CHEMISTRY

NCERT - FULL MARKS

CHEMISTRY(TAMIL)

CHEMICAL EQUILIBRIUM - II

Self Evaluation A Choose The Correct Answer

1. What is meant by 'chemical equilibrium ' ?

A. dynamic

B. stationery

C. none

D. both

Answer: A

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2. If the equilibrium constants of following reactions are $2A \Leftrightarrow B$ is K_1 and $B \Leftrightarrow 2A$ is K_2, then

A. $K_1 = 2K_2$

B. $K_1 = 1/K_2$

C. $K_2 = (K_1)^2$

D. $K_1 = 1/K_2{}^2$

Answer: B

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3. In the reversible reaction $2HI \Leftrightarrow H_2 + I_2, K_p$ is

A. greater than K_c

B. less than K_c

C. Equal to K_c

D. Zero

Answer: C

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4. For the reaction $N_{2(g)} + 3H_{2(g)} \rightarrow 2NH_{3(g)}$ the rate of the reaction in terms of ammonia is _____

A. low pressure and high temperature

B. low pressure and low temperature

C. high temperature and high pressure

D. high pressure and low temperature

Answer: D

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5. For the homogeneous are reaction at 600 K,

$4NH_{3(g)} + 5O_{2(g)} \Leftrightarrow 4NO_{(g)} + 6H_2O_{(g)}$.

The equilibrium K_c has the unit.

A. $\left(\text{mol dm}^{-3}\right)^{-1}$

B. $\left(\text{mol dm}^{-3}\right)$

C. $\left(\text{mol dm}^{-3}\right)^{10}$

D. $\left(\text{mol dm}^{-3}\right)^{-9}$

Answer: B

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6. Two moles of ammonia gas are introduced into a previously evacuated $1.0\ \text{dm}^3$ vessel in which it partially dissociates at high

temperature. At equilibrium 1.0 mole of ammonia remains. The equilibrium constant K_c for the dissociation is

A. $27/16\left(\text{mole dm}^{-3}\right)^2$

B. $27/8\left(\text{mole dm}^{-3}\right)^2$

C. $27/4\left(\text{mole dm}^{-3}\right)^2$

D. None of these

Answer: A

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7. An equilibrium reaction is endothermic if K_1 and K_2 are the equilibrium constants at T_1 and T_2 temperatures respectively and if T_2 is greater than T_1 then

A. K_1 is less than K_2

B. K_1 is greater than K_2

C. K_1 is equal to K_2

D. None

Answer: A

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Self Evaluation B Answer In One Or Two Sentences

1. Dissolution of ammonium nitrate increases with increase in temperature. why ?

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2. Write the equilibrium constant for the following

(i) $H_2O_{2(g)} \Leftrightarrow H_2O_{(g)} + 1/2O_{2(g)}$

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

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

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3. State Le-Chatelier principle.

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4. How will you arrive at the unit of equilibrium constant ?

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5. The Cyanobacteria are also referred to as

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6. Derive the relation $K_p = K_c(RT)^{\Delta n_g}$ for a general chemical equilibrium reaction.

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7. Calculate Δn_g, for the following reactions

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

(ii)

$2H_2O_{(g)} + 2Cl_{2(g)} \Leftrightarrow 4HCl_{(g)} + O_2((g))$

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Self Evaluation C Answer Not Exceeding 60 Words

1. Derive the relation $K_p = K_c(RT)^{\Delta n_g}$ for a general chemical equilibrium reaction.

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2. For the equilibrium reaction

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

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3. Derive the relationship between C_p and C_v for an ideal gas.

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Self Evaluation D Practice Problems

1. The equilibrium constant Kc for $A_{(g)} \Leftrightarrow B_{(g)}$ is 2.5×10^{-2}. The rate constant of the forward reaction is $0.05 \ \sec^{-1}$. Calculate the rate constant of the reverse reaction.

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2. In the equilibrium $H_2 + I_2 \Leftrightarrow 2HI$ the number of moles of H_2, I_2 and HI are 1,2,3

moles respectively. Total pressure of the reaction mixture is 60 atm. Calculate the partial pressures of H_2, I_2 and HI in the mixture.

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3. In 1 litre volume reaction vessel, the equilibrium constant K_c of the reaction $PCl_5 \Leftrightarrow PCl_3 + Cl_2$ is 2×10^{-4} lit^{-1}. What will be the degree of dissociation

assuming only a small of 1 mole of PCl_5 has dissociated ?

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4. At temperature T_1, the equilibrium constant of eaction is K_1. At a higher temperature T_2, K_2 is 10% of K_1. Predict whether the equilibrium is endothermic or exothermic.

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5. At $35^{\circ}C$, the value of K_p for the equilibrium reaction $N_2O_4 \Leftrightarrow 2NO_2$ is 0.3174, Calculate the degree of dissociation when P is 0.2382 atm

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6. For the equilibrium $2NOCl_{(g)} \Leftrightarrow 2NO_{(g)} + Cl_{2(g)}$ the value of the equilibrium constant K_c is 3.75×10^{-6} at

$790^\circ C$. Calculate K_p for this equilibrium at the same temperature.

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7. For the equilibrium $2SO_{3(g)} \Leftrightarrow SO_{2(g)} + O_{2(g)}$, the value of equilibrium constant is 4.8×10^{-3} at $700^\circ C$. At equilibrium, if the concentration of SO_3 and SO_2 are $0.60M$ and 0.15M respectively. Calculate the concentration of O_2 in the equillibrium mixture.

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8. Hydrogen iodide is injected into a container at $458^{\circ}C$. Certain amount of HI dissociates to H_2 and I_2 At equilibrium, concentration of HI is found to be $0.421M$ while $[H_2]$ and $[I_2]$ each equal to $6.04 \times 10^{-2}M$, at $458^{\circ}C$. Calculate the value of the equilibrium constant of the dissociation of HI at the same temperature.

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9. Dissociation equilibrium constant of HI is 2.06×10^{-2} at $458^{\circ}C$. At equilibrium, concentrations of HI and I_2 are $0.36M$ and $0.15M$ respectively. What is the equilibrium concentration of H_2 at $458^{\circ}C$.

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10. The equilibrium constant for the reaction $2SO_{3(g)} \Leftrightarrow 2SO_{2(g)} + O_{2(g)}$ is 0.15 at 900 K. Calculate the equilibrium constant for the

reaction $2SO_{2(g)} + O_{2(g)} \Leftrightarrow 2SO_{3(g)}$ at the same temperature.

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11. For the reaction $A + B \Leftrightarrow 3C$ at $25^\circ C$, a 3 litre volume reaction vessel contains 1,2 and 4 moles of A,B and C respectively at equilibrium, calculate the equilibrium constant K_c of the reaction at $25^\circ C$.

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12. How much PCl_5 must be added to one litre volume reaction vessel at $250^\circ C$ in order to obtain a concentration of 0.1 mole of Cl_2, K_c for $PCl_5 \Leftrightarrow PCl_3 + Cl_2$ is $0.0414 \ \text{mol dm}^{-3}$ at $250^\circ C$.

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13. At 540, the equilibrium constant K_p for PCl_5 dissociation equilibrium at 1.0 atm 1.77 atm. Calculate equilibrium constant in molar

concentration (K_c) at same temperature and pressure.

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