CHEMISTRY

BOOKS - UNIVERSAL BOOK DEPOT 1960 CHEMISTRY (HINGLISH)

CHEMICAL EQULIBRIUM

(ORDINARY THINKING) REVERSIBLE AND IRREVERSIBLE REACTION

1. In line kilns, the following reaction,

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

proceeds to completion because of

A. Of the high temperaturee

B. CaO is more stable than $CaCO_3$

C. CaO is not dissciated

D. CO_2 escapes continuously

Answer: D

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2. All reactions which have chemical disintegration

A. Is reversible

B. Is reversible and endothermic

C. Is exothermic

D. Is reversible or irreversible and endothermic or exothermic

Answer: D

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3. Which of the following is reversible process

A. Melting of ice at $10^{\circ} C$

B. Mixing of two gases by diffusion

C. Evaporation of water at $100^{\circ} C$ and 1 atm pressure

D. None of the above

Answer: C

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4. In the given reaction $N_2(g) + O_2(g) \Leftrightarrow 2NO(g)$, equilibrium means that

A. Concentration of reactants is changing where as concentration of products is constant

B. Concentration of all substances is contant

C. Concentration of reactants is constant where as concentration of prodcts is changing

D. Concentaration of all substances is changing

Answer: B

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5. Which of the following is an irreversible reaction?

A. $2NH_3 \rightarrow N_2 + 3H_2$

B. $PCl_5 \rightarrow PCl_3 + Cl_2$

C. $KClO_3 \rightarrow KCl + O_2$

D. $SO_3 \rightarrow SO_2 + O_2$

Answer: C

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(ORDINARY THINKING) EQUILIBRIUM STATE

1. In any chemical, an equilibrium is believed to be established when

A. Mutual reaction undergo in opposite reaction

B. Concentration of reactants and resulting products are equal

C. Velocity of mutual reactions become equal

D. The temperaturee of mutual opposite reactions become equal

Answer: C

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2. In chemical reaction $A \Leftrightarrow B$, the system will be know in equilibrium when

A. A completely changes to B

B. 50% of A changes to B

C. The rate of change of A to B and B to A on both the side are same

D. Only 10% of A chages to B

Answer: C

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3. The number of gram molecules of a substance present in unit volume is termed as

A. Activity

B. Normal solution

C. Molar concentration

D. Active mass

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4. The free energy for a recersible reaction at equlibrium is

A. Negative

B. Positive

C. Zero

D. Either positive or negative but not zero

Answer: B

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5. Which of the following statements ragarding a chemical equilibrium wrong

A. An equilibrium can be shifted by altering the temperaturee of pressure

B. An equilibrium can be shifted by altering the temperaturee or pressure

C. The same state of equilibrium is reacted whether one starts with the reactants or the products

D. Thet forward reaction si fovoured by the addition of a catalyst

Answer: A

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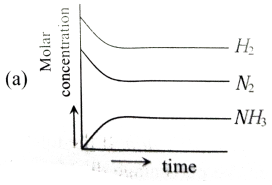
6. For the synthesis of ammonia by the reaction $N_2 + 3H_2 \Leftrightarrow 2NH_3$ in the Haber's process ,the attainment of equilibrium is correctly predicated bt the curve

A.



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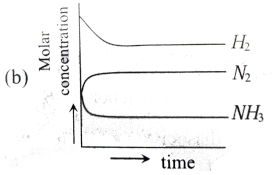

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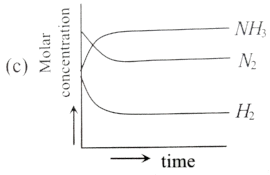
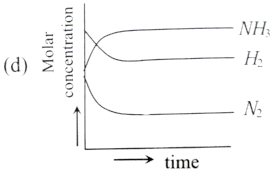


D.



Answer: C

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7. Which of the following conditions represents an equilibrium

A. Freezing of ice in a open vessel, temperaturee of ice is constant

B. Few drops of water is present along with air in a balloon, temperaturee of balloon is constant

C. Water is boiling in an open vessel over stove, temperaturee of water is constant

D. All the statements (a), (b) and (c) are correct for the equilibrium

Answer: A

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8. Assertion : Catalyst affects the final state of the equlibrium.

Reason: It enables the system to attain a new equilibrium state by complexing with the reagents.

A. If both assertion and reason are true and the reason in the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are false.

Answer: D

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9. Assertion : On cooling a freezing mixture, color of the mixture turns to pink from deep blue for a reaction. $Co(H_2O)_6^{2+}\_(aq) + 4Cl^-\_(aq) \Leftrightarrow CoCI_4^{2-}(aq) + 6H_2O_{(l)}$.

Reason : Reaction is endothermic so on cooling, the reaction moves to backward direction.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are false.

Answer: C

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(ORDINARY THINKING) LAW OF MASS ACTION

1. Under a given set of experiemental condition, with increase in the concentration of the reactants, the reate of a chemical reaction

A. Decreases

B. Increases

C. Remains unaltered

D. First decreases and them increases

Answer: B

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2. According to law of mass action rate of a chemical reaction is proportional to

A. Concentration of reactants

B. Molar concentration of reactants

C. Concentaation of products

D. Molar concentration of products

Answer: B

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3. 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. $87\ \%$

B. $13\ \%$

C. $43.5\ \%$

D. $6\ \%$

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

A. 6.3 atm

B. 6.93 atm

C. 0.63 atm

D. 69.3 atm

Answer: B

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5. Which is false

A. The greater the concentration of the substance involved in a reaction, the lower the speed of the reaction

B. The point of dynamic equilibrium is reached when the reaction rate in one direaction just balances the reaction rate in the opposote direction

C. The presentce of free ions facilitates chemical changes

D. The presence of the free ions facilitates chemical changes

Answer: A

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6. 120g of urea is present in 5L of solution, the active mass of urea is

A. 0.2

B. 0.06

C. 0.4

D. 0.08

Answer: C

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7. The law of mass action was enunciated by

A. Guldberg and Waage

B. Badenstein

C. Birthelot

D. Graham

Answer: A

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8. Theory of 'active mass' indicates that the rate of a chemical reaction is directly proportional to the

A. Equlibrium constant

B. Properties of reactants

C. Volume of apparatus

D. Concentration of reactants

Answer: D

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9. Chemical equations convey quantitative information on the

A. Type of atoms/molecules taking part in the reaction

B. Number of atoms/molecules of the reactants and products involved in the reaction

C. Relative number of moles of reactants and products involved in the reaction

D. Quantity of reactant consumed and quantity of product formed

Answer: C

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10. Assertion: Equlibrium constant has meaning only when the corresponding balanced chemical equation is given.

Reason: Its value changes for the new equation obtained by multiplying or dividing the original equation by a number

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If assertion is false but reason is true.

Answer: A

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(ORDINARY THINKING) Law of equilibrium and Equilibrium constant

1. In a chemical equilibrium $A + B \Leftrightarrow$ C + D, when one mole each of the two reactants are mixed, 0.6 mole each of the products are formed. The equilibrium constant calculated is

A. 1

B. 0.36

C. 2.25

D. $4/9$

Answer: C

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2. 28 g of $N_{20 \text{ and } 6g} of H_2$ were keip at $40^\circ C$ in 1 litre vesscel the equilibrium mixture contained $24.54g$ of NH_3. The approximate

value of $K_c$for the above reaction can be (in $\text{mole}^{-2}\text{litre}^2$

A. 75

B. 50

C. 25

D. 100

Answer: A

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3. In the gas phase reaction, $C_2H_4 + H_2 \Leftrightarrow C_2H_6$, the equilibrium constant can be expressed in units of

A. $\text{litre}^{-2}\text{mole}^{-1}$

B. litre mole^{-1}

C. $\text{mole}^2\text{litre}^2$

D. mole litre^{-1}

Answer: B

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4. In a 500 ml capacity vessel CO and Cl_2 are mixed to form $COCl_2$. At equilibrium, it contains 0.2 moles of $COCl_2$ and 0.1 mole of each of CO and Cl_2. The equilibrium constant K_c for the reaction $CO + Cl_2 \Leftrightarrow COCl_2$ is

A. 5

B. 10

C. 15

D. 20

Answer: B

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5. In the reaction,

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

The concentration of H_2, I_2, and HI at equilibrium are 8.0, 3.0 and 28.0 mol per L respectively. Determine the equilibrium constant.

A. 30.66

B. 32.66

C. 34.66

D. 36.66

Answer: B

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6. The equilibrium constant (K_c) for the reaction HA + B $\Leftrightarrow BH^+ + A^-$ is 100. If the rate constant for the forward reaction

is 10^5, then constant for the backward reaction is

A. 10^7

B. 10^3

C. 10^{-3}

D. 10^{-5}

Answer: B

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7. In Haber process 30 litre of dihydrogen and 30 litres of dinitrogen were taken for reaction which yielded only 50% of the expected product. What will be the composition of gaseous mixture under the aforesaid condition in the end ?

A. 20 litres ammonia, 25 litres nitrogen, 15 litres hydrogen

B. 20 litres ammonia, 20 litres nitrogen, 20 litres hydrogen

C. 10 litres ammonia, 25 litres notrogen, 15 litres hydrogen

D. 20n litres ammonia, 10 litres notrogen, 30 litres hydrogen

Answer: C

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8. The value of equilibrium constant of the reaction. $HI(g) \Leftrightarrow \frac{1}{2}H_2(g) + \frac{1}{2}I_2(g) is 8.0$ The equilibrium constant of the reaction. $H_2(g) + I_2(g) \Leftrightarrow 2HI(g)$ will be

A. 16

B. $\frac{1}{8}$

C. $\frac{1}{16}$

D. $\frac{1}{64}$

Answer: D

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9. The dissociation constants for acetic acid and HCN at $25^{\circ}C$ are 1.5×10^{-5} and 4.5×10^{-10} , respectively. The equilibrium constant for the equilibirum $CN^{-} + CH_3COOH \Leftrightarrow HCN + CH_3COO^{-}$ would be

A. 3.0×10^{5}

B. 3.0×10^{-5}

C. 3.0×10^{-4}

D. 3.0×10^{4}

Answer: D

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10. The reaction,

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

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

A. $[(0.75)^3(0.25)] \div [(1.00)^2(1.00)]$

B. $[(0.75)^3(0.25)] \div [(0.50)^2(0.75)]$

C. $[(0.75)^3(0.25)] \div [(0.50)^2(0.25)]$

D. $[(0.75)^3(0.25)] \div [(0.75)^2(0.25)]$

Answer: B

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11. 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. $\frac{1}{(K_1K_2)}$

B. $\frac{1}{(2K_1K_2)}$

C. $\frac{1}{(4K_1K_2)}$

D. $\left[\frac{1}{K_1K_2}\right]^{1/2}$

Answer: D

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12. Given that equilibrium constant for the reaction $2SO_2(g) + O_2(g) \Leftrightarrow 2SO_3(g)$ has a value of 278 at a particular

temperature. What is the value of the equilibrium constant for the following reaction at the same temperature ?

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

A. 1.8×10^{-3}

B. 3.6×10^{-3}

C. 6.0×10^{-2}

D. 1.3×10^{-5}

Answer: C

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13. Given the reaction between 2 gases represented by A_2 and B_2 to given the compound AB(g). $A_2(g) + B_2(g) \Leftrightarrow 2AB(g)$

At equilibrium, the concentrtation

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

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

of $AB = 2.8 \times 10^{-3} M$

If the reaction takes place in a sealed vessel at $527^{\circ} C$. then the value of K_c will be

A. 2.0

B. 1.9

C. 0.62

D. 4.5

Answer: C

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14. If the value of equilibrium constant for a particular reaction is 1.6×10^{12} , then art equilibrium the system will contain

A. Mostly reactants

B. Mostly products

C. Similar amounts of reactants and products

D. All reactants

Answer: B

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15. In the equilibrium constant for $N_2(g) + O_2(g) \Leftrightarrow 2NO(g)$ is K, the equilibrium constant for $\frac{1}{2}N_2(g) + \frac{1}{2}O_2(g) \Leftrightarrow NO(g)$ will be:

A. $K^{1/2}$

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

C. K

D. K^2

Answer: A

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16. The equilibrium constant in a reversible reaction at a given temperature which

A. Depends on the initial concentration of the reactants

B. Depends on the concentration of the products at equilibrium

C. Does not depend on the initial concentrations

D. It is not characteristic of the reaction

Answer: C

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17. For which of the following reaction does the equilibrium constant depend on the units of concentration

A. $NO_{(g)} \Leftrightarrow \frac{1}{2}N_{2(g)} + \frac{1}{2}O_{2(g)}$

B. $ZN_{(s)} + CU^{2+}_{(aq)} \Leftrightarrow Cu_{(s)} + Zn^{2+}_{(aq)}$

C.

$$C_2H_5OH_{(1)} + CH_3COOH_{(1)} \Leftrightarrow CH_3COOC_2H_{5(1)} + H_2O_{(1)}$$

(Reaction carried in an inert solvent)

D. $COCl_{2(g)} \Leftrightarrow CO_{(g)} + Cl_{2(g)}$

Answer: D

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18. 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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19. The rate constant for forward and backward reactions of hydrolysis of ester are 1.1×10^{-2} and 1.5×10^{-3} per minute respectively. Equilibrium constant for the reaction is

A. 4.33

B. 5.33

C. 6.33

D. 7.33

Answer: D

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20. 3.2 moles of hydrogemn iodide was heted in a sealed bulb at $444^{\circ}C$ till the equilibrium state was reached. Its degree of dissociation sat this temperature was found to be 22%. The number of moles of hydrogen iodide present at equilibrium is

A. 2.496

B. 1.84

C. 2

D. 4

Answer: A

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21. A reaction is $A + B \Leftrightarrow C + D$. Initially we start with equal concentration of A and B. At equlibrium we find the moles of C is two times of A. What is the equilibrium constant of the reaction

A. 4

B. 2

C. $1/4$

D. $1/2$

Answer: A

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22. In a reversible chemical reaction having two reactants in equilibrium, if the concentration of the reactants are doubled then the equilibrium constant will :

A. Also be doubled

B. Be halved

C. Become one-fourth

D. Remain the same

Answer: D

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23. For the system $A(g) + 2B(g) \Leftrightarrow C(g)$ the equilibrium concentration is

$A = 0.06 molL^{-1}$, $B = 0.12 molL^{-1}$

$C = 0.216 molL^{-1}$ The K_{eq} for the reaction is

A. 250

B. 416

C. 4×10^{-3}

D. 125

Answer: A

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24. The suitable expression for the equilibrium constant of the reaction $2NO_{(g)} + Cl_{2(g)} \Leftrightarrow NOCl_{(g)}$ is

A. $K_c = \frac{[2NOCl]}{[2NO][Cl_2]}$

B. $K_c = \frac{[2NOCl]^2}{[2NO]^2[Cl_2]}$

C. $K_c = \frac{[NOCl]^2}{[NO][Cl_2]^2}$

D. $K_c = \frac{[NOCl]^2}{[NO]^2[Cl_2]^2}$

Answer: B

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25. Partial pressure of A, B, C, and D on the basis of gaseous system $A + 2B \Leftrightarrow$ C + 3D are $A = 0.02, B = 0.10, C = 0.30$ and $D = 0.05$ atm. The numerical value of equilibrium constant is

A. 11.25

B. 18.75

C. 5

D. 3.75

Answer: D

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26. For the system $3A + 2B \Leftrightarrow$ C, the expression for equilibrium constant is

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

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

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

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

Answer: D

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27. For homogeneous gas reaction $4NH_3 + 5O_2 \Leftrightarrow 4NO + 6H_2O$. The equilibrium constant K_c has the unit of

A. Conc $^{\cdot} + (10)$

B. Conc $^{+1}$

C. Conc $^{-1}$

D. It is dimensionless

Answer: B

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28. 4 moles of A are mixed with 4 moles of B. At equilibrium for the raction $A + B \Leftrightarrow C + D$, 2 moles of C and D are formed. The equilibrium constant for the reaction will be

A. $\frac{1}{4}$

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

C. 1

D. 4

Answer: C

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29. In the reaction, $H_2 + I_2 \Leftrightarrow 2.\ Hl.$ In a 2 litre flasek 0.4 moles of HI each H_2 and I_2 are taken. At equlibrium 0.5 moles of HI are formed. What will be the value of equilibrium constant, k_c

A. 20.2

B. 25.4

C. 0.284

D. 11.1

Answer: D

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30. 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. $1.8, 2.4$

C. $0.4, 2.4$

D. $0.8, 2.0$

Answer: A

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31. On doubling P and V at constant temperature, the equilibrium constant will

A. Remain constant

B. Becomne double

C. Become one-fourth

D. None of these

Answer: A

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32. If α is the fraction of HI dissociated at equilibrium in the reaction, $2HI(g) \Leftrightarrow H_2(g) + I_2(g)$ starting with the 2 moles of HI. Then the total number of moles of reactants and products at equilibrium are

A. 1

B. 2

C. $1 + \alpha$

D. $2 + 2\alpha$

Answer: B

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33. If concentration of reactant is increased by 'm' then k becomes :

A. $\ln(K/x)$

B. K/x

C. $K + x$

D. K

Answer: D

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34. At temperature T, a compound $AB_2(g)$ dissociates according to the reaction

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

with degree of dissociation α, which is small compared with unity. The expression for K_p in terms of α and the total pressure P_T is

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

B. $\frac{Px^2}{2}$

C. $\frac{Px^3}{3}$

D. $\frac{Px^2}{2}$

Answer: A

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35. 2 mol of N_2 is mixed with 6 mol of H_2 in a closed vessel of one litre capacity. If $50\,\%$ N_2 is converted into NH_3 at equilibrium, the value of K_c for the reaction

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

A. $4/27$

B. $27/4$

C. $1/27$

D. 24

Answer: A

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36. The equlibrium constant K_P for the thermal dissociation of $PCl_5 at 200^\circ C$ is 1.6 atm. The pressure (in atm) at which it is $50\,\%$ dossociated at that temperaturee

A. 4.8

B. 4.2

C. 3.2

D. 6.4`

Answer: A

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37. If the equilibrium constant for the reaction $N_2(g) + 3H_2(g) \Leftrightarrow 2NH_3(g) at 750K$ is 49, then the equilibrium constant for the reaction $NH_3(g) \Leftrightarrow \frac{1}{2}N_3(g) + \frac{3}{2}H_2(g)$ at the same temperaturee is

A. $\frac{1}{49}$

B. 49

C. $\frac{1}{7}$

D. 49^2

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38. In the equilibrium, $2A \Leftrightarrow B + C,$ the equilibrium concentrations of $A. B \text{ and } Cat 300K$ are $3 \times 10^{-4}M, 1 \times 10^{-4}M \text{ and } 4.5 \times 10^{-4}M$ respectively. Thte vlue of K_c for the above equilibrium at 300 K is

A. 0.5

B. 0.05

C. 5.0

D. 1.5

Answer: A

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39. 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. 0.050

C. 0.033

D. 0.067

Answer: C

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40. Unit of equilibrium constant for the reversible reaction $H_2 + I_2 \Leftrightarrow 2HI$ is

A. mol^{-1} litre

B. mol^{-2} litre

C. mol $litre^{-1}$

D. None of these

Answer: D

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41. The equilibrium concentration of x, y and z are 4, 2 and 2 mol L^{-1}, respectively, at equilibrium of the reaction $2x + y \Leftrightarrow z$. The value of K_c is .....

A. 0.625

B. 2.0625

C. 6.25

D. 0.00625

Answer: B

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42. 4.5 moles each of hydrogen and iodine heated in a seated in a sealed ten litre vessel. At equlibrium, 3 moles of HI were found. The equilibrium constnt for $H_{2(g)} \Leftrightarrow PCl_{3(g)} + Cl_{2(g)}$ is

A. 1

B. 10

C. 5

D. 0.33

Answer: A

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43. 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. 2.0

B. 1.5

C. 1.0

D. 0.5

Answer: C

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44. 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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45. For the reaction, $AB(g) \Leftrightarrow A(g) + B(g), AB$ is $33\,\%$ dissociated at a total pressure of 'p' Therefore, 'p' is related to K_p by one of the following options

A. $P = K_p$

B. $+p3K_p$

C. $P = 6K_p$

D. $P = 8K_p$

Answer: D

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46. 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. 0.266

B. 0.53

C. 2.66

D. 5.3

Answer: A

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47. One mole of SO_3 was placed in a litre reaction vessel at a certain temperature. The following equilibrium was established $2SO_3(g) \Leftrightarrow 2SO_2(g) + O_2(g)$ At equilibrium 0.6 moles of SO_2 were formed. The equilibrium constant of the reaction will be

A. 0.36

B. 0.45

C. 0.54

D. 0.675

Answer: D

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48. For the reaction, $A + 2B \Leftrightarrow C$, the expession for equilibrium constant is

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

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

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

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

Answer: C

Watch Video Solution

49. 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. 0.25

C. 0.50

D. 4.0

Answer: D

Watch Video Solution

50. A 1 M solution of glucose reaches dissociation equilibrium according to equation given below $6HCHO \Leftrightarrow C_6H_{12}O_6$. What is the concentration of HCHO at equilibrium of equilibrium constant is 6×10^{22}

A. $1.6 \times 10^{-8}M$

B. $3.2 \times 10^{-6}M$

C. $3.2 \times 10^{-4}M$

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

Answer: D

View Text Solution

51. A quantity of PCl_5 ws heated in a 10 litre vessel at $250^\circ C: PCl_{5_g} \Leftrightarrow PCl_{3\,(g)} + Cl_{3\,(g)}$. At equilibrium the vessel contains 0.1 moles of $PCl_5 0.20$ mole of PCl_3 and 0.2 mole of Cl_2. The equilibrium constant of the reaction is

A. 0.02

B. 0.05

C. 0.04

D. 0.025

Answer: C

View Text Solution

52. The equlibrium constant is 6.0×10^{-4} for the $N_2 + O_2 \Leftrightarrow 2NO$ reaction. If the concentration of nitrogen is 0.10 mol/L and concentration of oxygen is 0.20 mol/L at equilibrium. Then the concentration of nitric oxide at equlibrium is

A. $10.9 \times 10^{-3} mol/L$

B. $1.09 \times 10^{-3} mol/L$

C. $10.9 \times 10^{-5} mol/L$

D. $1.09 \times 10^{-5} mol/L$

Answer: B

View Text Solution

53. One mole of pure ethyl alcohil was treated with one mole of pure acetic acid at $25^{\circ} C$ One -third of the acid changes into ester at equilibrium . The equilibrium constant for the reaction will be:

A. 1

B. 2

C. 3

D. 4

Answer: D

Watch Video Solution

54. On a given condition, the equilibrium concentration of HI, H_2 and I_2 are 0.80 , 0.10 and 0.10 mole/litre. The equilibrium constant for the reaction $H_2 + I_2 \Leftrightarrow 2HI$ will be

A. 64

B. 12

C. 8

D. 0.8

Answer: A

Watch Video Solution

55. 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. 0.0769

C. 0.0199

D. 1.99

Answer: C

Watch Video Solution

56. If in the reaction $N_2O_4 = 2N_2$, α is that part of N_2O_4 which dissociates, then the number of moles at equilibrium will be

A. 3

B. 1

C. $(1-\alpha)^2$

D. $(1+\alpha)$

Answer: D

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57. In a chemical reaction equilibrium is established when

A. Opposing reaction cases

B. Concentration of reactants and products are equal

C. Velocity of opposing reaction is the same as that of forward reaction

D. Reacton caeases to generate heat

Answer: C

Watch Video Solution

58. One mole of N_2O_4 is heated in a flask with a volume of $10dm^3$. At equilibrium 1.708 mole of NO_2 and 0.146 mole of N_2O_4 were found at $134^\circ C$. The equilibrium constnt will be

A. 250 mol dm^{-3}

B. 300 mol dm^{-3}

C. 2 mol dm^{-3}

D. 230 mol dm^{-3}

Answer: C

Watch Video Solution

59. Two moles of NH_3 when put into a previously evacuated vessel (one litre), partially dossociate into N_2 and H_2. If at equlib rium one mole of NH_3 is present, the equlibrium constant is

A. $3/4 mol^2 litre^{-2}$

B. $27/64 mol^2 litre^{-2}$

C. $27/32 mol^2 litre^{-2}$

D. $27/16 mol^2 litre^{-2}$

Answer: D

Watch Video Solution

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

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

A. $2500atm^2$

B. $50atm^2$

C. $100atm^2$

D. $200atm^2$

Answer: A

Watch Video Solution

61. The equilibrium $K_c$for the reaction $SO_2(g)NO_2(g) \Leftrightarrow SO_3(g) + NO(g)is16$ 1 mole of rach of all the four gases is taken in $1dm^3$ vessel , the equilibrium concentration of NO would be:

A. $0.4m$

B. $0.6m$

C. $1.4m$

D. $1.6m$

Answer: D

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62. The quantity of K in a rate of expression

A. is independent of concentration of reactants

B. Is called Arrhenius constant

C. Is dimesionless

D. Is independent of temperaturee

Answer: A

Watch Video Solution

63. Consider the imaginary equilibrium $4A(g) + 5B(g) \Leftrightarrow 4X(g) + 6Y(g)$, The unit of equilibrium constant K_C is

A. $\text{mole}^2 litre^2$

B. Litre mole^{-1}

C. Mole litre^{-1}

D. $\text{Litre}^2\text{mole}^2$

Answer: C

Watch Video Solution

64. Changing the volume of the system does not after the number of moles in which of the following equilibrium.

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

65. 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. $3.3 \times 10^{2} \text{mol litre}^{-1}$

B. $3 \times 10^{-1} \text{mol litre}^{-1}$

C. $3 \times 10^{-3} \text{mol litre}^{-1}$

D. $3 \times 10^{3} \text{mol litre}^{-1}$

Answer: C

Watch Video Solution

66. 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. 4×10^{-4}

B. 50

C. 2.5×10^2

D. 0.02

Answer: B

Watch Video Solution

67. What is the equilibrium expression for the reaction $P_4(s) + 50_2(g) \Leftrightarrow P_4O_{10}(s)$

A. $k_c = [O_2]^5$

B. $K_c = [P_4O_{10}] / [P_4][O_2]$

C. $K_c = [P_4O_{10}] / [P_4][O_2]^5$

D. $K_c = 1 / [O_2]^5$

Answer: D

Watch Video Solution

68. 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. 0.30

B. 0.18

C. 0.17

D. 1.11

Answer: D

Watch Video Solution

69. Phosphorus pentachloride dissociates as follows, ina closed reaction vessel, $PC1_{5(g)} \Leftrightarrow PC1_{3(g)} + C1_{2(g)}$ If total pressure at equilibrium of the reaction mixture is P and degree of dissociation of $PC1_5$ is x, the partial pressure of $PC1_3$ will be:

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

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

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

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

Answer: A

Watch Video Solution

70. In which of the followlwing, the reaction proceeds towards completion

A. $K = 10^3$

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

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

D. $K = 1$

Answer: A

Watch Video Solution

71. In the reaction, $A + B \Leftrightarrow 2C$, at equilibrium, the concentration of A and B is 0.20 mol L^{-1} each and that of C was found to be 0.60 mol L^{-1}. The equilibrium constant of the reaction is

A. 2.4

B. 18

C. 4.8

D. 9

Answer: D

Watch Video Solution

72. At a certain temp. $2HI \Leftrightarrow H_2 + I_2$. Only $50\,\%$ HI is dissociated at equilibrium. The equilibrium constant is

A. 0.25

B. 1.0

C. 3.0

D. 0.50

Answer: A

Watch Video Solution

73. 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. 40

B. 60

C. 50

D. 30

Answer: C

Watch Video Solution

74. Partial pressure of O_2 in the reaction

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

A. K_p

B. $\sqrt{K_p}$

C. $3\sqrt{K_p}$

D. $2K_p$

Answer: A

Watch Video Solution

75. One mole of $N_2O(g)$ at $300K$ is kept in a closed container under one atmosphere. It is heated to $600K$ when 20% by mass of $N_2O_4(g)$ decomposes of $NO_2(g)$. The resultant pressure

A. 1.2 atm

B. 2.4 atm

C. 2.0 atm

D. 1.0 atm

Answer: C

Watch Video Solution

76. The equilibrium constant of a reaction is 300, if the volume of the reaction flask is tripled, the equilibrium constant will be

A. 100

B. 900

C. 600

D. 300

Answer: D

Watch Video Solution

77. 3 moles of A and 4 moles of B are mixed together and allowed to come into equilibrium according to the following reaction.

$3A(g) + 4B(g) \rightarrow 2C(g) + 3D(g)$

When equilibrium is reached, there is 1 mole of C. The equilibrium constant of the reaction is

A. $1/4$

B. $1/3$

C. $1/2$

D. 1

Answer: C

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78. In a chemical equilibrium, the rate constant for the backward reaction is 7.5×10^{-4} and the equilibrium constant is 1.5 the rate constant for the forward reaction is:

A. 5×10^{-4}

B. 2×10^{-3}

C. 1.125×10^{-3}

D. 9.0×10^{-4}

Answer: C

Watch Video Solution

79. A mixture of 0.3 mole of H_2 and 0.3 mole of I_2 is allowed to react in a 10 litre evacuated flask at 500° C. The reaction is $H_2 + I_2 \Leftrightarrow 2HI$, the K is found to be 64. The amount of unreacted I_2 at equilibrium is

A. 0.15 mole

B. 0.06 mole

C. 0.03 mole

D. 0.2 mole

Answer: B

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80. 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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81. 0.6 mole of NH_3 in a reaction vessel of $2dm^3$ capacity was brought to equilibrium. The vessel was then found to contain 0.15 mole of H_2 formed by the reaction $2NH_3(g) \Leftrightarrow N_2(g) + 3H_2(g)$. Which of the following statements is true?

A. 0.15 mole of the original NH_3 had dissociated at equlibrium

B. 0.55 mole of ammonia is left in the vessel

C. At equilibrium the vessel contained 0.45 mole of N_2

D. The concentration of NH_3 at equlibrium is 0.25 mole per dm^3

Answer: D

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82. 5 moles of SO_2 and 5 moles of O_2 are allowed to react to form SO_3 in a closed vessel. At the equilibrium stage $60\,\%$ of SO_2 is used up. The total number of moles of SO_2, O_2 and SO_3 in the vessel now is

A. 10.0

B. 8.5

C. 10.5

D. 3.9

Answer: B

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

A. 2.5

B. 2.0

C. 0.5

D. 1.5

Answer: B

Watch Video Solution

84. The reaction, $2SO_{2(g)} + O_{2(g)} \Leftrightarrow 2SO_{3(g)}$ is carried out in a 1 dm^3 and 2 dm^3vessel separately. The ratio of the reaction velocity will be

A. $1:8$

B. $1:4$

C. $4:1$

D. $8:1$

Answer: D

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85. 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. 4.0

C. 2.5

D. 0.25

Answer: D

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86. 15 moles of H_2 and 5.2 moles of I_2 are mixed are allowed to attain equilibrium at $500^\circ C$. At equilibrium the concentration of HI is found to be 10 moles. The equilibrium constant for the formation of HI is

A. 50

B. 15

C. 100

D. 25

Answer: A

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87. 4 moles each of $SO_2 \text{and} O_2$ gases are allowed to react to form SO_3 in a closed vessel. At equilibrium 25% of O_2 is used up. The total number of moles of all the gases at equilibrium is

A. 6.5

B. 7.0

C. 8.0

D. 2.0

Answer: A

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88. 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

89. $2HI(g) \rightarrow H_2(g) + I_2(g)$

The equilibrium constant of the above reaction is 6.4 at 300 K. If 0.25 mole each of $H_2 \text{and} I_2$ are added to the system, the equilibrium constant will be

A. 0.8

B. 3.2

C. 1.6

D. 6.4

Answer: D

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90. 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

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

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

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

Answer: A

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93. Consider thr reaction where $K_p = 0.497$at 500K

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

If the htree gasses are mixed in a right container so that the partial

pressure of each gas in initially 1 atm ,then which is correct observation ?

A. More PCl_5 will be produced

B. More PCl_3 will be proudced

C. Equlibrium will be established when $50\ \%$ reaction is complete

D. None of the above

Answer: A

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94. Identify the incorrect statement regarding chemical equilibrium

A. It can be attained from either side

B. $Q_c = K_c$ at equlibrium

C. Equlibreium is achieved when the reactant and product concentration become equal

D. Presence of catalyst influences the position of equlibrium

Answer: C

Watch Video Solution

95. At 3000 K the equilibrium pressures of CO_2 CO and O_2 are $0.6, 0.4$ and 0.2 atmospheres respectively. K_p fot the reaction, $2CO_2 \Leftrightarrow 2CO + O_2$ is

A. 0.089

B. 0.0533

C. 0.133

D. 0.177

Answer: A

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96. Equilibrium concentration of HI, I_2 and H_2 is 0.7, 0.1 and 0.1 M respectively. The equilibrium constant for the reaction, $I_2 + H_2 \Leftrightarrow 2HI$ is :

A. 36

B. 49

C. 0.49

D. 0.36

Answer: B

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97. For the equilibrium $N_2 + 3H_2 \Leftrightarrow 2NH_3, K_c$ at 1000K is 2.73×10^{-3} if at equlibrium $[N_2] = 2M, [H_2] = 3M,$ the concentraion of NH_3 is

A. 0.00358 M

B. 0.0358 M

C. 0.358 M

D. 3.58 M

Answer: C

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98. In the thermal dissociation fo $PCl_5.$ the partical pressure in the gaseous equlibrium mixture is 1.0 atmosphere when half of PCl_5 is found to dissociate. The equlibrium constant of the reaction (K_p) in atomosphere is

A. 0.25

B. 0.50

C. 1.00

D. 0.3

Answer: D

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99. 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. If both assertion and reason are treu and the reason is the correct explaination of the assertion.

B. If both assertion and reason are true but reason is not the correct explaination of the assertion.

C. If assertin is true but reason is false.

D. If assertin is false but reson is true.

Answer: C

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100. 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. If both asserrion and are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are false.

Answer: B

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101. 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_2K_3 / K_1

C. $K_2^3K_3 / K_1$

D. $K_2K_3^3 / K_2$

Answer: A

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102. Which one of the following statements is not correct

A. The value of equlibrium constant is changed in the presence of a catalyst in the reacton at equlibrium

B. Enzymes catalyes mainly bio-chemical reactions

C. Coenzymes increases the catalytic activity

D. Catalyst does not initiate any reaction

Answer: A

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(ORDINARY THINKING) $K_p \& K_c$ RELATIONSHIP AND CHARACTERISTICS OF K

1. Two gaseous equlibriua $SO_{2(g)} + \frac{1}{2}O_{2(g)} \Leftrightarrow SO_{3(g)}$ and $2SO_{3(g)} \Leftrightarrow 2SO_{2(g)} + O_{2(g)}$ have equlibrium constants K_1 and K_2 respectively at 298K. Which of the following relationship between K_1 and K_2 is correct

A. $K_1 = K_2$

B. $K_2 = K_1^2$

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

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

Answer: C

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2. $H_2 + I_2 \Leftrightarrow 2HI$

In the above equlibrium system if the conectration of the reactants at $25^\circ C$ is increased, the value of K_c will

A. Increase

B. Decrease

C. Remains the same

D. Depends on the nature of the reactants

Answer: C

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3. For the reaction $H_2(g) + I_2(g) \Leftrightarrow 2HI(g)$ at 721 K the value of equilibrium constant (K_c) is 50. When the equilibrium concentration

of both is 0.5 M, the value of K_p under the same condtions will be

A. 0.002

B. 0.2

C. 50.0

D. $50 / RT$

Answer: C

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4. The equlibrium constant for the reaction $N_2 + 3H_2 \Leftrightarrow 2NH_3$ is K, then the equlibrium constant for the equlibrium $NH_3 \frac{1}{2} N_2 + \frac{3}{2} H_2$ is

A. $1 / K$

B. $1 / K^2$

C. $\sqrt{K}$

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

Answer: D

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5. Value of K_p in the reaction $MgCO_{3(s)} \Leftrightarrow MgO_{(s)} + CO_{2(g)}$ is :

A. $K_p = P_{CO_2}$

B. $K_p = P_{CO_2} \times \frac{P_{CO_2} \times P_{MgO}}{P_{MgCO_3}}$

C. $K_p = \frac{P_{CO_2} \times P_{MgO}}{P_{MgCO_3}}$

D. $K_p = \frac{P_{MgCO_3}}{P_{CO_2} \times P_{MgO}}$

Answer: A

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6. In which one of the followng gaseous equilibria, K_p is less than K_c?

A. $N_2O_4 \Leftrightarrow 2NO_2$

B. $2Hl \Leftrightarrow H_2 + I_2$

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

D. $N_2 + O_2 \Leftrightarrow 2NO$

Answer: C

Watch Video Solution

7. 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. $\frac{K_2K_3^3}{K_1}$

B. $K_1K_2K_3$

C. $\frac{K_1K_2}{K_1}$

D. $\frac{K_1K_3^2}{K_2}$

Answer: A

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8. 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

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9. For the reaction $CH_{4(g)} + 2O_{2(g)} \Leftrightarrow CO_{2(g)} + 2H_2O_l$: ($\Delta H = -170.8 kJmol^{-1}$). Which of the following statement is not true?

A. Adoeon of $CH_{4(g)}$ $onO_{2(g)}$ at equlibrium will cause a shift to the right

B. The reaction is exothermic

C. At equlibrium, the concentrations of $CO_{2(g)}$ and $H_2O_{(1)}$ are not equal

D. The equlibrium constant for the reaction is given by

$$K_p = \frac{[CO_2]}{[CH_4][O_2]}$$

Answer: D

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10. The equilibrium constant K_{p_1} and K_{p_2} for the reactions $X \Leftrightarrow 2Y$ and $Z \Leftrightarrow P + Q$, respectively are in the ratio of $1:9$. If the degree of dissociation of X and Z be equal, then the ratio of total pressure at these equilibrium is:

A. $1:1$

B. $1:3$

C. $1:9$

D. $1:36$

Answer: D

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11. The dissociation equilibrium of a gas AB_2 can be represented as, $2AB_2(g) \Leftrightarrow 2AB(g) + B_2(g)$. The degree of disssociation is 'x' and is small compared to 1. The expression relating the degree of dissociation (x) with equilibrium constant k_p and total pressure P is

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

B. (K_p / P)

C. $(2K_p / P)$

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

Answer: D

Watch Video Solution

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

A. $2C_{(s)} + O_{2(g)} \Leftrightarrow 2CO_{2(g)}$

B. $2NO_{(g)} \Leftrightarrow N_{2(g)} + O_{2(g)}$

C. $SO_{2(g)} + NO_{2(g)} \Leftrightarrow SO_{3(g)} + NO_{(g)}$

D. $H_{2(g)} + I_{2(g)} \Leftrightarrow 2HI_{(g)}$

Answer: A

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

A. $K_p = K'_p$

B. $K_p = \frac{1}{K'_p}$

C. $K_p > K'_p$

D. $K_p < K'_p$

Answer: C

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14. In the reaction $N_2(g) + 3H_2(g) \Leftrightarrow 2NH_3(g)$, the value of the equlibrium constant depends on

A. Volume of the reaction vessel

B. Total pressure of the system

C. The initial concentration of nitrogen and hydrogen

D. The tempereatue

Answer: D

Watch Video Solution

15. The value of K_p for the following reaction $2H_2S(g) \Leftrightarrow 2H_2(g) + S_2(g)$ is 1.2×10^{-2} at $10.6.5^\circ C$. The value of K_c for this reaction is

A. 1.2×10^{-2}

B. $< 1.2 \times 10^{-2}$

C. 83

D. $> 1.2 \times 10^{-2}$

Answer: B

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16. A chemical reaction has catalyst X. Hence X

A. Reduces enthalpy of the reaction

B. Decreases rate constant of the reaction

C. Does not affect equlibrium constant of reaction

D. Of the following which change will shift the reaction towards the product

Answer: D

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17. 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 temperaturee

D. Increase in total pressure

Answer: C

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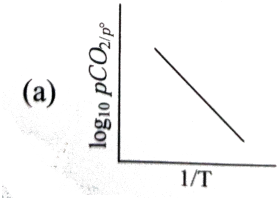
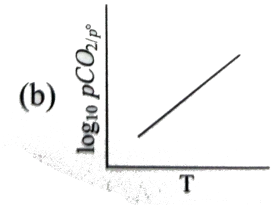
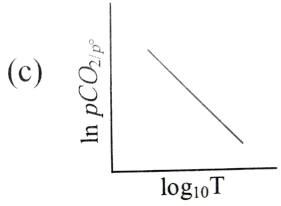
18. For the chemical equilibrium,

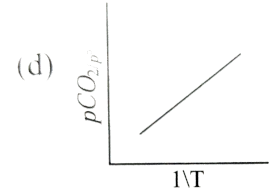
$$CaCO_3(s) \Leftrightarrow CaO(s) + CO_2(g)$$

$\Delta_r H^{\ominus}$ can be determined from which one of the following plots?

A. 

B. 

C. 

D. 

Answer: A

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19. For reacrtion $2NOC1(g) \Leftrightarrow 2NO(g) + C1_2(g)$, K_c at $427^\circ C$ is 3×10^{-6} L mol^{-1}. The value of K_p is nearly

A. 7.50×10^{-50}

B. 2.50×10^{-50}

C. 2.50×10^{-4}

D. 1.72×10^{-4}

Answer: D

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20. In which of the following reactions, the concentration of product is higher than the concentration of reactant at equilibrium? (K = equilibrium constant)

A. $M \Leftrightarrow B, K = 0.001$

B. $M \Leftrightarrow N, K = 10$

C. $X \Leftrightarrow Y, K = 0.005$

D. $R \Leftrightarrow P, K = 0.01$

Answer: B

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21. If equlibrium constnats of reaction,

$N_2 + O_2 \Leftrightarrow 2NO$ is K_1 and $\frac{1}{2}N_2 + \frac{1}{2}O_2 \Leftrightarrow NOisK_2,$ then

A. $K_1 = K_2$

B. $K_2 = \sqrt{K_1}$

C. $K_1 = 2K_2$

D. $K_1 = \frac{1}{2}K_2$

Answer: B

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22.

$CH_3CHOO_{(1)} + C_2H_5OH_{(1)} \Leftrightarrow CH_3COOC_2H_{5(1)} + H_2O_{(1)}$

In the above reaction, one mole of each of acetic acid and alcohol are heated in the presence of little conc. H_2SO_4. On equlibrium being attained

A. mole of ethyl acetate is formed

B. 2 mole of ethyl acetate are formed

C. $1/2$ moles of ethyl acetate is formed

D. $2/3$ moles of ethyl acetate is formed

Answer: D

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23. For the gas phase reaction $2NO \Leftrightarrow N_2 + O_2, \Delta H^\circ = -43.5\,\text{kcal mole}^{-1}$ Which one of the stateements below is true for $N_2(g) + O_2(g) \Leftrightarrow 2NO(g)$

A. K vaires with addition of NO

B. K decrease at temperaturee decreases

C. K increases at tempereature decreases

D. K is independent of temperaturee

Answer: B

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24. For $N_2 + 3H_2 \Leftrightarrow 2NH_3, \Delta H =$ -ve then :-

A. $K_p = K_c(RT)$

B. $K_p = K_c(RT)$

C. $K_p = K_c(RT)^{-2}$

D. $K_p = K_c(RT)^{-1}$

Answer: C

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25. $2NO_2 \Leftrightarrow 2NO + O_2, K = 1.6 \times 10^{-2}$,

$NO + (1).(2)O_2 \Leftrightarrow NO_2, K' = ?$

A. $K' \frac{1}{K^2}$

B. $K' = \frac{1}{K}$

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

D. None of these

Answer: C

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26. If for $H_{2(g)} + \frac{1}{2}S_{2(g)} \Leftrightarrow H_2S_{(g)}$ and $H_{2(g)} + Br_{2(g)} \Leftrightarrow 2HBr_{(g)}$

The equilibrium constants are K_1 and K_2 respectively, the reaction $Br_{2(g)} + H_2S_{(g)} \Leftrightarrow 2HBr_{(g)} + \frac{1}{2}S_{2(g)}$ would have equilibrium constant

A. $K_1 \times K_2$

B. K_1 / K_2

C. K_2 / K_1

D. K_2^2 / K_1

Answer: C

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

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

B. $H_2 + I_2 \Leftrightarrow 2HI$

C. $PCl +)_3 + Cl_2 \Leftrightarrow PCl_5$

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

Answer: D

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28. For reaction, $2A_{(g)} \Leftrightarrow 3C_{(g)} + D_{(s)}$, the value of K_c will be equal to

A. $K_p(RT)$

B. K_p / RT

C. K_p

D. None of these

Answer: B

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29. 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

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30. If K_c is the equlibrium constant for the formation of KH_3. the dissociation constant of ammonia under the same temperaturee will be

A. K_c

B. $\sqrt{K_c}$

C. K_c^2

D. $1/K_c$

Answer: D

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31. $NH_4COONH_2(s) \Leftrightarrow 2NH_3(g) + CO_2(g)$ If equilibrium pressure is 3 atm for the above reaction, then K_p for the reaction is

A. 4

B. 27

C. $4/27$

D. $1/27$

Answer: A

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32. 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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33. K_p and K_p^* are the equilibrium constants of the two reactions, given below

$\frac{1}{2}N_2(g) + \frac{3}{2}H_2(g) \Leftrightarrow NH_3(g)$

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

Therefore, K_p and K_p^* are related by

A. $K_p = K_p^2$

B. $K_2\sqrt{K'_p}$

C. $K_p = 2K'_p$

D. $K_p = K'_p$

Answer: B

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34. 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. 1.0

B. 2.0

C. 3.0

D. 4.0

Answer: D

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35. In which of the following equilibrium, the value of K_p is less than K_c

A. $H_2 + I_2 \Leftrightarrow 2HI$

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

C. $N_2 + O_2 \Leftrightarrow 2NH_3$

D. $CO + H_2O \Leftrightarrow CO_2 + H_2$

Answer: B

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36. For the following gaseous fraction $H_2 + I_2 \Leftrightarrow 2HI$, the equlibrium constant

A. $K_p > K_c$

B. $K_p < K_c$

C. $K_p = K_c$

D. $K_p = 1/K_c$

Answer: C

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37. For the reaction $CO_{(g)} + \frac{1}{2}O_{2(g)} \Leftrightarrow CO_{2(g)}$, $\frac{K_p}{K_c}$ is equivalent to

A. 1

B. RT

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

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

Answer: C

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38. If equilibrium constant for reaction $2AB = A_2 + B_2$. Is 49, then the equilibrium constant for reaction $AB < \Rightarrow \frac{1}{2_{A_2}} + \frac{1}{2_{B_2}}$, will be:

A. 7

B. 20

C. 49

D. 21

Answer: A

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39. For the reaction $PC1_3(g) + C1_2(g) \Leftrightarrow PC1_5(g)$ at $250^\circ C$, the value of K_c is 26, than the value of K_p at the same temperature will be

A. 0.61

B. 0.57

C. 0.83

D. 0.46

Answer: A

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40. The unit of K_c from the reaction $N_2 + H_2 \Leftrightarrow 2NH_3 + Q$ is

A. $lit^2 mol^{-2}$

B. $mollit^{-1}$

C. mol^2lit^2

D. $litmol^{-2}$

Answer: A

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

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

A. K_p is greater then K_c

B. K_p is less than K_c

C. $K_p = K_e$

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

Answer: A

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42. The reactions in which there is no change in volume is

A. $K_C = K_p$

B. $K_C > K_p$

C. $K_C < K_p$

D. $K_C = 0$

Answer: A

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43. $COCO_{3((s))} \Leftrightarrow CaO_{(s)} + SO_{2(g)}$ with of the following expression is correct

or

For the equlibrium $CaCO_{3(s)} \Leftrightarrow CaO_{(s)} + CO_{2(s)}$ the equlibrium constant is perpesented by the following from

A. $K_p = \left(P_{CaO + P_{CO_2}} / P_{CaCo_3}\right)$

B. $K_p = P_{CO_2}$

C. $K_p \times (P_{CaO} \times P_{CO_2}) . P_{CaCO_3}$

D. $\frac{K_p[CaP][CO_2]}{[CaCO_3]}$

Answer: B

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44. For the reaction $Pcl_{5(g)} \Leftrightarrow PCl_{3(g)} + Cl_{2(g)}$

A. $K_p = K_c$

B. $K_p = K_c(RT)^{-1}$

C. $K_p = K_c(RT)$

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

Answer: C

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45. The equlibrium constant of the reaction $H_{2(g)} + I_{2(g)} \Leftrightarrow 2HI_{(g)}$ is 64. If the volume of the container equlibrium constant will be

A. 16

B. 32

C. 64

D. 128

Answer: C

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46. For which one of the following reactions $K_p = K_c$?

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

B. $N_2 + O_2 \Leftrightarrow 2NO$

C. $PCl_5 \Leftrightarrow PCl_3 + Cl_2$

D. $2SO_3 2SO_2 + O_2$

Answer: B

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47. 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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48. A tenfold increase in pressure on the reaction $N_2(g) + 3H_2(g) \Leftrightarrow 2NH_3(g)$ at equilibrium result in ..... in K_p.

A. Unchanged

B. Two times

C. Four times

D. Ten times

Answer: A

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49. In chemical equilibrium, the vlue of Δn (number of molecules of products-number of molecules of reactants) is negative, then the relationship between K_p and K_c will be

A. $K_p - K_c = 0$

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

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

D. $K_p = \frac{1}{K_c}$

Answer: B

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50. For the reactin $uNO_{(g)} + Cl_{2(g)} \Leftrightarrow 2NOCl_{(g)}$ which is true

A. $K_p = K_c \times RT$

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

C. $K_p = \frac{K_c}{RT}$

D. $K_p = \frac{K_c}{(RT)^2}$

Answer: C

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51. For $N_2 + 3H_2 \Leftrightarrow 2NH_3$ equlibrium constant is k then equlibrium constant for $2N_2 + 6H_2 \Leftrightarrow 4NH_3$ is

A. $\sqrt{k}$

B. k^2

C. $k/2$

D. $\sqrt{k+1}$

Answer: B

Watch Video Solution

52. In which of following reactions, increase in the volume at constant temperature does not affect the number of moles of at equilibrium?

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

B. $C_{(g)} + \frac{1}{2}O_{2(g)} \Leftrightarrow CO_{(g)}$

C. $H_{2(g)} + O_{2(g)} \Leftrightarrow H_2O_{2(g)}$

D. None of these

Answer: D

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53. For the following three reaction 1, 2 and 3, equilibrium constants are given:

(1) $CO_{(g)} + H_2O_{(g)} \Leftrightarrow CO_{2(g)} + H_{2(g)}, K_1$

(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 relations is correct ?

A. $K_2K_3 = K_1$

B. $K_3 = K_1K_2$

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

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

Answer: B

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54. Δn, the change in the number of moles for the reactin, $C_{12}H_{22}O_{11(s)} + 12O_{2(g)} \Leftrightarrow 12CO_{2(g)} + 11H_2O_{(1)}\, at 25^\circ C$ is

A. 0

B. 2

C. 4

D. -1

Answer: A

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55. For the reaction

$N_2(g) + 3H_2(g) \Leftrightarrow 2NH_3(g) \quad \text{at} \quad 400K, K_p = 41$

Find the value of K_p for the following reaction :

$\frac{1}{2}N_2(g) + \frac{3}{2}H_2 \Leftrightarrow NH_3(g)$

A. 6.4

B. 0.02

C. 50

D. 4.6

Answer: A

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56. At room temperaturee, for the reaction

$$NH_4SH_{(s)} \Leftrightarrow NH_{3(s)} + H_2S_{(g)}$$

A. $K_p = K_c$

B. $K_p > K_c$

C. $K_p < K_c$

D. K_p and K_c do not relate

Answer: B

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57. For the following reaction in gaseous phase $CO(g) + \frac{1}{2}O_2 \rightarrow CO_2 \frac{K_P}{K_c}$ is

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

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

C. (RT)

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

Answer: B

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58. At a given temperature the equilibrium constant for the reaction of

$PCl_5 \Leftrightarrow PCl_3 + Cl_2$ is 2.4×10^{-3}. At the same temperature, the equilibrium constant for the reaction

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

A. 2.4×10^{-3}

B. -2.4×10^{-3}

C. -4.2×10^{2}

D. 4.8×10^{-2}

Answer: C

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59. 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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60. At $490^\circ C$, the equilibrium constant for the stnthesis of HI is 50, the value of K for the dissocisation of HI will be

A. 20.0

B. 2.0

C. 0.2

D. 0.02`

Answer: D

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61. A chemical reaction was carried out 300 K and 208 K the rate constants were found to be K_1 and K_2 respectively. The energy of activation is 1.157×10^4 cal mole^{-1} and R=1.987 cal. Then

A. $K_2 = 0.25K_1$

B. $K_2 = 0.5K_1$

C. $K_2 = 4K_1$

D. $K_2 = 2K_1$

Answer: A

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62. 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. 0.01

D. 0.025

Answer: B

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63. The reaction between N_2 and H_2 to from ammonia has $K_c 6 \times 10^{-2}$ at the temperaturee $500^\circ C$. The numerical value of K_p for this reaction is

A. 1.5×10^{-5}

B. 1.5×10^{5}

C. 1.5×10^{-6}

D. 1.5×10^{6}

Answer: A

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64. Some acid NH_4HS is placed in flask containing $0.5atm$ of NH_3. What would be pressures of NH_3 and H_2S when equilibrium is reached?

$NH_4HS_{(s)} \Leftrightarrow NH_{3(g)} + H_2S_{(g)}, K_p = 0.11$

A. 6.65 atm

B. 0.665 atm

C. 0.0665 atm

D. 66.5 atm

Answer: B

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65. A reversible reaction $H_2 + Cl_2 \Leftrightarrow 2HCl$ is carried out in one litre flask. If the same reaction is carried out in two litre flask, the equlibrium constant will be

A. Decreased

B. Doubled

C. Halved

D. Same

Answer: D

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66. 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. 12

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67. $A(g) + 3B(g) \rightarrow 4C(g)$Initially concentration of A is equal to that of B. The equilibrium concentrations of A and C are equal. Kc is :

A. 0.08

B. 0.8

C. 8

D. 80

Answer: C

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68. For the reaction $CO_{(g)} + 2H_{2(g)} \Leftrightarrow CH_3OH_{(g)}$, true condition is

A. $K_p = K_c$

B. $K_p > K_c$

C. $K_p < K_c$

D. $K_c = 0$ but $K_p \neq 0$

Answer: C

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69. In equilibrium $CH_3COOH + H_2O \Leftrightarrow CH_3COO^- + H_3O^+$

The equilibrium constant may change when

A. CH_3COO^- are added

B. CH_3COOH is added

C. Catalyst is added

D. Mixture is heated

Answer: D

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70. 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. 100.0

C. 166.6

D. 400.0

Answer: B

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71. Assertion : $K_p = K_c$ for all reaction.

Reason : At constant temperature, the pressure of the gas is proportional to its concentration.

A. If both assertin and reason are true and the reason is the correct explanation of the assertion.

B. If both assertin and reason are true but reason is not the correct explanation of the assertion.

C. If assertin is true but reason is false.

D. If the assertion and reason both are false.

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72. Assertion : The equilibrium constant for the reaction $CaSO_4.5H_2O(s) \Leftrightarrow CaSO_4.3H_2O(s) + 2H_2O(g)$ is

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

Reason : Equilibrium constant is the ratio of the product of molar concentration of the substance produced to the product of the molar concentrations of reactants with each concentrations term raised to the power equal to the respective stoichiometric constant.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If assertion is false but reason is true.

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73. Assertion: If Q_c (reacton quotient) $< K_C$ (equlibrium constant) reaction moves in direction of reactants.

Reason: Reactin quotient is difined in the same way as equilibrium constant at any stage of the reaction.

A. If both assertin and reason are true and the reason is the correct explanation of the asserttion.

B. If both assertion and reason are true but reason is not correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are false.

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74. Assertion: For the $2NH_{3(g)} \Leftrightarrow N_{2(g)} + 3H_{2(g)}$, the unit of K_p will be at.

Reason: Unit of K_p is $(atm)^{\Delta n}$,

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If assertion is false but reason is true.

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75. Assertion: For a gaseouss reaction,

$xA + yB \Leftrightarrow 1C + mD, K_p = K_C.$

Reason: Concentration of gaseous reactant is taken to be unity.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertin and reason are true but reason is not the correct explanation of the assertion.

C. If assertin is true but reason is false.

D. If the assertion and reason both are false.

Answer: D

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(ORDINARY THINKING) ACTIVATION ENERGY, STANDARD FREE ENERGY AND DEGREE OF DISSOCIATIN AND VAPOUR DENSITY

1. 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. Equlibrium is shifted in the forrward direction

C. Equlibreium remains unaffected

D. Additional trans-2-pentene is formed

Answer: A

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

A. $\Delta G = 2.30RT \log K$

B. $\Delta G^{\circ} = -2.30RT \log K$

C. $\Delta G^{\circ} = 2.30RT \log K$

D. $\Delta G = -2.30RT \log K$

Answer: B

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3. In an equilibrium reaction for which $\Delta G = 0,$ the equlibrium constant K =

A. 0

B. 1

C. 2

D. 10

Answer: B

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4. Calculate ΔG^{Θ} for the conversion of oxygen to ozone, $\left(\frac{3}{2}\right)O_2(g) \Leftrightarrow O_3(g) at 298K$, of K_p for this conversion is 2.47×10^{-29}.

A. $163 kJ mol^{-1}$

B. $2.4 \times 10^2 kJ mol^{-1}$

C. $1.63 kJ mol^{-1}$

D. $2.38 \times 10^6 kJ mol^{-1}$

Answer: A

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5. Reaction that have standard free energy changes less than zero always have equilibrium constant equal to

A. Unity

B. Greater than unity

C. Less than unity

D. Zero

Answer: B

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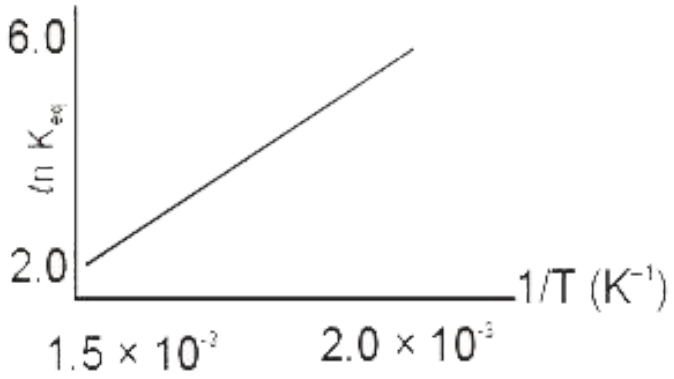
6. A schematic plot of ln K_{eq} versus inverse of temperature for a reaction is shown below



The reaction must be

A. Exothermic

B. Endothermic

C. One with negligible enthalpy change

D. Highly spontaneous at ordinary temperaturee

Answer: A

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7. The standard free energy change of a reaction is $\Delta G^{\circ} = -115$ at 298K. Calculate the equilibrium constant K_P in log K_P. $\left(R = 8.314 JK^{-1} mol^{-1}\right)$

A. 20.16

B. 2.303

C. 2.016

D. 13.83

Answer: A

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8. For a system in equilibrium, $\Delta G = 0$, under conditions of constant

A. temperaturee and pressure

B. Temperatue and volume

C. Energy and volume

D. Pressure and volume

Answer: A

Watch Video Solution

9. If $\Delta G^{\circ}(HI, g) = +1.7\text{kJ/mole}$. What is the equilibrium constnat at $25^{\circ}C$ for $2HI(g) \Leftrightarrow H_2(g) + I_2(g)$?

A. 24.0

B. 3.9

C. 2.0

D. 0.5

Answer: D

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10. In a reversible reaction, the catalyst

A. Increases the activation energy of the backward reaction

B. Increases the acivation energy of the forward reaction

C. Decreases the activation energy of both, forward and backward reaction

D. Decreases the activation energy of forward reaction

Answer: C

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11. For a reversible reaction where the forward reaction is exotherminc, which of the following statement is corret?

A. The backward reaction has higher activation energy than the forward reaction

B. The backward and the forward Processes have the same activation energy

C. The backward reaction has lower activation energy

D. No activation energy is required at all since energy is liberated in the process

Answer: A

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12. The vapour density of fully dissociated NH_4Cl would be

A. Singht less then half the of NH_4Cl

B. Half the of NH_4Cl

C. Double that of NH_4Cl

D. Determined by the amount of solid NH_4Cl in the experiment

Answer: B

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(ORDINARY THINKING) LE-CHATELIER PRINCIPLE AND ITS SPPLICATION

1. The chemical reaction : $BaO_{2(s)} \Leftrightarrow BaO_{(s)} + \frac{1}{2}O_{2(g)}, \Delta H = +ve.$ In equilibrium condition, pressure of O_2 depends upon

A. Increase mass of BaO

B. Increase mass of BaO_2

C. Increase in temperaturee

D. Increase mass of BaO_2 and BaO both

Answer: C

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2. 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. 64 times

B. 4 times

C. 8 times

D. 16 times

Answer: A

Watch Video Solution

3. In the manufacture of NH_3 by Haber's process, the condition which would give maximum yield is $N_2 + 3H_2 \Leftrightarrow 2NH_3 + Q$ kcal

A. High temperatue, high pressure and hig concentrations of the rectants

B. High temperatuer, low pressure and low concentrations of the reactants

C. Low temperaturee and high pressure

D. Low temperaturee, low pressure and low concentration of H_2

Answer: C

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

A. Increasing the concentration of the reactants

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

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

D. None of these

Answer: C

Watch Video Solution

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

A. $H_{2(g)} + Cl_{2(g)} = 2HCl_{(g)}$

B. $2CO_{(g)} + O_{2(g)} = CO_{2(g)}$

C. $N_{2(g)} + 3H_{2(g)} = 2NH_{3(g)}$

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

Answer: D

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6. Which one of the following information can be obtained on the basis of Le-chatelier's principle ?

A. Entorpy change in a reaction

B. Dissociation constant of a weak acid

C. Equlibrium constant of a chemical reaction

D. Shift in equilibrium position on changing value of a constant

Answer: D

Watch Video Solution

7. The endothermic reaction $(M + N \Leftrightarrow P)$is allowed to attain an equilibrium at 25° . Formation of P can be increased by

A. Raising temperaturee

B. Lowering temperaturee

C. Keeping temperaturee constant

D. Decreasing the concentration of M and N

Answer: A

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8. Te yield of product in the reaction

$A_{2(g)} + B_{2(g)} \Leftrightarrow 2AB_{(g)}, \Delta H = +ve$

A. Unaffected by pressure

B. It occurs at 1000 pressure

C. It occurs at high temperatue

D. It occurs at high pressure and high temperaturee

Answer: C

Watch Video Solution

9. $N_2 + O_2 \Leftrightarrow 2NO - Q$ cals In the above reaction which is the essential condition for the higher production of NO

A. High temperaturee

B. High pressure

C. Low temperaturee

D. Low pressure

Answer: A

Watch Video Solution

10. For the equilibrium $2NO_2(g) \Leftrightarrow N_2O_4(g) + 14.6$ Kcal the increase in temperature would

A. Favour the formation of N_2O_4

B. Favour the decomposition of N_2O_4

C. Not alter the equlibrium

D. Stop the reaction

Answer: B

Watch Video Solution

11. In the gaseous equilibrium H_2X_2 + heat $\Leftrightarrow$ 2HX, the formation of HX will be favoured by

A. High pressure and low temperaturee

B. High temperatuer and low pressure

C. Low temperatue and low pressure

D. High temperatue and high pressure

Answer: B

Watch Video Solution

12. When the pressure is applied over system ice $\Leftrightarrow$ wate what will happen

A. More water will form

B. More ice will form

C. There will be no effect over equlibrium

D. Water will decompose in H_2 and O_2

Answer: A

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13. In the formation of SO_3 by contact process, the conditions used are

A. Catalyst, optimum temperaturee and higher concentration or reactants

B. Catalyst, optimum temperatue and lower concentration of reactants

C. Catalyst, high temperaturee and higher concentration of reactants

D. Catalyst, low temperatue and lower concentration of reactants

Answer: A

Watch Video Solution

14. Which of the following reactions proceed at low pressure?

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

B. $H_2 + I_2 \Leftrightarrow 2HI$

C. $PCl_5 \Leftrightarrow PCl_3 + Cl_2$

D. $N_2 + O_2 \Leftrightarrow 2NO$

Answer: C

Watch Video Solution

15. The equlibrium $2SO_{2(g)} + O_{2(g)} \Leftrightarrow 2SO_{3(g)}$ shift forward, if

A. A catalyst is used

B. An adsorbent is used to remove SO_3 as soon as it is formed

C. Low pressure

D. Small amounts of reactants are used

Answer: B

Watch Video Solution

16. In reaction $N_2(g) + 3H_2(g) \Leftrightarrow 2NH_3(g), \Delta H = -93.6kJ$ /mole, the yield of ammonia does not increase when

A. Pressure is increased

B. temperaturee is lowered

C. Pressure is lowered

D. Volume of the reaction vessel is decreased

Answer: C

Watch Video Solution

17. The rate of reaction of which of the following is not affected by pressure

A. $PCl_3 + Cl_2 \Leftrightarrow PCl_5$

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

C. $N_2 + O_2 \Leftrightarrow 2NO$

D. $2SO_2 + O_2 \Leftrightarrow 2SO_2$

Answer: C

Watch Video Solution

18. Under what conditions of temperature and pressure the formation of atomic hydrogen from molecular hydrogen will be favoured most ?

A. High temperatuer and high pressure

B. Low temperatue and low pressure

C. High temperatue and low pressure

D. Low temperatue and high pressure

Answer: C

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19. Le-Chatelier's principle is applicable only to a

A. System in equlibrium

B. Irreversible reaction

C. Homogeneous reaction

D. Heterogenous reaction

Answer: A

Watch Video Solution

20. For the reaction: $A + B + Q \Leftrightarrow C + D$, if the temperature is increased, then concentration of the products will

A. Increase

B. Decrease

C. Remain same

D. Become Zero

Answer: A

Watch Video Solution

21. 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 temperatue and pressure

B. Decresing temperatue and increasing pressure

C. Increasing temperatue and decreasing pressure

D. Increasing temperatue at constant pressure

Answer: C

Watch Video Solution

22. 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. $33\ \%$

B. $66\ \%$

C. $50\ \%$

D. $40\ \%$

Answer: A

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23. Which reaction is not affected by change in pressure ?

A. $H_2 + I_2 \Leftrightarrow 2HI$

B. $2C + O_2 \Leftrightarrow 2CO$

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

D. $PCl_5 \Leftrightarrow PCl_3 + Cl_2$

Answer: A

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24. When in any system at equilibrium state pressure, temperatue and concentration is changed then the equilibria shifted to such a direction which neutralize the effect of change. This is known as

A. First law of thermodynamics

B. Le-chatelier's principle

C. Ostwald's rule

D. Hess's law of constant heat summation

Answer: D

Watch Video Solution

25. In the equlibrium $N_2 + 2H_2 \Leftrightarrow 2NH_3 + 22$ kcal, the formation of ammonia is fovoured by

A. Increasing the pressure

B. Increasing the temperatue

C. Decreasing the pressure

D. Adding ammonia

Answer: A

Watch Video Solution

26. The effect of increasing the pressure on the equilibrium $2A + 3B \Leftrightarrow 3A + 2B$ is

A. Ofrward reaction is favoured

B. Backward reaction is favoured

C. No effect

D. None of the above

Answer: C

Watch Video Solution

27. Formation of SO_3 take place according to the reaction $2SO_2 + O_2 \Leftrightarrow 2SO_3$, $\Delta H = -45.2$ kcal Which of the following factors favours the formation of SO_3 ?

A. Increase in temperatue

B. Increase in pressure

C. Removal of oxygen

D. Increase in volume

Answer: B

Watch Video Solution

28. In the reaction A (g) + B (g) $\Leftrightarrow$ C (g), the backward reaction is favoured by (A) Increase in pressure

A. Decrease of pressure

B. Increase of pressure

C. Either of the two

D. None of the two

Answer: A

Watch Video Solution

29. In the equilibrium, $AB(s) \rightarrow A(g) + B(g)$, if the equilibrium concentration of A is doubled, the equilibrium concentration of B would become

A. Twice

B. Half

C. $1/4^{th}$

D. $1/8^{th}$

Answer: B

Watch Video Solution

30. The formation of nitric oxide by contact process $N_2 + O_2 \Leftrightarrow . \Delta H = 43.200$ kcal is favoured by

A. Low temperatue and low pressure

B. Low temperature and high pressure

C. High temperature and high pressure

D. High temperature and excess reactants concentration

Answer: D

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31. Select the correct statement from the fllowing

A. Equlibrium constant changes with addition of catalyst

B. Catalyst increases the rate of forward reaction

C. The ratio of mixture at equlibrium is not changed by catalyst

D. Catalyst are active only in solution

Answer: C

Watch Video Solution

32. According to Le-Chatelier's principle, an increase in the temperature of the following reaction will

$N_2 + O_2 \Leftrightarrow 2NO, \ -43,200$ Kcal

A. Increase the yield of NO

B. Decrease the yield of NO

C. Not effect the yield of NO

D. No help the reaction to proceed in forward direction

Answer: A

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33. On the velocity in a reversible reaction, the correct explanation of the effect of catalyst is.

A. It provides a now reaction path of low activation energy

B. In increases the kinetic enrrgy of reacting molecules

C. It displaces the equlibrium state on right side

D. It decreases the velocity of backward reaction

Answer: A

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34. Raising the temperatue of an equlibrium system

A. Favours the oxothermic reaction only

B. Favours the endotermic reaction only

C. Favours both the exothermic and cindothermic reactions

D. Favours neither the exothermic nor endotermic reactions

Answer: B

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35. In the reaction $A_{(g)} + 2B_{(g)} \Leftrightarrow C_{(g)} + QkJ,$ greater product will be obtained or the forward reaction is foroured by

A. At high temperature and high pressure

B. At high temperatue and low pressure

C. At low temperature and high pressure

D. At low temperature and low pressure

Answer: C

Watch Video Solution

36. Suppose the reaction $PC1_{5(s)} \Leftrightarrow PC1_{3(s)} + C1_{2(g)}$ is in a closed vessel at equilibrium stage. What is the effect on equilibrium concentration of $C1_{2(g)}$ by adding $PC1_5$ at constant temperqture ?

A. Decreases

B. Increases

C. Unaffected

D. Cannot be described without the value of k_p

Answer: B

Watch Video Solution

37. According to Le-chatelier's principle, which of the following factors influence a chemical system

A. Concentration only

B. Pressure only

C. Temperatuer only

D. Concentration, pressure and temperatue

Answer: D

Watch Video Solution

38. What would happen to a reversible reaction at equilibrium when an inert gas is added while the volume remains unchanged?

A. More of the product will be formed

B. Less of the product will be formed

C. More of the reactants will be formed

D. It remains unaffected

Answer: D

Watch Video Solution

39. Which of the following equlibrium will shift to right side on increasing the temperature

A. $CO_{(g)} + H_2O_{(g)} \Leftrightarrow CO_{2(g)} + H_{2(g)}$

B. $2SO_{2(g)} + O_{2(g)} \Leftrightarrow 2SO_{3(g)}$

C. $H_2O_{(g)} \Leftrightarrow H_{2(g)} + \frac{1}{2}(O_2)_{(g)}$

D. $4HCl_{(g)} + O_{2(g)} \Leftrightarrow 2H_2O_{(g)} + 2Cl_{2(g)}$

Answer: C

Watch Video Solution

40. Which of the following equilibrium is not shifted by increase in the pressure ?

A. $H_{2(g)} + I_{2(g)} \Leftrightarrow 2HI_{(g)}$

B. $N_{2(g)} + 3H_{2(g)} \Leftrightarrow 2NH_{2(g)}$

C. $2CO_{(g)} + O_{2(g)} \Leftrightarrow 2CO_{2(g)}$

D. $2C_{(s)} + O_{2(g)} \Leftrightarrow 2CO_{(g)}$

Answer: A

Watch Video Solution

41. For the reaction, $PCl_3(g) + Cl_2(g) \Leftrightarrow PCl_5(g)$, the position of equilibrium can be shifted to the right by:

A. Increasing the temperature

B. Doubling the volume

C. Additional of Cl_2 at constant volume

D. Additional of equimolar quantities of PCl_3 and PCl_5

Answer: C

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42. In an exothermic reaction, high yield of the product is obtained at

A. High temperature

B. Low temperature

C. Low concentration

D. None of these

Answer: B

View Text Solution

43. Which of the following conditions is favourable for the production of ammonia by Haber's process

A. High concentration of reactants

B. Low temperature and high pressure

C. Continuous removal of ammonia

D. All of these

Answer: D

View Text Solution

44. Sodium sulphate dissolves in water with evolution of heat. Consider a saturated solution of sodium sulphate. If the temperature is raised, then according to Le-Chatelier principle

A. More solid will dissolve

B. Some solid will precipitate out from the solution

C. The solution will become supersturated

D. Solution concentration will remain unchanged

Answer: B

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45. According to le-Chatelier's principle, adding heat to a solid and liquid in equilibrium will cause the

A. Temperature to rise

B. Temperature to fall

C. Amount of solid to decrease

D. Amount of liquid to decrease

Answer: C

Watch Video Solution

46. According to Le-Chatelier's principle, the increase of temperature in the following reaction

$CO_2(g) + 2H_2O(g) \rightarrow CH_4(g) + 2O_2(g)$

will cause it shift to the right. This reaction is, therefore :

A. Exothermic

B. Unimolecular

C. Endothermic

D. Spontaneous

Answer: C

Watch Video Solution

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

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

48. $CaCO_3(s) \Leftrightarrow CaO(s) + CO_2(g), \Delta H = 110kJ$ The pressure of CO_2

A. Increases on adding catalyst

B. Decreases if T is raised

C. Increase if T is raised

D. Increases if inert gas is passed keeping T constant

Answer: C

View Text Solution

49. $2HI_{(g)} \Leftrightarrow H_{2(g)} + I_{2(g)}$, When inert gas added, effect on its $K_p(atV = \text{const})$

A. Increase

B. Decreases

C. Same

D. None

Answer: C

View Text Solution

50. $H_{2(g)} + I_{2(g)} \Leftrightarrow 2HI_{(g)}$

In this reaction when pressure increases, the reaction direction

A. Does not change

B. Forward

C. Backward

D. Decrease

Answer: A

Watch Video Solution

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

A. Low pressure

B. hifh pressure

C. High temperature

D. Low temperature

Answer: A

Watch Video Solution

52. 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 temperature as well as pressure

C. Lowering the tmpeerature and increasing the pressure

D. Any vaue of temperature and pressure

Answer: C

Watch Video Solution

53. For the reaction

$CO(g) + CI_2(g) \Leftrightarrow COCI_2(g)$

K_p / K_c is equal to

A. $\sqrt{RT}$

B. RT

C. $1/RT$

D. 1.0

Answer: C

Watch Video Solution

54. 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

55. According the Le-chatelier principle, if heat is given to solidliquid system, then

A. Quantity of solid will reduce

B. Quantity of liquid will reduce

C. Increase in temperature

D. Decrease in temperature

Answer: A

View Text Solution

56. On addition of an inert gas at constant volume to the reaction $N_2 + 3H_2 \Leftrightarrow 2NH_3$ at equilibrium

A. The reaction remains unaffected

B. Forward reacton is favored

C. The reaction halts

D. Backward reaction is favoured

Answer: A

Watch Video Solution

57. Le-Chatelier principle is not applicable to

A. $H_{2(g)} + I_{2(g)} \Leftrightarrow 2HI_{(g)}$

B. $Fe_{(s)} + S_{(s)} + \Leftrightarrow FeS_{(s)}$

C. $N_{2(g)} + 3H_{2(g)} \Leftrightarrow 2NH_{3(g)}$

D. $N_{2(g)} + O_2 \Leftrightarrow 2NO_{2(g)}$

Answer: B

Watch Video Solution

58. The equilibrium reaction that is not influenced by volume change at constant temperature is :

A. $H_{2(g)} + I_{2(g)} \Leftrightarrow 2HI$

B. $N_{2(g)} + 3H_{2(g)} \Leftrightarrow 2NH_{3(g)}$

C. $N_2O_{4(g)} \Leftrightarrow 2NO_{2(g)}$

D. $2NO_{(g)} \Leftrightarrow O_2 \Leftrightarrow 2NO_{2(g)}$

Answer: A

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59. In which one of the following equlibria, the increase of pressure over the equlibrium will favour the backward reaction

A. Decomposition equlibrium of HI

B. Formation equlibrium of SO_3

C. Decomposition equlibrium of NH_3

D. Formation equlibrium of PCl_5

Answer: C

View Text Solution

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

A. Increases

B. Decreases

C. Remains unaltered

D. Changes unpredicatable

Answer: C

Watch Video Solution

61. According to Le-Chetelier's principle, the equlibrium constant of a reversible reaction will not shift by

A. Increasing the temperature of an exothermic reaction

B. Increasing the temperature of an endothermic reaction

C. Changing the concentrations of the reactants

D. The effect of catalyst

Answer: D

View Text Solution

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

A. Low temperature and high pressure

B. High temperature and high pressure

C. High temperature and low pressure

D. Low temperature and low pressure

Answer: D

Watch Video Solution

63. 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 temperature

D. Removing ammonia as it is formed

Answer: A

Watch Video Solution

64. In which of the following equilibrium system the rate of the backward reaction is favoured by increase of pressure

A. $PCl_5 \Leftrightarrow PCl_3 + Cl_2$

B. $2SO_2 \Leftrightarrow 2SO_3$

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

D. $N_2 + O_2 \Leftrightarrow 2NO$

Answer: A

Watch Video Solution

65. $N_2(g) + 3H_2(g) \rightarrow 2NH_3(g) + heat$.What is the effect of the increase of temperature on the equilibrium of the reaction ?

A. Equlibrium is unaltered

B. Reactin rate does not change

C. Equlibrium is shifted to the left

D. Equlibrium is shifted to the right

Answer: C

Watch Video Solution

66. If pressure increases then its effect on given equlibrium $C_{(s)} + H_2O_{(g)} \Leftrightarrow CO_{(g)} + H_{2(g)}$ it is satisfied in

A. Forward direaction

B. Backward direction

C. No effect

D. None of these

Answer: B

View Text Solution

67. The reaction $2SO_2 + O_2 \rightarrow 2SO_3 + heat$. The equilibrium reaction proceeds in forward direction by :

A. Oxygen is removed

B. SO_3 is added

C. Heat is added

D. Oxygen is added

Answer: D

Watch Video Solution

68. An equilibrium constant of 10^{-4} for a reaction means, the equilibrium is

A. Largely towards backward direction

B. Largely towards forward direction

C. Equally poised

D. Never established

Answer: A

Watch Video Solution

69. 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. $1000atm$ and $500^\circ C$

B. $500atm$ and $500^\circ C$

C. $1000atm$ and $100^\circ C$

D. $500atm$ and $100^\circ C$

Answer: C

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70. Consider the reaction $HCN_{(aq)} \Leftrightarrow H^{+}_{(aq)} + CN^{-}_{(aq)}$. At equilibrium, the addition of $CN^{-}_{(aq)}$ would

A. Reduce $HNC_{(aq)}$ concentration

B. Decrease the $H^{+}_{(aq)}$ ion concentration

C. Increase the equlibrium constant

D. Decrease the equlibrium constant

Answer: B

Watch Video Solution

71. Reaction in which yield of product will increase with increase in pressure is

A. $H_{2(g)} + I_{2(g)} \Leftrightarrow HI_{(g)}$

B. $H_2O_{(g)} + CO_{(g)} \Leftrightarrow CO_{2(g)} + H_{2(g)}$

C. $H_2O_{(g)} + CO_{(g)} \Leftrightarrow CO_{2(g)} + H_{2(g)}$

D. $CO_{(g)} + 3H_{2(g)} \Leftrightarrow CH_{4(g)} + H_2O_{(g)}$

Answer: D

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72. Assertion : NaCl solution can be purfied by passage of hydrogen chloride through brine.

Reason: This type of purfication is based on Le-Chatelier's principle.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are false.

Answer: A

View Text Solution

73. Assertion: According to Le-Chatelier's principle addition of heat to an equilibrium solid liquid results in decrease in the amount of solid. Reason: Reaction is endothermic, so on heating forward reaction is favoured.

A. If both assertion and reason are treu and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If assertion is false but reason is true.

Answer: A

View Text Solution

74. Assertion: For a reaction $H_{2(g)} + I_{2(g)} \Leftrightarrow 2HI_{(g)}$ if the volume of vessel is reduced to half of its original volume, equlibrium constant will be doubled.

Reason: According to Le-Chatelier principle, reaction shifts in a direction that tends to undo the effect of the stress.

A. If both assertion and reason are treu and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reaosn is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are false.

View Text Solution

75. Which one of the following condition will favour maximum formation of the product in the reaction. $A_2(g) + B_2(g) \Leftrightarrow X_2(g) \Delta_r H = -X$ kJ ?

A. Low temperature and high pressure

B. Low temperatue and low pressure

C. High temperatue and high pressure

D. High temperature and low pressure

Answer: A

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CRITICAL THINKING (OBJECTIVE QUESTIONS)

1. K_p for the following reaction at 700 K is $1.3 \times 10^{-3} atm^{-1}$. The K_c at same temperature for the reaction $2SO_2 + O_2 \rightarrow 2SO_3$ will be

A. 1.1×10^{-2}

B. 3.1×10^{-2}

C. 5.2×10^{-2}

D. 7.4×10^{-2}

Answer: D

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2. $2SO_3 \Leftrightarrow 2SO_2 + O_2$. If $K_c = 100$, $\alpha = 1$, half of the reaction is completed, the concentration of SO_3 and SO_2 are equal, the concentration of O_2 is

A. $0.001M$

B. $\frac{1}{2}SO_2$

C. 2 times of SO_2

D. Data incomplete

Answer: D

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3. At $700K$, the equilibrium constant K_p for the reaction

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

is $1.80 \times 10^{-3} kPa$. What is the numerical value of K_c in moles per litre for this reaction at the same temperature?

A. 8.18×10^{-9}mol-litre

B. 5.07×10^{-8}mol-litre

C. 8.18×10^{-9}mol-litre

D. 9.24×10^{-10}mol-litre

Answer: A

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4. If dissociation for reaction, $PC1_5 \Leftrightarrow PC1_3 + C1_2$ is $20\,\%$ at 1 atm pressure. Calculate K_c.

A. 0.04

B. 0.05

C. 0.07

D. 0.06

Answer: B

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5. 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. $\frac{9}{16}$

B. $\frac{1}{9}$

C. $\frac{16}{9}$

D. 9

Answer: D

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6. 20.0 kg of $N_2(g)$ and 3.0 kg of $H_2(g)$ are mixed to produce $NH_3(g)$. The amount of $NH_3(g)$ formed is

A. 17 kg

B. 34 kg

C. 20 kg

D. 3 kg

Answer: A

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7. The order of K_{eq} values for the following keto-enol equilibrium constants is

$$CH_3 - CHO \overset{K_1}{\Longleftrightarrow} CH_2 = CH - OH,$$

$$CH_3 - \overset{\overset{O}{||}}{C} - CH_2 - \overset{\overset{O}{||}}{C} - CH_3 \overset{K_2}{\Longleftrightarrow} CH_3 - \overset{\overset{OH}{|}}{C} = CH - \overset{\overset{O}{||}}{C} - CH_3$$

$$CH_3 - \overset{\overset{O}{||}}{C} - CH_3 \overset{K_3}{\Longleftrightarrow} CH_2 = \overset{\overset{OH}{|}}{C} - CH_3$$

A. $K_1 > K_2 > K_3$

B. $K_1 < K_2 < K_3$

C. $K_1 > K_3 > K_2$

D. $K_1 < K_3 < K_2$

Answer: A

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8. 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. 0.52 atm

B. 0.21 atm

C. 0.41 atm

D. 0.82 atm

Answer: C

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9. For the reaction, $2NO_2(g) \rightarrow 2NO(g) + O_2(g), K_c = 1.8 \times 10^{-6} \text{at} 185^\circ C$, the value of K_c for the reaction $NO(g) + \frac{1}{2}O_2(g) \rightarrow NO_2(g)$ is

A. 0.9×10^6

B. 7.5×10^2

C. 1.95×10^{-3}

D. 1.95×10^3

Answer: B

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10. 0.1 mole of $N_{2O_4(g)}$ was sealed in a tude under one atmospheric conditions at $25^\circ C$ Calculate the number of moles of $NO_2(g)$ preesent , if the equilibrium $N_2O_4(g) \Leftrightarrow 2NO_2(g)(K_P = 0.14)$ is reached after some time :

A. 1.8×10^2

B. 2.8×10^2

C. 0.034

D. 2.8×10^{-2}

Answer: C

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JS JEE SECTION (ONLY ONE CHOICE ANSWER)

1. The reaction $A + B \Leftrightarrow C + D$ + heat, has reached equilibrium. The reaction may be made to proceed forward by

A. Adding more C

B. Adding more D

C. Decreasing the temperature

D. Increasing the temperature

Answer: C

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2. In a reaction the rate of reaction is proportional to its active mass, this statement is known as

A. Law of mass action

B. Le-chatelier principle

C. Faraday law of electrolysis

D. Low of constant proportion

Answer: A

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3. 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

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4. $2NH_3 \Leftrightarrow N_2 + 3H_2$. the vessel is such that the volume remains effectively constant where as pressure increases to 50 atm. Calculate the percentage of NH_3 actually decomposed

A. $65\ \%$

B. $61.3\ \%$

C. $62.5\ \%$

D. $64\ \%$

Answer: B

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5. A liquid is in equlibrium with its vapour at its boiling point. On the average, the molecules in the two phases have equal

A. Inter-molecular forces

B. Potential energy

C. Total energy

D. Kinetic energy

Answer: C

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6. Pure ammonia is placed in a vessel at a temperature where its dissociation constant (α) is appreciable. At equilibrium,

A. K_p does not change significantly with pressure

B. α does not change with pressure

C. Concentration of NH_3 does not change with pressure

D. Concentration of H_2 is less than that of N_2

Answer: A

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7. Which of the following is not favourble for SO_3 formation ?

$2SO_2(g) + O_2(g) \Leftrightarrow 2SO_3(g)$, $\delta H = -45.0$ kcal

A. High pressure

B. High temperature

C. Decreasing SO_3 concentration

D. Increasing reactant concentration

Answer: B

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8. An example of a reversible reaction is

A. $Pb(NO_3)_2(aq) + 2Na(aq) = PnI_2(s) + 2NaNO_3(aq)$

B. $AgNO_3(aq) + HCl(aq) = Ag(Cl(s0 + NaNO_3(aq)$

C. $2Na(s) + H_2O(1) = 2NaOH(aq) + H_2(g)$

D. $KNO_3 + (aq) + NaCl(aq) = KCl(aq) + NaNO_3(aq)$

Answer: D

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9. The compound insolubel in acetic acid is

A. Calcium oxide

B. Calcium carbonate

C. Calcium oxalate

D. Calcium hydroxide

Answer: C

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10. The equilibrium $SO_2Cl_2(g) \Leftrightarrow SO_2(g) + Cl_2(g)$ is attained at $25^\circ C$ in a closed container and an inert gas, helium, is introduced. Which of the following statement is / are correct?

A. More chlorine is formed

B. Concentration of SO_2 is reduced

C. More SO_2Cl_2 is formed

D. Concentration of SO_2, Cl_2, So_2 and Cl_2 does not change

Answer: D

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11. Amongest the following hydroxides, the one which has the lowest value of K sp at ordinary temperature is:

A. $Mg(OH)_2$

B. $Ca(OH)_2$

C. $Ba(OH)_2$

D. $Be(OH)_2$

Answer: D

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

A. 0.5

B. 4.0

C. 8.0

D. 32.0

Answer: C

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13. K for the synthesis of HI is 50. K for dissociation of HI is

A. 50

B. 5

C. 0.2

D. 32.0

Answer: D

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14. The partial pressure of CH_3OH, CO and H_2 in the equilibrium mixture for the reaction $CO + 2H_2 \Leftrightarrow CH_3OH$ at $427^\circ C$ are 2.0 ,1.0

and 0.1 atm respectively. The value of K_p for the decomposition of CH_3OH to CO and H_2 is

A. $1 \times 10^2 atm$

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

C. $50 atm^2$

D. $5 \times 10^{-3} atm^2$

Answer: D

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15. In the reaction, $A_{2(g)} + 4B_{2(g)} \Leftrightarrow 2AB_{4(g)}\, \Delta H < 0$ the formation of AB_4 is will be favoured at

A. Low temperature, high pressure

B. High temperature, low pressure

C. Low temperature, low pressure

D. High temperature, high pressure

Answer: A

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16. The reaction which proceeds in the forward direction is

A. $Fe_2O_3 + 6HCl = 2FeCl_3 + 3H_2O$

B. $NH_3 + H^2O + NaCl = NH_4Cl + NaOH$

C. $SnCl_4 + Hg_2Cl_2 = SnCl_2 = SnCl_2 + 2HgCl_2$

D. $2CuI + I_2 + 4K^+ = 2Cu^{2+} + 4KI$

Answer: A

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17. For which of the following reactions $K_p = K_c$

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

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

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

D. $N_2O_4(g) \Leftrightarrow 2HCl(g)$

Answer: C

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18. An equilibrium mixture of the reaction $2H_2S(g) \Leftrightarrow 2H_2(g) + S_2(g)$ had 0.5 mole H_2S, 0.10 mole H_2 and 0.4 mole S_2 in one litre vessel. The value of equilibrium constants (K) in mole $litre^{-1}$ is

A. 0.004

B. 0.008

C. 0.016

D. 0.160

Answer: C

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19. The relationship between equilibrium constants $K_p \text{and} K_c$ for a gaseous reaction is:

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

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

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

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

Answer: B

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20. Which one is more acidic in aqueous solution ?

A. $NiCl_2$

B. $FeCl_3$

C. $AlCl_3$

D. $BeCl_2$

Answer: C

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21. 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. Decreasing the volume of the container

D. Increasing the amount CO(g)

Answer: D

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22. 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

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23. When two reactants, A and B are mixed to give products C and D, the reaction quotient Q, at the initial stages of the reaction.

A. Is zero

B. Decreases with time

C. Is independent of time

D. Increases with time

Answer: D

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24. 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. $1.44 \times 10^{-5} / (0.082 \times 773)^{2}$

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

Answer: D

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25. At constant temperature, the equilibrium constant (K_p) for the decomopsition reaction $N_2O_4 \Leftrightarrow 2NO_2$ is expressed by

$K_p = \frac{(4x^2P)}{(1-x^2)}$, where P = pressure, x = extent of decomposition. Which one of the following statement is true ?

A. K_p increases with increase of P

B. K_p increase with increase of x

C. K_p increase with decrease of x

D. K_p remains constant with change in P and x

Answer: D

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26. 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 statements hold true regarding the equilibrium constant (K_p) and 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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27. $N_2 + 3H_2 \Leftrightarrow 2NH_3$

Which is correct statement if N_2 is added at equilibrium condition?

A. The equlibrium will shift to forward direction because according to II^{nd} law of thermodynamics the entropy must increases in the direction of spontaneous reaction

B. The condition for equlibrium is $G_{N_2} + 3G_{H_2} = 2G_{NH3}$ where G is Gibber free energy per mole of the gaseous species masured

at that partial pressuer. The condition of speical measured at that partial pressuer.The condition of equlibrium is unaffected by the use of catalyst, which increase the rate of both the forward and backward reactions to the same extent.

C. The catalyst will increase the rate of forward reaction by α and that of backward reaction by β.

D. Catalyst will not alter the rate of either of the reaction

Answer: B

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28. For the reaction $SO_{2(g)} + \frac{1}{2}O_{2(g)} \Leftrightarrow SO_{3(g)}$, if $K_c = K_p(RT)^X$ then the value of X is

A. -1

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

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

D. 1

Answer: B

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29. The standard Gibbs energy change at $300K$ for the reaction $2A \Leftrightarrow B + C$ is 2494. $2J$. At a given time, the composition of the reaction mixture is $[A] = \frac{1}{2}, [B] = 2$ and $[C] = \frac{1}{2}$. The reaction proceeds in the

$(R = 8.314JK/\text{mole} = 2.718)$

A. Forward diraction because $Q > K_C$

B. Reverse direction because $Q > K_C$

C. Forward directin because $Q < K_C$

D. Reverse direction because $Q < K_C$

Answer: B

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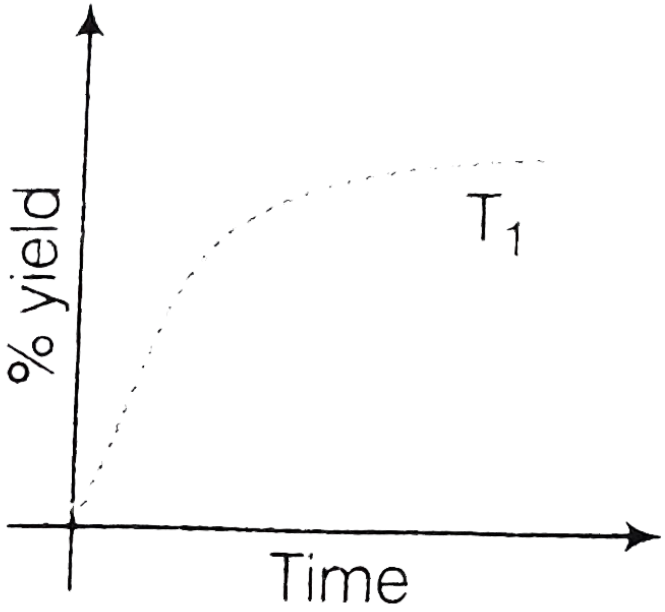
30. The % yield of ammonia as a function of time in the reaction,

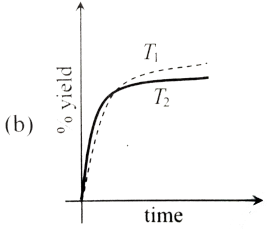
$N_2(g) + 3H_2(g) \Leftrightarrow 2NH_3(g)\,'\Delta H < 0$

at (p, T_1) is given below

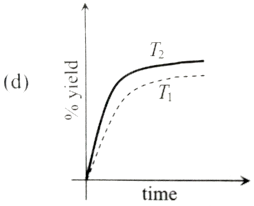


If this reaction is conducted at (p, T_1), with $T_2 > T_1$ the % yield by of ammonia as a function of time is represented by

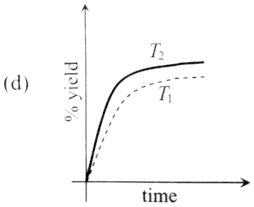
A.



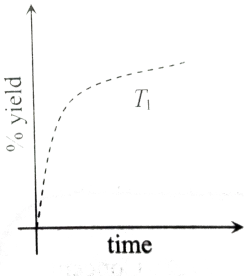
B.



C.



D.



Answer: B

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31. The equilibrium constant at $298K$ for a reaction, $A + B \Leftrightarrow C + D$ is 100. If the initial concentrations of all the four species were 1M each, then equilibirum concentration of D (in mol L^{-1}) will be

A. 0.818

B. 1.818

C. 1.182

D. 0.182

Answer: B

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32. An aqueous solution contains $0.10MH_2S$ and 0.20 M HCl. If the equilibrium constants for the formation of HS^- from H_2S is

1.0×10^{-7} and that of S^{2-} from HS^- ions is 1.2×10^{-13} then the concentration of S^{2-} ions in aqueous solution is

A. 3×10^{-20}

B. 6×10^{-21}

C. 5×10^{-19}

D. 5×10^{-8}

Answer: A

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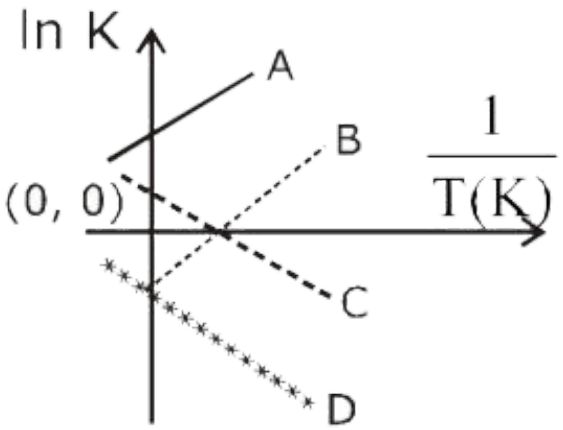
33. Which of the following lines correctly show the temperature dependence of equilibrium constant, K, for an exothermic reaction ?



A. B and C

B. C and D

C. A and D

D. A and B

Answer: D

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34. An aqueous solution contains an unknown concentration of Ba^{2+}. When 50 mL of a 1 M solution of Na_2SO_4 is added, $BaSO_4$ just begins to precipitate. The final volume is 500 mL. The solubility product of $BaSO_4$ is 1×10^{-10}. What is the original concentration of Ba^{2+}?

A. $2 \times 10^{-9} M$

B. $1.1 \times 10^{-9} M$

C. $1.0 \times 10^{-10} M$

D. $5 \times 10^{-9} M$

Answer: B

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35. In which of the following case, equlibrium constant decreases with increase of temperture

A. When the reaction is exothermic

B. When the reaction is endothermic

C. When the reaction is in the gaseous phase

D. When the reaction takes place in the solution

Answer: A

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JS JEE SECTION (ONLY ONE CHOICE ANSWER (More than one choice correct answer))

1. Chemical equilibrium is a dynamic equilibrium because

A. Equlibrium is maintained rapidly

B. The concentraion of reactants and products become some at equlibrium

C. The concentration of reactants and products are constant but different

D. Both forward and backward reaction occur at all time which same speed

Answer: D

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2. For the gas phase reaction,

$C_2H_4 + H_2 \Leftrightarrow C_2H_6(\Delta H = -32.7$ 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 H_2

D. Adding some C_2H_6

Answer: A::B::C::D

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3. 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 temperatue favours forward reaction

D. Increasing pressure favours reverse reaction

Answer: C::D

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4. For the reaction

$PCl_5(g) \Leftrightarrow PCl_3(g) + Cl\_(2)(g)$

The forward reaction at constant temperature is favoured by

A. Introducing an inert gas at constant volume

B. Introducting chlorine gas at constant volume

C. Increasing the volume of the container

D. Introducing PCl_5 at constant volume

Answer: C::D

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5. The formation of NO_2 in the reaction $2NO + O_2 \Leftrightarrow 2NO_2 +$ heat is favoured by

A. Low pressre

B. High pressure

C. Low temperatue

D. Reduction in the mass of reactant

Answer: B::C

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6. When two reactants A and B are mixed to give products, C and D, the reaction quotient (Q) at the initial stages of the reaction

A. Is zero

B. Decreases with time

C. Is independent of time

D. Increases with time

Answer: D

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7. The thermal dissociation of equilibrium of $CaCo_3(s)$ is studied under different conditions

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

For this equilibrium, the correct statement (s) is/are

A. Δh is dependent on T

B. K is independent of the initial amount of $CaCO_3$

C. K is dependent on the pressure of CO_{20} at a givn T

D. ΔH is independent of the catalyst, if any

Answer: A::B::D

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8. In H_3PO_4 which of the following is true?

A. $K_a = K_{a_1} \times K_{a_2} \times K_{a_3}$

B. $K_{a_1} < K_{a_2} < K_{a_3}$

C. $K_{a_1} > K_{a_2} < K_{a_3}$

D. $K_{a_1} = K_{a_2} = K_{a_3}$

Answer: A::C

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9. Which of the following can act as buffer ?

A. $NaCl + NaOH$

B. Borax+ Boric acid

C. $NaH_2PO_4 + Na_2HPO_4$

D. $NH_4Cl + NH_4OH$

Answer: B:C:D

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10. Choose the correct statement

A. pH of acidic buffer solution decrease if more salt is added

B. pH of acidic buffer solution increeses if more salt is added

C. pH of basic buffer decreases if more salt is added

D. pH of basic buffer increases if more salt is added

Answer: B::C

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11. NH_4^+ is kept in group zero because

A. Its salts are highly solublr in water

B. The K_{sp} of salts of ammonium is high

C. K_{sp} of salts of NH_4^+ are low

D. Ammonium salts are insoluble in water

Answer: A::B

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12. The degree fo hydrolysis for a salt of strong acid and weak base

A. Independent of dilution

B. Increases with dilution

C. Increases with decrease in K_b of the bases

D. Decreases with decrease in temperature

Answer: B::C::D

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13. For two different acids with same concentration:

A. The relative strngth is expressed as $\frac{\alpha_1}{a_2}$

B. Relative strength is expressed as $\frac{K_{a_1}}{K_{a_2}}$

C. Relative strength is expressed as $\sqrt{\frac{K_{a_1}}{K_{a_2}}}$

D. Relative strength is expressed as $\frac{pH_1}{pH_2}$

Answer: A::C

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14. In the reaction $C(s) + CO_2(g) \Leftrightarrow 2CO(g)$, the equilibrium pressure is 12 atm. If $50\ \%$ of CO_2 reacts, calculate K_p.

A. K_p will be equal to 4

B. K_p will be equal to 16

C. The initial pressure =8

D. The partial pressure of CO is 8 atm at equlibrium

Answer: B::C::D

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15. For a reaction $C(s) + CO_2(g) \Leftrightarrow 2CO(g)$ Δn value is

A. The equlibrium shifts in backward direction if more of CO is added

B. The equilibrium shifts in backward direction if more of CO is added

C. The equlibrium shifts in forward direction if more of corbon is added

D. On adding carbon, the equlibrium is not disturbed

Answer: A::B::D

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16. For a system at equilibrium

A. $\left(\frac{\partial \ln K_p}{\partial P}\right) = -\frac{\partial}{\partial P}\left(\frac{\Delta G}{RT}\right)_T$

B. $\Delta G = 0$

C. $G_{(P)} = G_{(R)}$

D. The free energy of the ststem is minimum

Answer: A::B::C::D

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17. In third group of qualitive analysis, NH_4Cl is added before NH_4OH so that

A. OH^- concentration decreases

B. only group III radical get precipitated as hydroxide but others with high solubility product do not

C. K_{sp} of group III hydroxide is high

D. Group III radicals get precipitated as chlorides

Answer: A::B

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18. For the system at equlibrium, which of the following are correct

A. $\log K = \frac{1}{2.303R}\left(\Delta S - \frac{\Delta H}{T}\right)$

B. On increasing the temperature of an endothemic reaction, the equlibrium shifts in forwared direction because Q decreases

C. On increasing the temperture of an endothermic reaction, the equilibrium shifts in forward direction because K increase

D. On increasing the temperature of an endothemic reaction, the conncentration in moles per litre of the reactants increase

Answer: A::C

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19. $A 0.1M$ sodium acetate solution was prepared. The $K_h = 5.6 \times 10^{-10}$

A. The degree of hydrolysis is 7.48×10^{-5}

B. The $\left[OH^-\right]$ concentration is $7.48 \times 10^{-3} M$

C. The $\left[OH^-\right]$ concentration is $7.48 \times 10^{-6} M$

D. The pH is approximately 8.88

Answer: A::C::D

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JS JEE SECTION (ONLY ONE CHOICE ANSWER (Reasoning type question))

1. Statement1: $PCl_5 \Leftrightarrow PCl_3(g) + Cl_2(g)$. Final pressure is more than the initial pressure.

Statement2: $\Delta n > 0$, more no. of moles on product side.

A. Statement 1 is true, stetement 2 is true, statement 2 is a correct explanation for statement 1

B. Statement 1 is true, statement 2 is true, statement 2 is not a correct explanation for statement 1

C. Statement 1 is true, statement 2 is false

D. Statement 1 is false, statement 2 is true

Answer: A

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2. Assertion: Snow does not melt easily at mountains.

Reason: A decrease in pressure leads to an increase in freezing point.

A. Statement 1 is true, stetement 2 is true, statement 2 is a correct explanation for statement 2

B. Statement 1 is true, statement 2 is true, statement 2 is not a correct explanation for statement 2

C. Statement 1 is true, statement 2 is false

D. Statement 1 is false, statement 2 is true

Answer: A

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3. Statement 1: $CuSO_4.5H_2O(s) \Leftrightarrow CuSO_4.3H_2O(s) + 2H_2O(g)$.

For this equlibrium partial pressure of $H_2O(g)$ increases continously

with increasing volume.

Statement 2: Vapour pressure depends only on temperarture.

A. Statement 1 is true, stetement 2 is true, statement 2 is a correct explanation for statement 3

B. Statement 1 is true, statement 2 is true, statement 2 is not a correct explanation for statement 3

C. Statement 1 is true, statement 2 is false

D. Statement 1 is false, statement 2 is true

Answer: D

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JS JEE SECTION (ONLY ONE CHOICE ANSWER (comprehension type question))

1. Thermal decomposition of gaseous X_2 to gaseous X at $298K$ takes place according to the following equation:

$X(g) \Leftrightarrow 2X(g)$

The standard reaction Gibbs energy $\Delta_r G^\circ$, of this reaction is positive. At the start of the reaction, there is one mole of X_2 and no X. As the reaction proceeds, the number of moles of X formed is given by β. Thus $\beta_{\text{equilibrium}}$ is the number of moles of X formed at equilibrium. The reaction is carried out at a constant total pressure of 2 bar. Consider the gases to behave ideally.

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

The equilibrium constant K_p for this reaction at $298K$, in terms of $\beta_{\text{equilibrium}}$ is

A. $\dfrac{8\beta^2_{\text{equlibrium}}}{2-\beta_{\text{equlibrium}}}$

B. $\dfrac{8\beta^2_{\text{equlibrium}}}{4-\beta^2_{\text{equlibrium}}}$

C. $\dfrac{4\beta^2_{\text{equlibrium}}}{2-\beta_{\text{equlibrium}}}$

D. $\dfrac{4\beta^2_{\text{equlibrium}}}{4-\beta^2_{\text{equlibrium}}}$

Answer: B

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2. Thermal decomposition of gaseous X_2 to gaseous X at $298K$ takes place according to the following equation:

$X(g) \Leftrightarrow 2X(g)$

The standard reaction Gibbs energy $\Delta_r G^\circ$, of this reaction is positive. At the start of the reaction, there is one mole of X_2 and no X. As the reaction proceeds, the number of moles of X formed is given by β. Thus $\beta_{\text{equilibrium}}$ is the number of moles of X formed at equilibrium. The reaction is carried out at a constant total pressure of 2 bar. Consider the gases to behave ideally.

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

The incorrect statement among the following for this reaction, is

A. Decrease in the total pressure will result in formation of more moles of gaseous X

B. At the start of the reaction, dissociation of gaseous X_2 takes place spontaneously

C. $\beta_{\text{equlibrium}} = 0.7$

D. $K_c < 1$

Answer: C

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3. The reaction quotient, Q is expresse as some as, that for equilibrium constant K.The value of Q for the given composition of a reaction mixture helps us to know whether the reaction will move forward or backward or remain in equlibrium. It helphs to pedict the effect of pressure on the direction of the gaseous reaction. In some reactions, addition of inert gas also favours either the formation of reactansts or products. The value of equlibrium constant of a reaction changes with change of temperture and the change is gives

by van't Hoff equation, d ln $K_p/dT = \Delta H^\circ/RT^2$ where enthalpy change, ΔH°, is taken as constant in the small temperatue range. For the above reaction in equlibrium, helium gas was added but the mixture was allowed to expand to keep the pressure constant. Then

A. More of ammonia will be formed

B. Ammonia will dissociate back into N_2 and H_2

C. There will be no effect on equlibrium

D. Equlibrium constant of the reaction will change

Answer: B

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4. The reaction quotient, Q is expresse as some as, that for equilibrium constant K.The value of Q for the given composition of a reaction mixture helps us to know whether the reaction will move forward or backward or remain in equlibrium. It helphs to pedict the

effect of pressure on the direction of the gaseous reaction. In some reactions, addition of inert gas also favours either the formation of reactansts or products. The value of equlibrium constant of a reaction changes with change of temperture and the change is gives by van't Hoff equation, d ln $K_p / dT = \Delta H^\circ / RT^2$ where enthalpy change, ΔH°, is taken as constant in the small temperatue range. Which of the following will be correct

A. Plot of ln K_p versus $1/T^2$ will be linear with +ve slope

B. Plot of ln K_p versus $1/T$ will be linear with +ve slope

C. Plot of ln K_p versus $1/T^2$ will be linear with-ve slope

D. Plot of ln K_p versus $1/T$ will be linear with -ve slope

Answer: D

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5. The equlibrium constant for the reaction between $CH_4(g)$ and $H_2S(g)$ to from $CS_2(g)$ and $H_2(g)$, at 1173 K is 3.6. for the following composition of th reaciton mixture, decide which of the following option is correct

$[CH_4] = 1.07M, [H_2S] = 1.20M,$

$[CS_2] = 0.09M, [H_2] = 1.78M$

A. Reaction is in equlibrium

B. Reaction will shift to from more of CS_2

C. Reaction will shift to from more of H_2S

D. No reaction takes place

Answer: C

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6. The reaction $N_2(g) + 3H_2(g) \Leftrightarrow 2NH_3(g)$ is in equlibrium. Now the reaction mixture is compressed to half the volume

A. More of ammonia will be formed

B. Ammonia will dissociate back into N_2 and H_2

C. There will be no effect on equlibrium

D. Equlibrium constant of the reaction will change

Answer: A

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JS JEE SECTION (ONLY ONE CHOICE ANSWER (Integer type question))

1. If α is the fraction of HI dissociated at equilibrium in the reaction, $2HI(g) \Leftrightarrow H_2(g) + I_2(g)$ starting with the 2 moles of HI. Then the total number of moles of reactants and products at equilibrium are

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2. For the reaction $A + B \Leftrightarrow C + D$, the initial concentrations of A and B are equal. The equilibrium concentration of C is two times the equilibrium concentration of A. The value of equilibrium constant is .....

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3. A mixture of N_2 and H_2 in the molare ratio $1:3$ attains equlibrium when $50\,\%$ of mixture has reacted. If P is the total pressue of the mixture, the partial pressure of NH_3 formed is P/y. The value of y is

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JS JEE SECTION (ONLY ONE CHOICE ANSWER (Matrix)

1. Match the entries listed in Column I with appropriate entries listed in Column II.

Column I	Column II
(A) $N_2 + 3H_2 \rightleftharpoons 2NH_3$, $\Delta H = -92.5\ kJ$	(p) Increase of temperature will shift the equilibrium forward
(B) $\underbrace{H_{2(g)} + CO_{(g)}}_{\text{water gas}} + \underset{\text{Steam}}{H_2O_{(g)}} \rightleftharpoons 2H_{2(g)} + CO_{2(g)}$, $\Delta H = +42.0\ kJ$	(q) Increase of pressure will shift the equilibrium forward
(C) $N_2O_4 + 58.6\ kJ \rightleftharpoons 2NO_2$	(r) Pressure has no effect
(D) $CH_3COOH + C_2H_5OH \rightleftharpoons CH_3COOC_2H_5 + H_2O$	(s) Decrease of pressure will shift the equilibrium forward

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