substances are in equilibrium. If the concentration of each one is reduced to half, the equilibrium constant will be

A. reduced to half of its original value

B. doubled

C. same

D. reduced to one fourth its original value.

Answer: C

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25. The concentration of reactants is increased by x, then equilibrium constant K becomes

A. ln K/x

B. K / x

C. $K + x$

D. K.

Answer: D

Watch Video Solution

26. In which case K_p is less than K_c ?

A. $PCl_5 \Leftrightarrow PCl_3 + Cl_2$

B. $H_2 + Cl_2 \Leftrightarrow 2HCl$

C. $2SO_2 + O_2 \Leftrightarrow 2SO_3$

D. All of above

Answer: C

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27. The reaction

$3Fe(s) + 4H_2O \Leftrightarrow Fe_3O_4(s) + 4H_2(g)$ is reversible if it is carried out

A. at constant pressure

B. at constant temperature

C. in an open vessel

D. in a closed vessel.

Answer: D

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28. In a reaction $A + B \Leftrightarrow C + D$, the initial concentrations of A and B were 0.9 mol dm^{-3} each. At equilibrim the concentration of D was found to be 0.6 mol dm^{-3}. What is the value of equilibruim constant for the reaction ?

A. 8

B. 4

C. 9

D. 3

Answer: B

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29. At a given temperature, the equilibrium constant for the reactions $NO(g) + 1/2O_2(g) \Leftrightarrow NO_2(g)$ and $2NO_2(g) \Leftrightarrow 2NO(g) + O_2(g)$ are K_1 and K_2 respectivel. If K_1 is 4×10^{-3} then K_2 will be

A. 8×10^{-3}

B. 16×10^{-3}

C. 6.25×10^{4}

D. 6.25×10^{6}

Answer: C

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30. The yield of NH_3 in the reaction $N_2 + 3H_2 \Leftrightarrow 2NH_3, \Delta H = -22.08$kcal is affected by

A. change in pressure and temperature

B. change in temperature and concentration of N_2

C. change in pressure and concentration of N_2

D. change in pressure, temperature and concentration of N_2

Answer: D

Watch Video Solution

31. For the reaction $PCl_5(g) \Leftrightarrow PCl_3(g) + Cl_2(g)$ the forward reaction at constant temeprature is favoured by

A. introduction of an inert gas at constant volume

B. introduction of $PCl_3(g)$ at constant volume.

C. introduction of $PCl_5(g)$ at constant volume.

D. introduction of Cl_2 at constant volume.

Answer: C

Watch Video Solution

32. If the equilibrium constant for the reaction $2AB \Leftrightarrow A_2 + B_2$ is 49, what is the value of equilibrium constant for

$AB \Leftrightarrow \frac{1}{2}A_2 + \frac{1}{2}B_2$

A. 49

B. 2401

C. 7

D. 0.02

Answer: C

Watch Video Solution

33. 4.5 moles each of hydrogen and iodine heated in a sealed 10 litrevesel. At equilibrium, 3 moles of HI was foun. The equilibrium constant for $H_2(g) + I_2(g) \Leftrightarrow 2HI(g)$ is

A. 1

B. 10

C. 5

D. 0.33

Answer: A

Watch Video Solution

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

A. $K = K'$

B. $K' = \sqrt{K}$

C. $K = \sqrt{K'}$

D. $K \times K' = 1$

Answer: B

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35. On the basis of Le- Chatelier's principle, predict which of the following conditions would be unfavourable for the formation of SO_3 ? Given that $2SO_2 + O_2 \Leftrightarrow 2SO_3, \Delta H = -42$ kcal

A. Low pressure

B. High pressure

C. High temperature

D. High concentration of SO_2

Answer: C

Watch Video Solution

36. If K_1 and K_2 are the equilibrium constants of the equilibria (a) and (b) respectivel, what is the relationship between the two constants ?

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

(b) $2SO_3(g) \Leftrightarrow 2SO_2(g) + O_2(g), K_2$

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

B. $K_2 = (K_1)^2$

C. $K_1 = \frac{1}{K_2}$

D. $K_1 = K_2$

Answer: A

Watch Video Solution

37. For the reaction, $ZnCO_3(s) \Leftrightarrow ZnO(s) + CO_2(g)$ expression for the partial pressure constant for the above reaction would be

A. $K_p = \frac{[ZnO][CO_2]}{[ZnCO_3]}$

B. $K_p = \frac{p_{(ZnO)} \times p_{CO_2}}{p_{ZnCO_3}}$

C. $K_p = p^2_{(ZnO)} \times p_{CO_2}$

D. $K_p = p_{CO_2}$

Answer: D

Watch Video Solution

38. In the reaction $N_2(g) + O_2(g) \Leftrightarrow 2NO(g), \Delta H = +180.7kJ$. On increasing the temperature the production of NO

A. increases

B. Decreases

C. remains same

D. cannot be predicted

Answer: A

Watch Video Solution

39. When 3 moles of A and 1 mole of B are mixed in 1 litre vessel, the following reaction takes place $A_{(g)} + B_{(g)} \Leftrightarrow 2C_{(g)}$. 1.5 moles of C are formed. The equilibrium constant for the reaction is

A. 0.12

B. 0.5

C. 0.25

D. 4

Answer: D

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40. Choose the equilibrium that is not influenced by pressure

A. $2SO_2(g) + O_2(g) \Leftrightarrow 2SO_3(g)$

B. $PCl_3(g) + Cl_3(g) \Leftrightarrow PCl_5(g)$

C. `N_(2)(g)

D. $N_2(g) + 3H_2(g) \Leftrightarrow 2NO(g)$

Answer: D

Watch Video Solution

41. $H_2 + I_2 \Leftrightarrow 2HI$ Which one of the following will not affect the rate of this reaction ?

A. Pressure change

B. Temperature change

C. Concentration change

D. Catalyst

Answer: A

Watch Video Solution

42. In which of the following equilibrium, change in the volume of the system does not alter the number of moles?

A. $N_2(g) + O_2(g) \Leftrightarrow 2NO(g)$

B. $PCl_5(g) \Leftrightarrow PCl_3(g) + Cl_2(g)$

C. $N_2(g) + 3H_2(g) \Leftrightarrow 2NH_3(g)$

D. $SO_2Cl_2(g) \Leftrightarrow SO_2(g) + Cl_2(g)$

Answer: A

Watch Video Solution

43. For the reaction

$CO(g) + \frac{1}{2}O_2(g) \Leftrightarrow CO_2(g)$, K_p / K_c is

A. RT

B. $(RT)^{-1}$

C. $(RT)^{-1/2}$

D. $(RT)^{1/2}$

Answer: C

Watch Video Solution

44. For the reaction $2HI \Leftrightarrow H_2 + I_2$

A. $K_p > K_c$

B. $K_c > K_p$

C. $K_p = K_c$

D. None of these

Answer: C

Watch Video Solution

45. A gas bulb is filled with NO_2 gas and immersed in an ice bath at $0^\circ C$, which becomes colourless after sometime. This colourless gas will be:

A. NO_2

B. N_2O

C. N_2O_4

D. N_2O_5

Answer: C

Watch Video Solution

46. What are the most favourable conditions for the reaction $SO_2 + /2O_2 \Leftrightarrow SO_3, \Delta H = -ve$ to occur

A. low T, high P

B. low T and low P

C. high T, low P

D. high T, high P.

Answer: A

Watch Video Solution

47. When H_2 and I_2 are mixed and equilibrium is attained,then

A. amount of HI formed is equal to the amount of H_2 dissociated

B. HI dissociation stops

C. the reaction stops completely

D. None of these

Answer: D

Watch Video Solution

48. In the case of gaseous homogeneous reaction, the active mass of the reaction is obtained by the expression.

A. $\frac{PV}{RT}$

B. $\frac{P}{RT}$

C. $\frac{RT}{P}$

D. $\frac{n}{V}RT.$

Answer: B

Watch Video Solution

49. Which of the following favours the reverse reaction in chemical equilibrium ?

A. Increasing the concentration of the reactant

B. Removal of at least one of the products at regular intervals

C. Increasing the concentrations of one or more of the products

D. increasing the pressure.

Answer: C

Watch Video Solution

50. If $N_2 + 3H_2 \overset{K}{\Longleftrightarrow} 2NH_3$ then $2N_2 + 6H_2 \overset{K}{\Longleftrightarrow} 4NH_3 - K'$ is equal to

A. K^2

B. $\sqrt{K}$

C. $\frac{1}{\sqrt{K}}$

D. $\frac{1}{K^2}$

Answer: A

Watch Video Solution

51. 1 mol of hydrogen and 2 mol of iodine are taken initially in a 2L vessel. The number of moles of hydrogen at equilibrium is 0.2. Then the number of moles of iodine and hydrogen iodide at equilibrium are

A. 1.2,1.6

B. 1.8,1.0

C. 0.4,2.4

D. 0.8,2.0

Answer: A

Watch Video Solution

52. 1 mol of N_2 and 2 mol of H_2 are allowed to react in a 1 dm^3 vessel. At equilibrium, 0.8 mol of NH_3 is formed. The concentration of H_2 in the vessel is

A. 0.6 mole

B. 0.8 mole

C. 0.2 mole

D. 0.4 mole

Answer: B

Watch Video Solution

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

A. 0.5

B. 1.5

C. 2.5

D. 2

Answer: D

Watch Video Solution

54. The equilibrium constant for the following reaction will be

$3A + 2B \rightarrow C$

A. $\frac{[3A][2B]}{[C]}$

B. $\frac{[C]}{[3A][2B]}$

C. $\frac{[C]}{[A]^2[B]^2}$

D. $\frac{[C]}{[A]^3[B]^2}$

Answer: D

Watch Video Solution

55. A chemical reaction is in equilibrium when

A. formation of product is minimum

B. reactants are completely transformed into products

C. rates of forard and backward reactions are equal

D. equal amounts of reactants and products are present.

Answer: C

Watch Video Solution

56. Under what conditoin of temperature and pressur the formation of atomic hydrogen from molecular hydrogen will be favoured most ?

A. high temperature and high pressure

B. low temperature and low pressure

C. high temperature and low pressure

D. low temperature and high pressure

Answer: C

Watch Video Solution

57. The reaction quotient (Q) for thereaction

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

is given by

$$Q = \frac{[NH_3]^2}{[N_2][H_2]^3}$$

The reaction will proceed from right to left if where K_C is the equilibrium constant.

A. Q=0

B. $Q = K_c$

C. $Q < K_c$

D. $Q > K_c$

Answer: D

Watch Video Solution

58. The following equilibria are given by :

$N_2 + 3H_2 \Leftrightarrow 2NH_3, K_1$

$N_2 + O_2 \Leftrightarrow 2NO, K_2$

$H_2 + \frac{1}{2}O_2 \Leftrightarrow H_2O, K_3$

The equilibrium constant of the reaction $2NH_3 + \frac{5}{2}O_2 \Leftrightarrow 2NO + 3H_2O$ in terms of K_1, K_2 and K_3 is

A. $K_2K_3^3 / K_1$

B. $K_1K_2K_3$

C. K_1K_2 / K_3

D. $K_1K_3^2 / K_2$

Answer: A

Watch Video Solution

59. Consider the reaction equilibrium, $2SO_{2(g)} + O_{2(g)} \Leftrightarrow$, $\Delta H^\circ = -198kJ$. On the basis of Le-Chatelier's principle, the condition favourable for the forward reaction is

A. lowering of temperature as well as pressure

B. increasing of temperature as well as pressure

C. lowering of temperature and increasing of pressure

D. any value of temperature and pressure

Answer: C

Watch Video Solution

60. For an equilibrium reaction, $N_2O_4(g) \Leftrightarrow 2NO_2(g)$, the concentrations of N_2O_4 and NO_2 at equilibrium are 4.8×10^{-2} and $1.2 \times 10^{-2} mol/L$ respectively. The value of K_c for the reaction is

A. $3.3 \times 10^{2} molL^{-1}$

B. $3.3 \times 10^{-1} molL^{-1}$

C. $3.3 \times 10^{-3} molL^{-1}$

D. $3.3 \times 10^{3} molL^{-1}$

Answer: C

Watch Video Solution

61. The gaseous reaction $A + B \Leftrightarrow 2C + D, \ + Q$is most favoured at

A. High temperature and low pressure

B. Loww temperature and low pressure

C. Low temperature and high pressure

D. High temperature and high pressure

Answer: B

Watch Video Solution

62. For a reaction if $K_p > K_c$, the forward reaction is favoured by $(T > 15K)$

A. High temperature

B. Low temperature

C. Low pressure

D. High temperature

Answer: C

Watch Video Solution

63. In a lime kiln, to get higher yield of CO_2 the measure that can be taken is :

A. to maintain high temperature

B. to pump out CO_2

C. to remove CaO

D. to add more $CaCO_3$

Answer: B

Watch Video Solution

64. In the reaction

$PCl_5(g) \Leftrightarrow PCl_3(g) + Cl_2(g)$, the equilibrium concentrations of PCl_5 and PCl_3 are 0.4 and 0.2 mole / litre respectively. If the value of K_c is 0.5 , what is the concentration of Cl_2 in moles / litre ?

A. 2

B. 1.5

C. 1

D. 0.5

Answer: C

Watch Video Solution

65. One mole of a compound AB reacts with 1 mole of a compound CD according to the equation $AB + CD \Leftrightarrow AD + CB$.

When equilibrium had been established it was found that $\frac{3}{4}$ mole each of

reactant AB and CD has been converted to AD and CB. There is no change in volume. The equilibrium constant for the reaction is

A. $9/16$

B. $1/9$

C. $16/9$

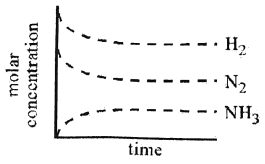
D. 9

Answer: D

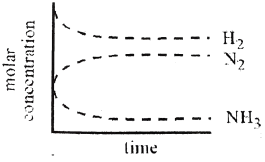
Watch Video Solution

66. For the synthesis of ammonia by the reaction $N_2 + 3H_2 \Leftrightarrow 2NH_3$ in the Haber's process ,the attainment of equilibrium is correctly predicated bt the curve

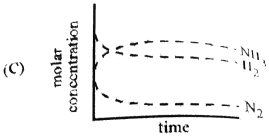
A.



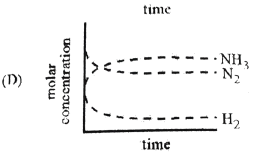
B.



C.



D.



Answer: A

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67. When the rate of formation of reactants is equal to the rate of formation of products, this is known as ,

A. Chemical reaction

B. Chemical equilibrium

C. Chemical kinetics

D. None

Answer: B

Watch Video Solution

68. Which of the following is a characterisstic of a reversible reaction ?

A. it never proceeds by a catalyst

B. it proceeds onlly in the forward direction

C. number of moles of reactants and products are equal.

D.

Answer: A

Watch Video Solution

69. What is the equilibrium expression for the reaction $P_{4(s)} + 5O_{2(g)} \Leftrightarrow P_4O_{10(s)}$?

A. $K_c = \frac{[P_4O_{10}]}{[P_4][O_2]^5}$

B. $K_c = \frac{1}{[O_2]^5}$

C. $K_c = [O_2]^5$

D. $K_c = \frac{[P_4O_{10}]}{5[P_4][O_2]}$

Answer: B

Watch Video Solution

70. For the reaction $CO(g) + Cl_2(g) \leftrightarrow COCl_2(g)$, K_p / K_c is equal to:

A. $\frac{1}{RT}$

B. 1.0

C. $\sqrt{RT}$

D. RT

Answer: A

Watch Video Solution

71. The equilibrium constant for the reaction

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

at temperature T is 4×10^{-4}.

The value of K_c for the reaction

$NO(g) \Leftrightarrow \frac{1}{2}N_2(g) + \frac{1}{2}O_2(g)$

at the same temperature is

A. 2.5×10^2

B. 0.02

C. 4×10^{-4}

D. 50

Answer: D

Watch Video Solution

72. Calculate the partial pressure of carbon monoxide from the following data :

$CaCO_3 \overset{\Delta}{\Longleftrightarrow} CaO(s) + CO_2 \uparrow, K(p) = 8 \times 10^{-2}$

$CO_2(g) + C(s) \Leftrightarrow 2CO(g), K_p = 2$

A. 0.2

B. 0.4

C. 1.6

D. 4

Answer: B

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73. Of the following, which change will shift the reaction towards the product ?

$I_2(g) \Leftrightarrow 2I(g), \Delta H_r^\circ(298K) = +150J$

A. increase in concentration of I

B. decrease in concentration of I_2

C. increase in temperature

D. increase in total pressure

Answer: C

Watch Video Solution

74. Consider the following reversible reactionat equilibrium:

$2H_2O(g) \Leftrightarrow 2H_2(g) + O_2(g), \Delta H = +24.7kJ$

Which one of the following changes in conditions will lead to maximum decomposition of $H_2O(g)$?

A. Increasing both temeprature and pressure

B. Decreasing temperature and increasing pressure

C. Increasing temperature and decreasing pressure

D. Increasing temperature at constant pressure

Answer: C

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75. Ammoina carbonate when heated to $200^\circ C$ gives a mixture of NH_3 and CO_2 vapour with a density of 13.0 What is the degree of dissociation of ammonium carbonate ?

A. $\frac{3}{2}$

B. $\frac{1}{2}$

C. $\frac{5}{2}$

D. 1

Answer: D

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76. Given reaction is $2X_{(gas)} + Y_{(gas)} \Leftrightarrow 2Z_{(gas)} + 80$ Kcal

Which combination of pressure and temperature gives the highest yield of Z at equilibrium ?

A. 1000 atm and $200^{\circ} C$

B.

C.

D.

Answer: C

Watch Video Solution

77. The compounds A and B are mixed in equimolar proportion to form the products, $A + B \Leftrightarrow C + D$

At equilibrium, one third of A and B are consumed. The equilibrium constant for the reaction is

A. 0.5

B. 4

C. 2.5

D. 0.25

Answer: D

Watch Video Solution

78. In the manufacture of ammonia by Haber's process, $N_2(g) + 3H_2(g) \Leftrightarrow 2NH_3(g) + 92.3kJ$, which of the following conditions is unfavourable ?

A. increasing the temperature

B. increasing the pressure

C. reducing the temperture

D. removing ammonia as it is formed.

Answer: A

Watch Video Solution

79. The chemical equlibrium of a reversible reaction is not influenced by :

A. Pressure change

B. catalyst

C. concentration of the reactants

D. temperature

Answer: B

Watch Video Solution

80. The equilibrium:

$P_4(g) + 6Cl_2(g) \Leftrightarrow 4PCl_3(g)$

is attained by mixing equal moles of P_4 and Cl_2 in an evacuated vessel. Then at equilibrium:

A. $[Cl_2] > [PCl_3]$

B. $[Cl_2] > [P_4]$

C. $[P_4] > [Cl_2]$

D. $[PCl_3] > [P_4]$

Answer: C

Watch Video Solution

81. The following equilibrium exists in a closed vessel in $1L$ capacity

$A(g) + 3B(g) \Leftrightarrow 4C(g)$

initial cocentration of $A(g)$ is equal to that $B(g)$. The equilibrium concentration of $A(g)$ and $C(g)$ are equal. K_c for the reaction is

A. 0.08

B. 0.8

C. 8

D. 80

Answer: C

Watch Video Solution

82. 2mole of PCl_5 were heated in a closed vessel of $2litre$ capacity. At equilibrium $40\,\%$ of PCl_5 dissociated into PCl_3 and Cl_2. The value of the equilibrium constant is:

A. 0.532

B. 0.266

C. 0.133

D. 0.174

Answer: B

Watch Video Solution

83. Equilibrium constants K_1 and K_2 for the following equilibria

$NO(g) + 1/2O_2(g) \overset{K_1}{\Longleftrightarrow} NO_2(g)$ and 2NO_(2)(g) overset(K_(2)) (hArr)2NO(g)+O_(2)(g)`

are related as

A. $K_2 = 1/K_1$

B. $K_2 = K_1^2$

C. $K_2 = K_1/2$

D. $K_2 = 1/K_1^2$

Answer: D

Watch Video Solution

84. The exothermic formation of ClF_3 is represented by thr equation:

$Cl_2(g) + 3F_2(g) \Leftrightarrow 2ClF_3(g), \Delta H = -329kJ$

Which of the following will increase the quantity of ClF_3 in an equilibrium mixture of Cl_2, F_2, and ClF_3?

A. increasing the temperature

B. removing Cl_2

C. increasing the volume of the container

D. adding F_2

Answer: D

Watch Video Solution

85. For the reaction $2NO_2(g) \Leftrightarrow 2NO(g) + O_2(g)$

$K_c = 1.8 \times 10^{-6}$ at $184^\circ C$, $R = 0.00831 kJ/$ (mol.K) when K_p and K_c are compared at $184^\circ C$, it is found

A. K_p is greater than K_c

B. K_p is less than K_c

C. $K_p = K_c$

D. whether K_p is greater than, less than or equal to K_c depends upon the total gas pressure.

Answer: A

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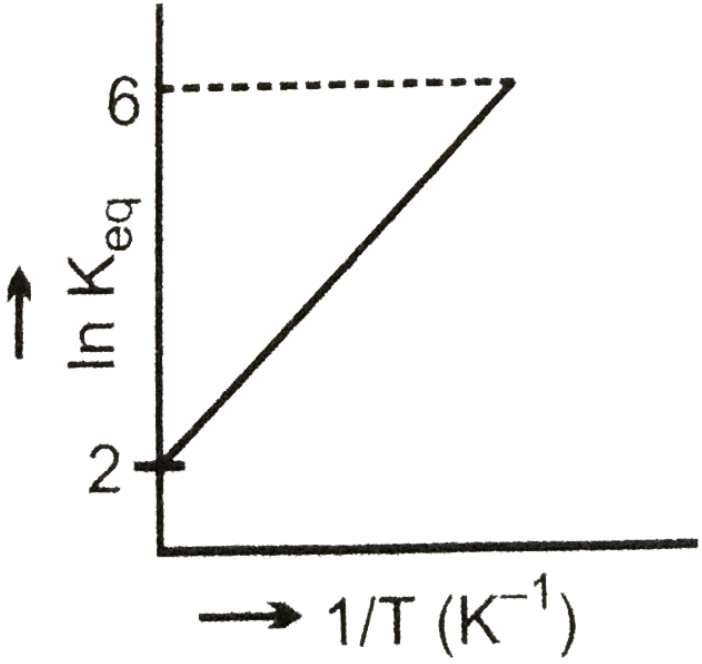
86. A schematic plot of In K_{eq} versus inverse o ftemperature for a reaction is shown below



the reaction must be:

A. exothermic

B. Endothermic

C. one with negligible enthalpy change

D. highly spontaneous at ordinary temperature

Answer: A

Watch Video Solution

87. An amount of solid NH_4HS is placed in a flask already containing ammonia gas at a certain temperature and 0.50 atm pressure.Ammonium hydrogen sulphide decomposes to yield NH_3 and H_2S gases in the flask.When the decomposition reaction reaches equilibrium, the total pressure in the flask rises to 0.84 atm ? The equilibrium constant for NH_4HS decomposition at this temperature is :

A. 0.3

B. 0.18

C. 0.17

D. 0.11

Answer: D

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88. For the hypothetic reaction, the equilibrium constant (K) values are given

$A \Leftrightarrow B, K_1 = 2.0$

$B \Leftrightarrow C, K_2 = 4.0$

$C \Leftrightarrow D, K_3 = 3.0$

The equilibrium constant for the reaction

$A \Leftrightarrow D$ is

A. 48

B. 6

C. 2.7

D. 24

Answer: D

Watch Video Solution

89. $CaCO_3 \Leftrightarrow CaO + CO_2$ reaction in a lime kiln goes to completion because

A. CaO does not react with CO_2 to give $CaCO_3$

B. backward reaction is very slow

C. CO_2 formed escpaes out

D. None of these

Answer: C

Watch Video Solution

90. A 550 K, the K_c for the following reaction is $10^4 mol^{-1} L$

$X(g) + Y(g) \Leftrightarrow Z(g)$

At equilibrium, it was observed that

$$[X] = \frac{1}{2}[Y] = \frac{1}{2}[Z]$$

What is the value of [Z] (in mol L^{-1}) at equilibrium ?

A. 2×10^{-4}

B. 10^{-4}

C. 2×10^{4}

D. 10^{4}

Answer: A

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91. $A + B \Leftrightarrow C + D$. If finally the concentrations of A an d B are both equal but at equilibrium concentration of D will be twice of that of A then what will be the equilibrium constant of reaction.

A. $4/9$

B. $9/4$

C. $1/9$

D. 4

Answer: D

Watch Video Solution

92. Partial pressure of O_2 in the reaction

$2Ag_2O(s) \Leftrightarrow 4Ag(s) + O_2(g)$ is

A. K_p is greater than K_c

B. $\sqrt{K_p}$

C. $3\sqrt{K_p}$

D. $2K_p$

Answer: A

Watch Video Solution

93. $NH_4COONH_4(s) \Leftrightarrow 2NH_3(g) + CO_2(g)$. If equilibrium pressure is 3 atm for the above reaction, K_p will be

A. 4

B. 27

C. $4/27$

D. $1/27$

Answer: A

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94. For the reaction $N_{2(g)} + O_{2(g)} \Leftrightarrow 2NO_{(g)}$, the value of K_c at $800^\circ C$ is 0.1. When the equilibrium concentrations of both the reactants is 0.5 mol, what is the value of K_p at the same temperature

A. 0.5

B. 0.1

C. 0.001

D. 0.025

Answer: B

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95. For the reaction

$H_2(g) + CO(g) \Leftrightarrow CO(g) + H_2O(g)$, if the initial concentration of $[H_2] = [CO_2]$and x moles /litres of hydrogen is consummed at equilibrium , the correct expression of K_p is :

A. $\frac{x^2}{(1-x)^2}$

B. $\frac{(1+x)^2}{(1-x)}$

C. $\frac{x^2}{2+x^2}$

D. $\frac{x^2}{1-x^2}$

Answer: A

Watch Video Solution

96. One mole of H_2 and 2 moles of I_2 are taken initially in a two litre vessel. The number of moles of H_2 at equilibrium is 0.2. Then the number of moles of I_2 and HI at equilibrium is

A. 1.2,1.6

B. 1.8,1.0

C. 0.4,2.4

D. 0.8,2.0

Answer: A

Watch Video Solution

97. When hydrogen molecules decompose into its atoms, which conditions give the maximum yield of hydrogen atoms ?

A. High temperature and low pressure

B. low temperature and high pressure

C. high temperature and high pressure

D. low temperature and low pressure.

Answer: A

Watch Video Solution

98. For the reaction, $H_2 + I_2 \Leftrightarrow 2HI$, $K = 47.6$. If the initial number of moles of each reactant and product is 1 mole then at equilibrium

A. $[I_2] = [H_2], [I_2] > [HI]$

B. $[I_2] < [H_2], [I_2] = [HI]$

C. $[I_2] = [H_2], [I_2] < [HI]$

D. $[I_2] > [H_2], [I_2] = [HI]$

Answer: C

Watch Video Solution

99. The equilibrium constant (K_p) for the decomposition of gaseous H_2O

$$H_2O(g) \Leftrightarrow H_2(g) + \frac{1}{2}O_2(g)$$

is related to the degree of dissociation α at a total pressure P by

A. $K_p = \dfrac{\alpha^3 p_2^2}{(1+\alpha)(2+\alpha)^{1/2}}$

B. $K_p = \dfrac{\alpha^3 p^{3/2}}{(1-\alpha)(2+\alpha)^{1/2}}$

C. $K_p = \dfrac{\alpha^{3/2} p^2}{(1-\alpha)(2+\alpha)^{1/2}}$

D. $K_p = \dfrac{\alpha^{3/2} p^{1/2}}{(1-\alpha)(2+\alpha)^{1/2}}$

Answer: D

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100. At equilibrium of the reaction ,

$$N_2O_4(g) \Leftrightarrow 2NO_2(g)$$

the observed molecular weight of $N_{92})O_4$ is 80g mol^{-1} at 350K. The percentage dissociation of $N_2O_4(g)$ at 350K is

A. $10\ \%$

B. $15\ \%$

C. $20\ \%$

D. $18\ \%$

Answer: B

Watch Video Solution

101. According to Le- Chatelier's principile , maximum yiled of NH_3 is obtained at

A. High temperature and low pressure

B. High pressure

C. Low temperature

D. Low temperature and high pressure

Answer: D

Watch Video Solution

102. Given the equilibrium system :

$NH_4Cl(g) \Leftrightarrow NH_{44}^{+}(aq) + Cl^{-}(aq), (\Delta H = +35kcal/\text{ mol})$.

What change will shift the equilibrium to the right ?

A. decreasing the temperature

B. increasing the temperature

C. dissolving NaCl crystals in the equilibrium mixture

D. dissolving NH_4NO_3 crystals in the equlibrium mixture

Answer: B

Watch Video Solution

103. Equilivalent amounts of H_2 and I_2 are heated in a closed vessel till equilibrium is obtained. If $80\,\%$ of the hydrogen is converted to HI, the K_c at this temperature is

A. 64

B. 16

C. 0.25

D. 14

Answer: A

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104. 16 mol of $PCl_5(g)$ is placed in 4 dm^{-3} closed vessel. When the temperature is raised to 500 K, it decompses and at equilibrium, 1.2 mol of $PCl_5(g)$ remains. What is K_c value for the decomposition of $PCl_5(g)$ to $PCl_3(g)$ and $Cl_2(g)$ at 500K.

A. 0.013

B. 0.05

C. 0.033

D. 0.067

Answer: C

Watch Video Solution

105. Equimolar concentrations of H_2 and I_2 are heated to equilibrium in a 2 L flask. At equilibrium, the forward and backward rate constants are found to be equal. What percentage of initial concentration of H_2 has reached at equilibrium ?

A. 0.33

B. 0.66

C. $50\ \%$

D. 0.4

Answer: A

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106. Three moles of PCl_5, three moles of PCl_3 and two moles of Cl_2 are taken in a closed vessel. If at equilibium, the vessel has 1.5 moles of PCl_5 the number of moles of PCl_3 present in it is

A. 6

B. 4.5

C. 5

D. 3

Answer: B

Watch Video Solution

107. For equilibrium $H_2 + I_2 \Leftrightarrow 2HI$ which of the following will affect the equilibrium constant ?

A. Pressure change

B. Concentration change

C. Catalyst

D. Temperature Change

Answer: D

Watch Video Solution

108. For a reaction $2SO_2(g) + O_2(g) \Leftrightarrow 2SO_3(g), \Delta H = -188.3kJ$ The number of moles of SO_3 formed is increased if

A. Temperature is increased at constant volume

B. Inert gas is added to the mixture

C. O_2 is removed from the mixture

D. Volume of the reaction flask is decreased

Answer: D

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109. The equilibrium constant for the given reaction is 100.

$N_2(g) + 2O_2(g) \Leftrightarrow 2NO_2(g)$

What is the equilibrium constant for the reaction ?

$NO_2(g) \Leftrightarrow 1/2N_2(g) + O_2(g)$

A. 10

B. 1

C. 0.1

D. 0.01

Answer: C

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110. If $K_1 =$ Rate constant at temperature T_1 and k_2 rate constant at temperature T_2 for a first order reaction, then which of the following relation is correct ?

A. $\log. \frac{k_2}{k_1} = \frac{2.303}{RT}\left[\frac{T_2 - T_1}{T_1 T_2}\right]$

B. $\log. \frac{k_2}{k_1} = \frac{E_a}{2.303RT}\left[\frac{T_2 - T_1}{T_1 T_2}\right]$

C. $\log. \frac{k_2}{k_1} = \frac{E_a}{2.303RT}\left[\frac{T_1 T_2}{T_2 - T_1}\right]$

D. $\log. \frac{k_1}{k_2} = \frac{E_a}{2.303RT}\left[\frac{T_2 T_2}{T_2 - T_1}\right]$

Answer: B

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111. In which of the following pairs, the constant / quantities are not mathematically related to each other ?

A. Gibb's free energy and standard cell potential

B. Equilibrium constant and standard cell potential

C. Rate constant and activation energy

D. Rate constant and standard cell potential

Answer: D

Watch Video Solution

112. At equilibrium of the reaction

$2X(g) + Y(g) \Leftrightarrow X_2Y(g)$

the number of moles of X_2Y at equilibrium is affected by the

A. temperature and pressure

B. Temperature only

C. pressure only

D. temperature , pressure and catalyst.

Answer: A

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113. $100mL$ of phosphine (PH_3) on hearing forms phosphorous (P) and hydrogen (H_2). The volume change in the reaction is

A. an increase of 50 mL

B. an increase of 100 mL

C. an increase of 150 Ml

D. a decrease of 50 Ml

Answer: A

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114. 5 moles of $SO_2$and 5 moles of O_2 are allowed to react .At equilibrium , it was foumnd that $60\,\%$ of SO_2 is used up .If the pressure of the equilibrium mixture is one aatmosphere, the parital pressure of O_2 is :

A. 0.82 atm

B. 0.52 atm

C. 0.21 atm

D. 0.41 atm

Answer: D

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115. The equilibrium constant (K) of a reaction may be written as

A. $K = e^{-\Delta G / RT}$

B. $K = e^{-\Delta G^{\circ} RT}$

C. $K = e^{-\Delta H / RT}$

D. $K = e^{-\Delta H^{\circ} RT}$

Answer: B

Watch Video Solution

116. $N_2(g) + 3H_2(g) \Leftrightarrow 2NH_3(g)$,

In the reaction given above, the addition of small amount of an inert gas at constant pressure will shift the equilibrium towardss which side of

A. LHS(left Hand side)

B. RHS (Right Hand Side)

C. neither side

D. either side

Answer: A

Watch Video Solution

117. $NH_4HS(s) \Leftrightarrow NH_3(g) + H_2S(g)$

In the above reaction, if the pressure at equilibrium and at 300K is 100atm then what will be equilibrium constant K_p ?

A. 2500 atm^2

B. 50 atm^2

C. 100 atm^2

D. 200 atm^2

Answer: A

Watch Video Solution

118. consider the following gaseous equilibrium with equilibrium constant K_1 and K_2 respectively

$SO_2(g) + 1/2O_2 \Leftrightarrow SO_3(g)$

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

The equilibrium constants are related as

A. $K_1^2 = \frac{1}{K_2}$

B. $2K_1 = K_2^2$

C. $K_2 = \frac{2}{K_1^2}$

D. $K_2^2 = \frac{1}{K}$

Answer: A

Watch Video Solution

119. Consider the following reactions in which all the reactants and the products are in gaseous state.

$2PQ \Leftrightarrow P_2 = Q_2, K_1 = 2.5 \times 10^5$

$PQ + 1/2R_2 \Leftrightarrow PQR, K_{92}) = 5 \times 10^{-3}$

The value of K_2 for the equilibrium

$1/2P_2 + 1/2Q_2 + 1/2R_2 \Leftrightarrow PQR,$ is

A. 2.5×10^{-3}

B. 2.5×10^3

C. 1.0×10^{-5}

D. 5×10^3

Answer: C

Watch Video Solution

120. For the reaction

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

The equilibrium constant K_p changes with

A. total pressure

B. temperature

C. catalyst

D. amount of H_2 and I_2 present

Answer: B

Watch Video Solution

121. In the preparation of CaO from $CaCO_3$ using the equilibrium,

$CaCO_3(s) \Leftrightarrow CaO(s) + CO_2(g)$

K_p is expressed as

$\log K_p = 7.282 - \frac{8500}{T}$

For complete decomposition of $CaCO_3$, the temperature in celsius to be used is:

A. 1167

B. 894

C. 8500

D. 850

Answer: B

Watch Video Solution

122. For the reaction $C(s) + CO_2(g) \rightarrow 2CO(g)$, $k_p = 63$ atm at 100 K. If at equilibrium $p_{CO} = 10p_{CO_2}$ then the total pressure of the gases at equilibrium is

A. 6.3 atm

B. 6.93 atm

C. 0.63 atm

D. 0.693 atm

Answer: B

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123. In the reaction $AB(g) \Leftrightarrow A(g) + B(g)$ at $30^{\circ}C, k_p$ for the dissociation equilibrium is $2.56 \times 10^{-2} atm.$ If the total pressure at equilibrium is 1 atm, then the percentage dissociation of AB is

A. 0.87

B. 0.13

C. 0.435

D. 0.16

Answer: D

Watch Video Solution

124. Choose the equilibrium that is not influenced by pressure

A. $N_2(g) + 3H_2(g) \Leftrightarrow 2NH_3(g)$

B. $CO_2(g) + 3H_2(g) \Leftrightarrow CH_4(g) + H_2O(g)$

C. $PCl_5(g) \Leftrightarrow PCl(g) + Cl_2(g)$

D. $2HI(g) \Leftrightarrow H_2(g) + I_2(g)$

Answer: D

Watch Video Solution

Selected Straight Objective Type Mcqs

1. When $NaNO_3$ is heated in a closed vessel, oxygen is liberated and $NaNO_2$ is left behind. At equilibrium

A. Addition of $NaNO_2$ favours reverse reaction

B. Addition of $NaNO_3$ favours forward reaction

C. Increasing temperature favours forward reaction

D. Increasing pressure favours reverse reaction

Answer: C,D

Watch Video Solution

2. Which of the following will not affect the value of equilibrium constant of the reaction

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

A. Change in initial conc. Of reactanst

B. change in temperature

C. Addition of catalyst

D. Change in pressure

Answer: A,C,D

Watch Video Solution

3. For the gas phase reaction

$C_2H_4 + H_2 \Leftrightarrow C_2H_6(\Delta H = -32.7\text{kcal})$

carried out in a vessel, the equilibrium concentration of C_2H_4 can be increased by

A. Increasing the temperature

B. Decreasing the pressure

C. Removing some C_2H_6

D. Adding some H_2

Answer: A,B

Watch Video Solution

4. For the reaction $PCl_5(g) \Leftrightarrow PCl_3(g) + Cl_2(g)$ the forward reaction at constant temeprature is favoured by

A. introducing inert gas at constant pressure

B. introducing inert gas at constant volume

C. introducing PCl_5 at constant volume

D. introducing Cl_2 at constant volume.

Answer: A,C

Watch Video Solution

Mcqs With Only One Correct Answer

1. One mole of $N_{20O_4(g)}$ at 300K is kept in a closed container under one atmosphere. It is heated to 600K when 20% of $N_2O_4(g)$ is converted to $NO_2(g)$

$N_2O_4 \Leftrightarrow 2NO_2(g)$ Hence resultant pressure is :

A. 1.2 atm

B. 2.4 atm

C. 2.0 atm

D. 1.0 atm

Answer: B

Watch Video Solution

2. In the reaction ,

$A(s) + B(g) + \text{heat} \Leftrightarrow 2C(s) + 2D(g)$

at equilibrium, pressure of B is doubled to re-establish the equilibrium. The factor, by which conc. Of D is changed, is

A. $\sqrt{2}$

B. 2

C. 3

D. $\sqrt{3}$

Answer: A

Watch Video Solution

3. A vessel at $1000K$ contains carbon dioxide with a pressure of $0.5atm$. Some of the carbon dioxide is converted to carbon monoxide on addition of graphite. Calculate the value of K_p if total pressure at equilibrium is $0.8atm$.

A. 0.18 atm

B. 1.8 atm

C. 2 atm

D. 2.8 atm

Answer: B

Watch Video Solution

4. The equilibrium

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

is attained at $25^\circ C$ in a closed container and inert gas helium is introduced. Which of the following statement $/$s is $/$ are correct ?

A. Concentrations of SO_2Cl_2, SO_2 and Cl_2 will change

B. More chlorine is formed

C. Conc. Of SO_2 is reduced

D. Equilibrium constant will remain unaffected.

Answer: D

Watch Video Solution

5. For the reaction

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

The equilibrium constant K_p changes with

A. Total pressure

B. catalyst

C. The amounts of H_2 and I_2 present

D. Temperature

Answer: D

Watch Video Solution

6. The oxidation of SO_2 by O_2 to SO_3 is an exothermic reaction . The yield of SO_2 will be maximum if

A. temperature is increased and pressure is kept constant

B. temperature is reducted and pressure is increased

C. both temperature and pressure is increased

D. both temperature and pressure are decreased.

Answer: B

Watch Video Solution

7. In the reaction $A_2(g) + 4B_2(g) \Leftrightarrow 2AB_4(g), \quad \Delta H < 0$. The decomposition of AB_4 (g) will be favoured at

A. low temperature and high pressure

B. high temperature and low pressure

C. low temperature and low pressure

D. high temperature and high pressure

Answer: A

Watch Video Solution

8. For the reaction

$CO(g) + H_2O(g) \Leftrightarrow CO_2(g) + H_2(g)$

at a given temperature, the equilibrium amount of $CO_2(g)$ can be increased by

A. adding a suitable catalyst

B. adding an inert gas

C. decreaseing the volume of the container

D. increasing the amount of $CO(g)$

Answer: D

Watch Video Solution

9. For the chemical reaction

$3X(g) + Y(g) \Leftrightarrow X_3Y(g),$

the amount of X_3Y at equilibrium is affected by

A. temperature and pressure

B. temperature only

C. pressure only

D. temperature , pressure and catalyst.

Answer: A

Watch Video Solution

10. For the reversible reaction

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

at $500^\circ C$, the value of K_p is 1.44×10^{-5} when the partial pressure is measured in atmosphere. The corresponding value of K_c with concentration in mol L^{-1} is

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

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

C. $1.44 \times 10^{-5} / (0.0832 \times 500)^{2}$

D. $1.44 \times 10^{-5} / (0.0832 \times 773)^{-2}$

Answer: D

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11. At constant temperature, the equilibrium constant (K_p) for the decomposition reaction

$N_2O_4 \Leftrightarrow 2NO_2$

is expressed by $K_p = 4x^2p/\left(1-x^2\right)$, where p=pressure x= extent of decomposition. Which of the following statements is true?

A. K_p increases with increase of P

B. K_p increases wih increase of x

C. K_p increases with decrease of x

D. K_p remains constant with change in P or x.

Answer: D

Watch Video Solution

12. Consider the following equilibrium in a closed container

$N_2O_4(g) \Leftrightarrow 2NO_2(g)$

At a fixed temperature, the volume of the reaction container is halved. For this change, which of the following statement holds true regarding the equilibrium constant (K_p) and the degree of dissociation (α)?

A. neither K_p nor α changes

B. both K_p and α change

C. K_p changes, but α does not change

D. K_p does not change, but α changes.

Answer: D

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13. PCl_5 dissociation a closed container as :

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

If total pressure at equilibrium of the reaction mixture is P and degree of dissociation of PCl_5 is α, the partial pressure of PCl_3 will be:

A. $\left(\frac{x}{x-1}\right)P$

B. $\left(\frac{x}{1-x}\right)P$

C. $\left(\frac{x}{x+1}\right)P$

D. $\left(\frac{2x}{1-x}\right)P$

Answer: C

Watch Video Solution

14. $N_2 + 3H_2 \Leftrightarrow 2NH_3$

Which of the following statements is correct if N_2 added at equilibrium condition?

A. The equilibrium will shift to forward direction because according to 2nd law of thermodynamics, the entropy must increase in the direction of the spontaneous reaction

B. The condition for equilibrium is $G(N_2) + 3G(H_2) = 2G(NH_3)$, where G is Gibbs free energy per mole of the gaseous species measured at ehtir partial pressure. The condition of equilibrium is unaffected by the use of catalyst which increases the rate of both the forward and the backward directions to the same extent

C. The catalyst will increase the rate of forward reaction by β.

D. The catalyst will not alter the rate either of the reaction.

Answer: B

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15. If the concentration of OH^- ions in the reaction

$Fe(OH)_3(s) \Leftrightarrow Fe^{3+}(aq.) + 3OH^-(aq.)$

is decreased by $1/4$ times, then the equilibrium concentration of Fe^{3+} will increase by

A. 8 times

B. 16 times

C. 64 times

D. 4 times

Answer: C

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16. The dissociation equilibrium of a gas AB_2 can be represented as

$2AB_2(g) \Leftrightarrow 2AB(g) + B_2(g)$

The degree of dissociation is x and is small compared to 1. The expression relating the degree of dissociation (x) with equilibrium contant K_p and total pressure p is

A. $2K_p / P$

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

C. $2(K_p / P)^{1/2}$

D. (K_p / P)

Answer: B

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17. The value of equilibrium constant of the reaction, HI $\Leftrightarrow \frac{1}{2}H_2 + \frac{1}{2}I_2$ is 8 . The equilibrium constant of the reaction $H_2(g) + I_2(g) \Leftrightarrow 2HI(g)$ will be

A. $1\frac{\cdot}{16}$

B. $1/64$

C. 16

D. $1/8$

Answer: B

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18. The values of K_{p_1} and K_{p_2} for the reactions

$X \Leftrightarrow Y + Z$ ....(i)

and $A \Leftrightarrow 2B$ ...(ii)

are in ratio of 9 : 1. If degree of dissociation of X and A be equal, then total presure at equilibrium (i) and (ii) are in the ratio.

A. $3:1$

B. $1:9$

C. $36:1$

D. $1:1$

Answer: C

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19. For the following reactions (1), (2) and (3) equilibrium constants are given

$(1) CO_2(g) + H_2O(g) \Leftrightarrow CO_2(g) + H_2(g), K_1$

$(2) CH_4(g) + H_2O(g) \Leftrightarrow CO(g) + 3H_2(g), K_2$

$(3) CH_4(g) + 2H_2O(g) \Leftrightarrow CO_2(g) + 4H_2(g), K_3$

Which of the following relation is correct ?

A. $K_3 = K_1 \times K_2$

B. $K_3K_2^3 = K_1^2$

C. $K_1\sqrt{K_2} = K_3$

D. $K_2K_3 = K_1$

Answer: A

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20. For the reaction $N_2 + 3H_2 \rightarrow 2NH_3$, if $\frac{d[NH_3]}{dt}. = 4 \times 10^{-4}$ mol $L^{-1}s^{-1}$, the value of $\frac{-d[H_2]}{dt}$ would be

A. $1 \times 10^{-4} molL^{-1}s^{-1}$

B. $3 \times 10^{-4} molL^{-1}s^{-1}$

C. $4 \times 10^{-4} molL^{-1}s^{-1}$

D. $6 \times 10^{-4} molL^{-1}s^{-1}$

Answer: D

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21. In the reaction

$BrO^{-3}(aq) + 5Br^{-}(aq) + 6H^{+} \rightarrow 3Br_2(1) + 3H_2O(1)$

The rate of appearance of bromine (Br_2) is related to rate of disapperance of bromide ions as folllwoing :

A. $\frac{d[Br_2]}{dt} = \frac{3}{5}\frac{d[Br^-]}{dt}$

B. $\frac{d[Br_2]}{dt} = \frac{-3}{5}\frac{d[Br^-]}{dt}$

C. $\frac{d[Br_2]}{dt} = \frac{-5}{3}\frac{d[Br^-]}{dt}$

D. $\frac{d[Br_2]}{dt} = \frac{-5d}{3}\frac{d[Br^-]}{dt}$

Answer: B

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22. A vessel at $1000K$ contains carbon dioxide with a pressure of $0.5atm$. Some of the carbon dioxide is converted to carbon monoxide on addition of graphite. Calculate the value of K_p if total pressure at equilibrium is $0.8atm$.

A. 3 atm

B. 0.3 atm

C. 0.18 atm

D. 1.8 atm

Answer: D

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23. The value of ΔH for the reaction $X_2(g) + 4Y_2g) \Leftrightarrow 2XY_4(g)$ is less than zero. Formation of $XY_4(g)$ will be favoured at :

A. High temperature and low pressure

B. High pressure and low temperature

C. high temperature and high pressure

D. Low pressure and low temperature

Answer: B

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24. For the reaction $N_2(g) + O_2(g) \Leftrightarrow 2NO(g)$, the equilibrium constant is K_1. The equilibrium constant is K_2 for the reaction

$2NO(g) + O_2 \Leftrightarrow 2NO_2(g)$

What is K for the reaction

$NO_2(g) \Leftrightarrow \frac{1}{2}N_2(g) + O_2(g)$?

A. $[1/K_1K_2]^{1/2}$

B. $1/(K_1K_2)$

C. $1/(2K_1K_2)$

D. $1/(4K_1K_2)$

Answer: A

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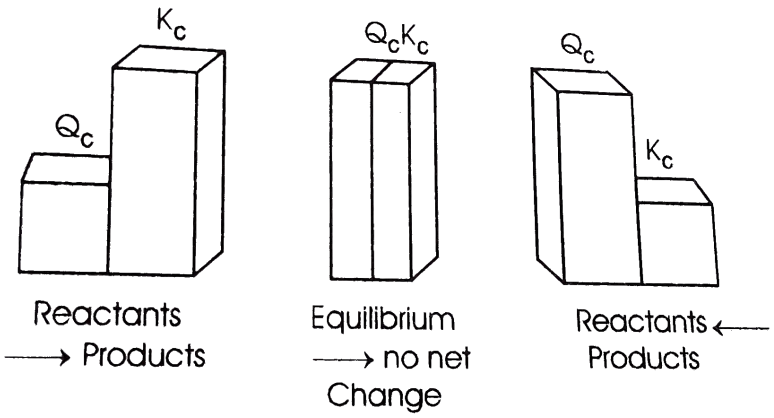
Linked Comprehension Type Mcq S Comprehension 1

1. The reaction which is in dynamic equilibrium, ensured us, that the reaction is reversible . But if that the reaction is in equilibrium. The reaction quotient predict either the reversible reaction is in equilibrium or tries to achieve equilibrium. In those reactions which have not

achieved equilibrium, we obtain reaction quotient Q_c in place of equilibrium constant (K_c) by substituting the concentration of reactant and product at the time, at whih we have to calculate the value of Q_c . To determine the direction at which the net reaction will proceed to achieve equilibrium, we compare values of Q_c and K_c. The three possible cases are shown as comparison of K_c and Q_c in the following figures.



Change in Gibbs free energy, i.e., ΔG is the driving force of any reaction.

For spontaneous reaction , $\Delta G = \ -ve$

For non-spontaneous reaction , $\Delta G = \ +ve$

For reaction at equilibrium , $\Delta G = 0$

Thermodynamically, we know that

$\Delta G = \Delta G^\circ + RT \ln Q$, where Q is reaction quotient and $\Delta G^\circ =$ change in Gibbs energy at standard condition.

For equilibrium $A(g) \Leftrightarrow B(g) (K_{eq} = 1.732)$ If the pressure of the

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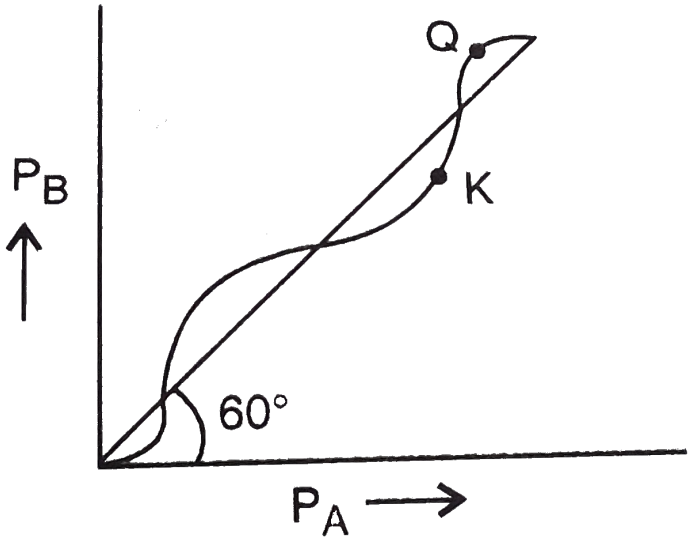

What will be the value of difference of standard Gibbs free energy to Gibbs free energy change at point Q in the figure above ?

A. $-ve$

B. $+ve$

C. 0

D. cannot be predicted

Answer: A

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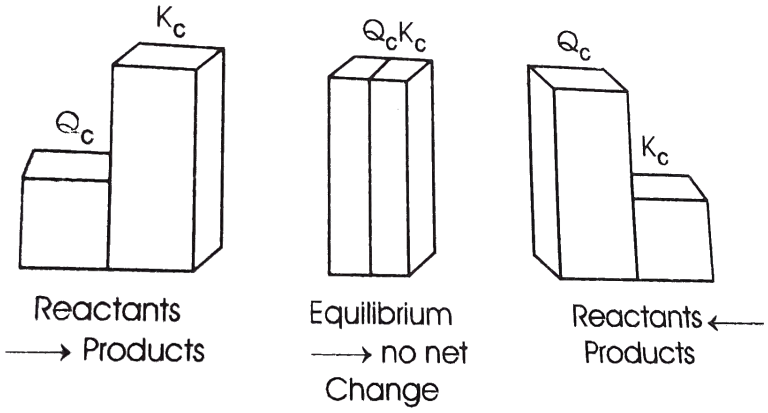

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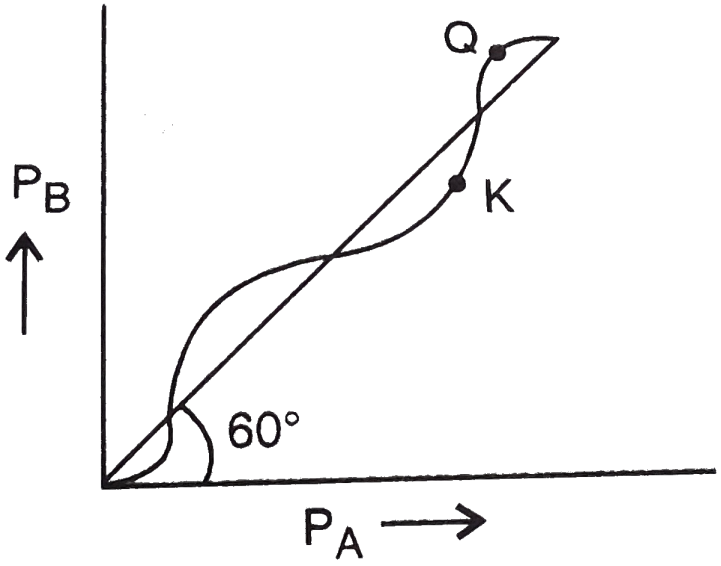

Which of the following is the correct statement at point R in the figure above ?

A. The reaction will move in backward direction in order to gain equilibrium

B. The reaction will move in forward direction in order to gain equilibrium

C. ΔG of the reaction will be zero

D. Cannotbe predicted.

Answer: B

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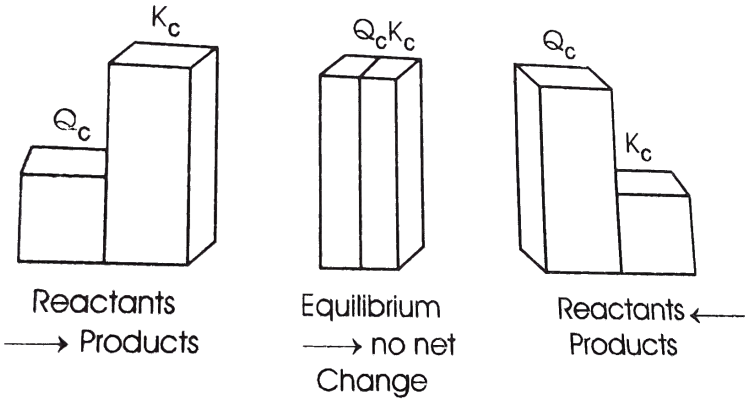

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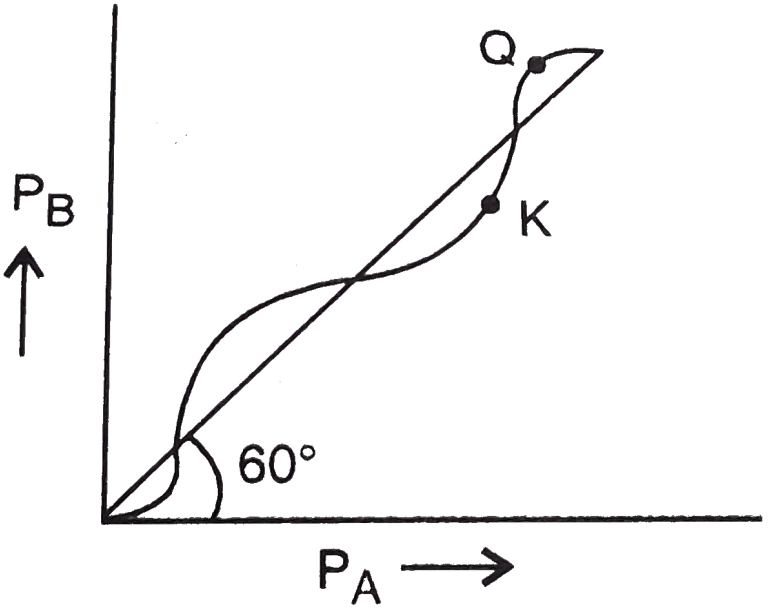

If A and B are enclosed in the cylinder and piston of the cylinder be moved downward so that volume of cylinder becomes half, then what will be the effect in K_c at constant temeprature ?

A. K_c will increase

B. K_c will decrease

C. K_c has no relation with K_p

D. No effect in K_c

Answer: D

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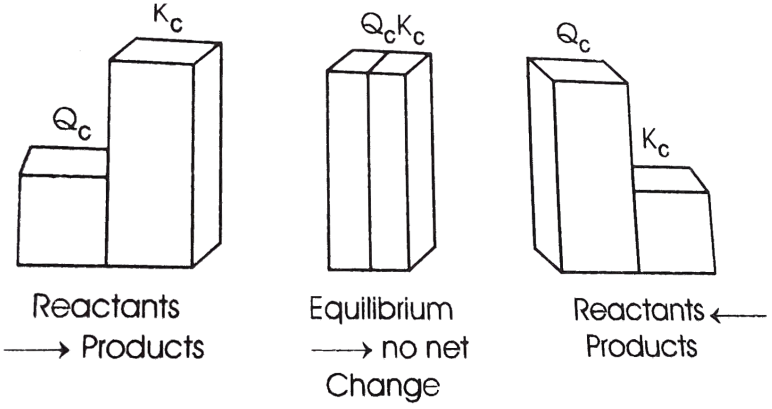

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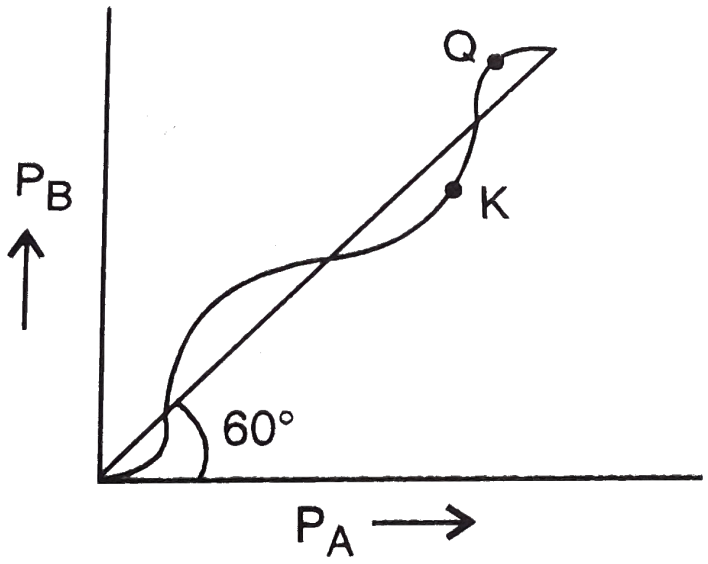

Suppose $N_2O_4(g)$ is enclosed in a cylinder fitted with a movable piston which attains the following equilibrium

$N_2O_4)(g) \Leftrightarrow 2NO_2(g)$

Given that for the 10 atmosphere pressure of the equilibrium mixture, the content of NO_2 is 8×1^5 ppm. if the piston of cylinder is moved upward in such a manner so that the volume of the gaseous mixture becomes double, then what will be new ppm of $NO_2(g)$ in the cylinder ? (Assuming that the temperature of the cylinder remains constant)

A. 8.2×10^5ppm

B. 10^5 ppm

C. 8.72×10^5 ppm

D. 7.4×10^5 ppm

Answer: C

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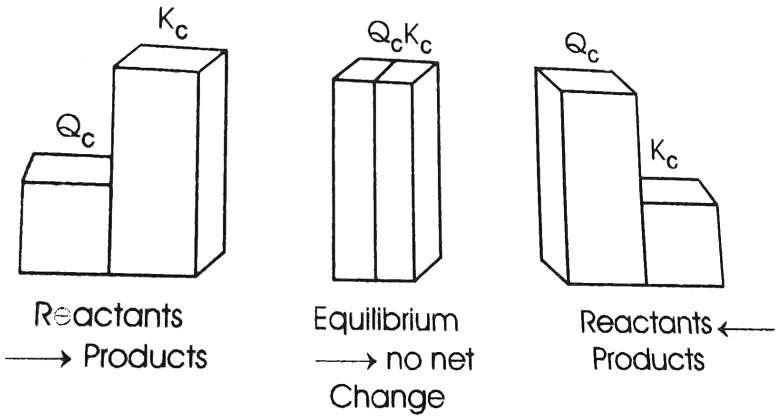

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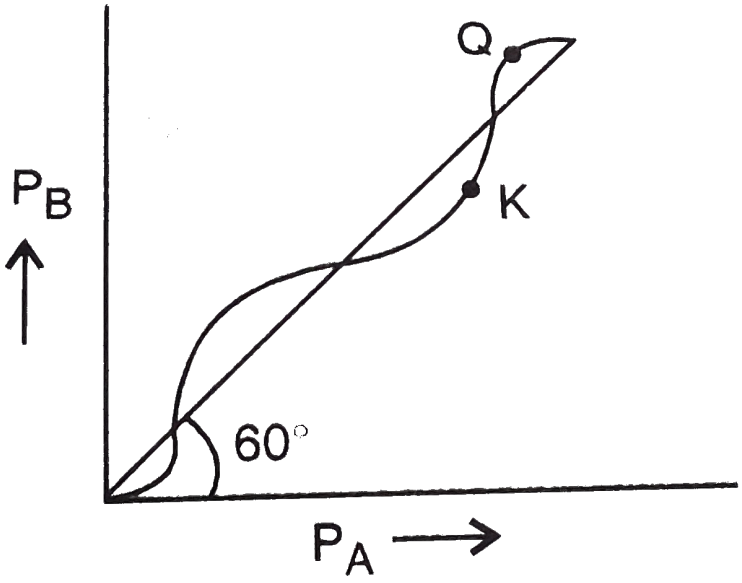
$\Delta G = \Delta G^\circ + RT \ln Q$, where Q is reaction quotient and $\Delta G^\circ =$ change in Gibbs energy at standard condition.

For equilibrium $A(g) \Leftrightarrow B(g)(K_{eq} = 1.732)$ If the pressure of the

system [varied by introducing a stream of $A(g)$ and B (g) is represented by the curve at constant temperature T.



Suppose the equilibrium system

$N_2O_4(g) \Leftrightarrow 2NO_2(g)$

$N_2O_4(g)$ is in a cylinder fitted with a movable piston . Which of the following statements is correct ?

A. If piston is pushed downwards at constant temperature, $Q_c > K_c$ and the direction shifts in the left direction.

B. If pistaon is pushed downwards at constant temperature $Q_c > K_c$ and the reaction shifts in the right direction.

C. If piston is released at constant temperature , $Q_c > K_c$ and the reaction shifts in the left direction.

D. If piston is released at a constant temperature, and the reaction shifts in the right direction.

Answer: A

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6. The reaction which is in dynamic equilibrium, ensured us, that the reaction is reversible . But if that the reaction is in equilibrium. The reaction quotient predict either the reversible reaction is in equilibrium or tries to achieve equilibrium. In those reactions which have not achieved equilibrium, we obtain reaction quotient Q_c in place of equilibrium constant (K_c) by substituting the concentration of reactant and product at the time, at whih we have to calculate the value of Q_c . To determine the direction at which the net reaction will proceed to achieve equilibrium, we compare values of Q_c and K_c. The three possible cases

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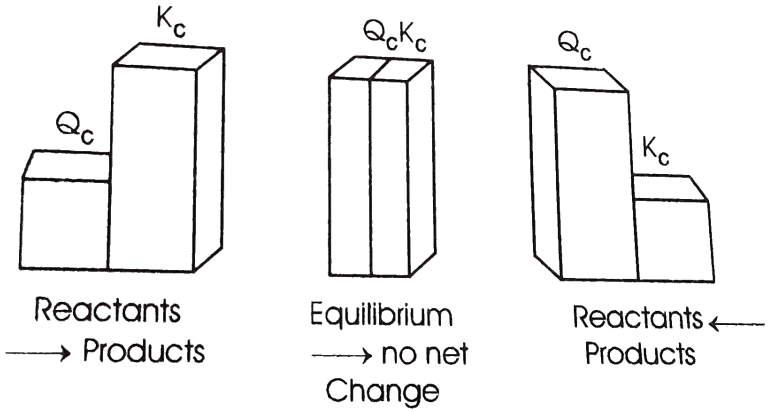

Change in Gibbs free energy, i.e., ΔG is the driving force of any reaction.

For spontaneous reaction , $\Delta G = -ve$

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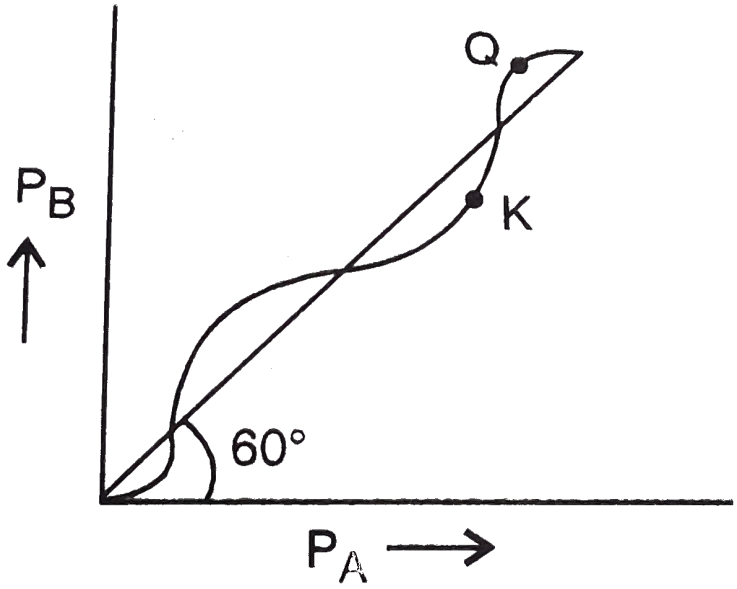
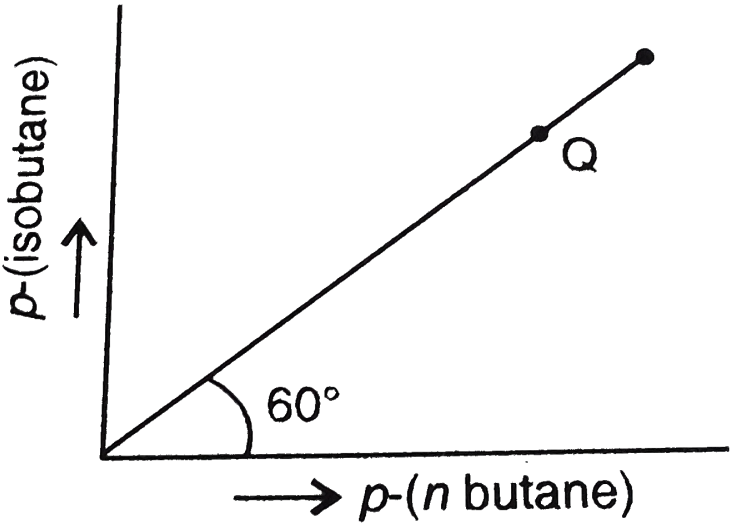


For the equilibrium

n Butane $(g) \Leftrightarrow$ Isobutane $(g), (K_{eq} = 1.732)$ If the pressure of the system (varied by introducing a stream of n butane and isobutane) is represented by the curve at constant temperature T.



At a particular point Q, which of the following statements holds good ?

A. The reaction moves in the backward direction.

B. The reaction movess in the forward direction.

C. The reaction is at equilibrium .

D. The data is insufficient to prodict

Answer: C

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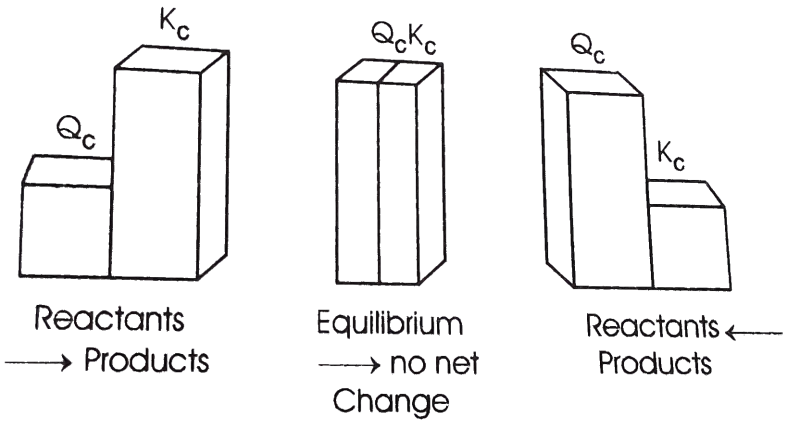

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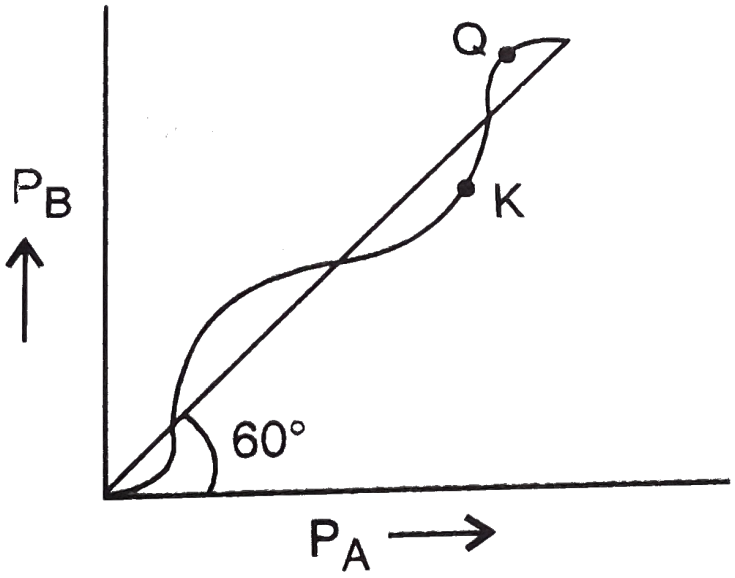

If the gaseous substances A,B,C, be in equilibrium as under :

$$\begin{array}{ccc} B(g) & \Longleftrightarrow & A(g) \\ 10\,\% & & 60\,\% \\ B(g) & \Longleftrightarrow & C(g) \\ 10\,\% & & 30\,\% \end{array}$$

then which of the following is the correct order of stability of A,B, and C in the equilibrium mixture ?

A. $A > B > C$

B. $C > B > A$

C. $A > C > B$

D. $B > A > C$

Answer: C

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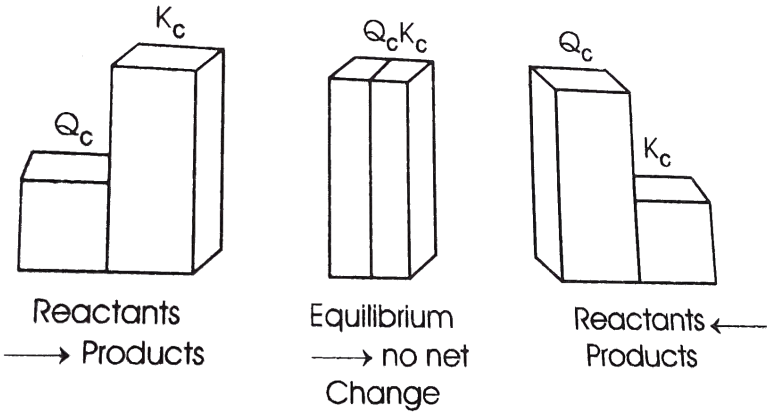

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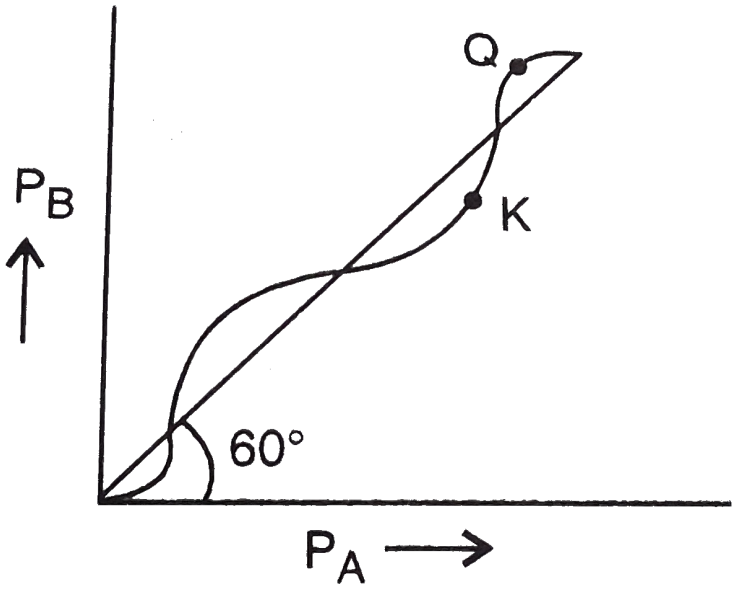

For equilibrium system

$N_2O_4(g) \Leftrightarrow 2NO_2(g)$

$N_2O_4(g)$ is in a cylinder which is fitted with movable piston. Assume that equilibrium partial pressure of $N_2O_4(g)$ and $NO_2(g)$ are 10 and 14 atmospheres respectively. If the piston of the cylinder is pulled out in such way so that volume of the system than what will be the value of equilibrium partial pressure of the NO_2 gas ?

A. 10.7 atm

B. 9.72 atm

C. 5.72 atm

D. 7.72 atm

Answer: D

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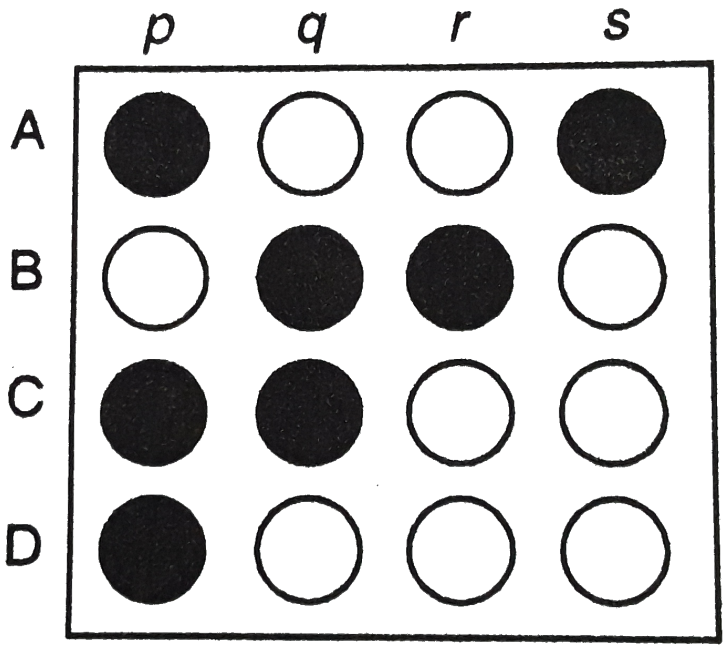
Matrix Match Type Mcqs

1. Statements in Column I are labelled as A,B,C and D whereas the statements in Column II are labelled as p,q,r and s . The answers to these question are to be appropriately bubbled as illustrated in the following example.

If the correct matches are $A-p, A-SB-q, B-r, C-p, C-q$ and

$D - p$ then correctly labelled 4×4 matrix should look like the following



(Column I, , , , Column II), $((A)N_2(g) + 3H_2(g) \Leftrightarrow 2NH_3(g), \Delta H = -9$
$((B)N_2(g) + O_2(g) \Leftrightarrow 2NO_2(g), \Delta H = +180kJ, , , ,$ (q) K decreases wi
$((C)A(g) + B(g) \Leftrightarrow 2C(g) + D.(g), \Delta H = +ve, , , ,$ (r) Pressure has n

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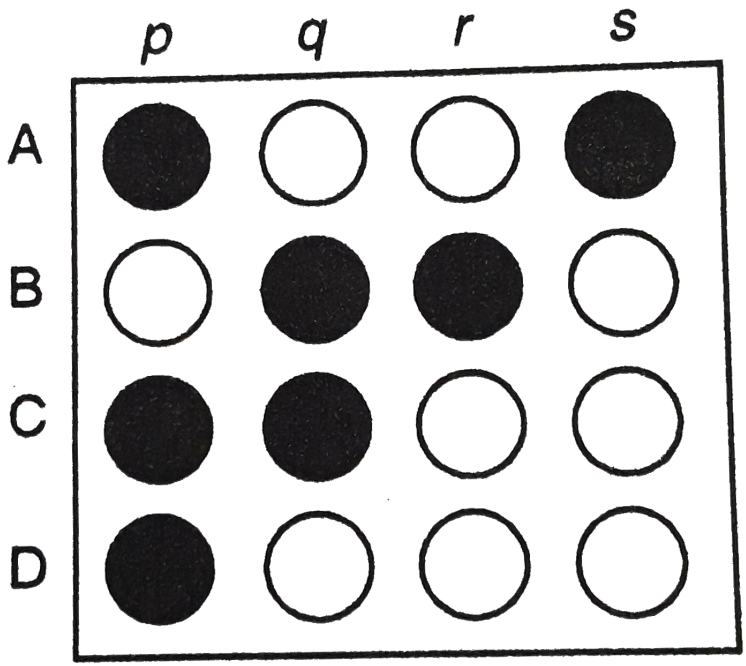

2.

Column I	Column II
Chemical equilirium	(p) Dynamic
Physical equilibrium	(q) Reversible chamical change
Ionic equilibrium	(r) Reversible physical change
Equilibrium constant	(s) Affected by change in temperature

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Reason Assertion Type Mcqs

1. Assertion (A) : The equilibrium constant is fixed and characteristic for any given chemical reaction at a specified temperature.

Reason (R) : The composition of the final equilibrium mixture at a particular temperature depends upon the starting amount of reactants.

A. Both A and R are true and R is the correct explanation of A.

B. Both A and R are true but R is not a correct explanation of A.

C. A is true but R is false

D. A is false but R is true.

Answer: c

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2. Assertion (A): Water boiling at $100^{\circ}C$ at 1 atmospheric pressure in a beaker is not at equilibrium.

Reason (R): If refers to an open system.

A. Both A and R are true and R is the correct explanation of A.

B. Both A and R are true but R is not a correct explanation of A.

C. A is true but R is false

D. A is false but R is true.

Answer: a

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3. Assertion (A) : The values of equilibrium constant of forward and backward reactions are same.

Reason (R) : Under particular set of conditions, the values of equilibrium constants of forward and backward reactions are reciprocal to each other.

A. Both A and R are true and R is the correct explanation of A.

B. Both A and R are true but R is not a correct explanation of A.

C. A is true but R is false

D. A is false but R is true.

Answer: d

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4. Assertion (A) : Chemical equilibrium represents a state of a reversible reaction in which measurable properties of the system (pressure, concentration , colour etc.) become constant under the given set conditions.

Reason (R) : A chemical equilibrium is attained when the concentrations of the reactants become equal to the concentrations of the products.

A. Both A and R are true and R is the correct explanation of A.

B. Both A and R are true but R is not a correct explanation of A.

C. A is true but R is false

D. A is false but R is true.

Answer: c

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5. Assertion (A) : The value of equilibrium constant tells us about the extent to which the reactants are converted into the products before the equilibrium is attained at that given temperature.

Reason (R) : A small value of K means only small quantities of reactant have undergone change into the products.

A. Both A and R are true and R is the correct explanation of A.

B. Both A and R are true but R is not a correct explanation of A.

C. A is true but R is false

D. A is false but R is true.

Answer: a

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6. Assertion (A) : The equilibrium is not static but a dynamic one.

Reason (R) : The chemical equilibrium is an apparent state of rest in

which two opposing reactions are proceeding at the same rate.

A. Both A and R are true and R is the correct explanation of A.

B. Both A and R are true but R is not a correct explanation of A.

C. A is true but R is false

D. A is false but R is true.

Answer: a

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7. Assertion (A) : The value of equilibrium constant alters with temperature.

Reason (R) : The forward and backward reactions differ in their activation energies.

A. Both A and R are true and R is the correct explanation of A.

B. Both A and R are true but R is not a correct explanation of A.

C. A is true but R is false

D. A is false but R is true.

Answer: a

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8. Assertion (A) : For the reaction

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

unit of $K_c = L^2 mol^{-2}$

Reason (R) : For the reaction

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

equilibrium constant $K_c = \frac{[NH_3]^2}{[N_2] \times [H_2]^3}$

A. Both A and R are true and R is the correct explanation of A.

B. Both A and R are true but R is not a correct explanation of A.

C. A is true but R is false

D. A is false but R is true.

Answer: a

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9. Assertion (A) : For gaseous reaction when $\Delta n = 0$, $K_p = K_c$.

$\Delta n =$ change in the number of gas moles

Reason (R) : For gaseous reaction, $K_p = K_c(RT)^{\Delta n}$

A. Both A and R are true and R is the correct explanation of A.

B. Both A and R are true but R is not a correct explanation of A.

C. A is true but R is false

D. A is false but R is true.

Answer: a

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10. Assertion (A) : Addition of an inert gas to the equilibrium mixture has no effect on the state of equilibrium at constant volume or at constant pressure.

Reason (R) : The addition of inert gas at constant volume will not alter the concentrations of the reactants as well as products of a reaction mixture.

A. Both A and R are true and R is the correct explanation of A.

B. Both A and R are true but R is not a correct explanation of A.

C. A is true but R is false

D. A is false but R is true.

Answer: d

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1. For the equilibrium

$N_2 + 3H_2 \Leftrightarrow 2NH_3$ at 298K

and 5 atm. Pressure, increasing pressure to 50 atm, will (here K is the equilibrium constant)

A. decrease the yield of NH_3 as well as the value of K

B. increase the yield of NH_3 as well as the value of K

C. increase the yield of NH_3, but will not change the value of K

D. increase the yield of NH_3 , but will decrease the value of K

Answer: C

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2. External pressure on ice at $0^\circ C$ is increased from 1 to 1.2 atm

A. It has no effect on the melting point of ice

B. It increases the melting point of water

C. It decreases the melting point of water

D. None of these

Answer: C

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3. Flash evaporation is

A. evaporating a liquid in a flash of light

B. evaporating a liquid under reduced pressure

C. instant evaporationg by very strong heating with a laser

D. none of these

Answer: B

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4. Freeze drying is

A. drying a wet substance by putting it in a fridge

B. freezing a substance and drying it mechanicallye

C. subliming off water at a temperature below the freezing point of water by reducing external pressure

D. none of these

Answer: C

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5. Which of the following equilibrium will shift left on increasing temperature.

$(i) \quad H_2O(g) \Leftrightarrow +1/2O_2(g)$

$(ii) \quad CO_2(g) + C(s) \Leftrightarrow CO(g)$

$(iii) \quad C(s, \text{diamond}) \Leftrightarrow C(s, \text{graphite})$

A. Only (i)

B. Both (i) and (ii)

C. Only (iii)

D. None

Answer: C

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6. Which of the following equilibrium will shift left on increasing pressure ?

$(i) \quad CO(g) + H_2(g) \Leftrightarrow CO_2(g) + H_2(g)$

$(ii) \quad C(s, \text{diamond}) \Leftrightarrow C(s, \text{graphite})$

$(iii) \quad CaCO_3(s) \Leftrightarrow CaO(s) + CO_2(g)$

A. Only (i)

B. Only (iii)

C. Both (ii) and (iii)

D. None

Answer: C

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7. A system at equilibrium is described by the equation

$SO_2Cl_2 \Leftrightarrow SO_2 + Cl_2, \Delta H = +ve.$

When Cl_2 is added to the equilibrium mixture at constant volume, the temperture of the system

A. increases

B. decreases

C. does not change

D. first increases and then decreases.

Answer: A

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8. For the reaction of XO with O_2 to form XO_2 the equilibrium constant at $398K$ is $1.0 \times 10^{-4} mol^{-1}$. If 1.0 mol of XO and 2,0 mol of O_2 are placed in a 1.0 L flask and allowed to come to equilibrium, the equilibrium concentration of XO_2 will be

A. $1.4 \times 10^{-2} molL^{-1}$

B. $2.8 \times 10^{-2} molL^{-1}$

C. $2.8 \times 10^{-3} molL^{-1}$

D. none of these

Answer: A

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9. For the hypothetical reaction

$A + B \Leftrightarrow C + 2D$

equilibrium constant at 400 K is 1.8×10^{-6} mol L^{-1}

A. $9.5 \times 10^{-5} molL^{-1}$

B. $9.5 \times 10^{-4} molL^{-1}$

C. $4.75 \times 10^{-4} molL^{-1}$

D. None of these

Answer: B

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10. The theoretically computed equilibrium constant for the polymerisation of formaldehyde to glucose in aqueous solution : $6HCHO \Leftrightarrow C_6H_{12}O_6$ is 1.0×10^{24} If 1 M-solution of glucose was taken, what should be the equilibrium concentration of formaldehyde ?

A. $1.6 \times 10^{22} M$

B. $1.6 \times 10^{-4} M$

C. $6\sqrt{6 \times 10^4} \times 10^3 M$

D. None of these

Answer: B

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11. NH_4ClO_4 crystallises in orthohombic structure with unit cell volume of $395Å^3$. The structure of $HClO_4.\ H_2O$ will be

A. tetragonal will unit cell volume of $210Å^3$

B. cubic with unit cell volume of $78Å^3$

C. orthorhomibic with unit cell volume of $370Å^3$

D. the data given is not sufficient to find the structure.

Answer: C

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12. Solubility of NaOH in water

A. increases with increase in temperature

B. decreases with increase in temperature

C. is not affected by a change in temperature

D. first increases and then decreases with temperature.

Answer: B

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13. Solubility of N_2 in water

A. increases with increase in temperature

B. decreases with increase in temperature

C. is not affected by a change in temperature

D. first increases and then decreases with temperature.

Answer: B

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