Chemistry Class - 11: Chapter – 7. Equilibrium Part – 1

Question: 1

We know that the relationship between K_c and K_p is

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

What would be the value of Δn for the reaction?

$$NH_4Cl\,(s) \rightleftharpoons NH_3\,(g) + HCl\,(g)$$

(i)

(ii) 0.5

(iii) 1.5

(iv)

Answer: (iv)

Question: 2

For the reaction $H_2\,(g) + I_2\,(g) \rightleftharpoons 2HI\,(g)$, the standard free energy is $\Delta G^{\theta} > 0$. The equilibrium constant (K) would be _____.

(i) $K = 0$

(ii) $K > 1$

(iii) $K = 1$

(iv) $K < 1$

Answer: (iv)

Question: 3

Which of the following is not a general characteristic of equilibrium involving physical processes?

(i) Equilibrium is possible only in a closed system at a given temperature.

(ii) All measurable properties of the system remain constant.

(iii) All the physical processes stop at equilibrium.

(iv) The opposing processes occur at the same rate and there is dynamic but stable condition.

Answer: (iii)

Question: 4

PCl_5, PCl_3 and Cl_2 are at equilibrium at $500K$ in a closed container and their concentrations are $0.8 \times 10^{-3} mol L^{-1}, 1.2 \times 10^{-3} mol L^{-1}$ and $1.2 \times 10^{-3} mol L^{-1}$ respectively. The value of K_c for the reaction $PCl_5(g) \rightleftharpoons PCl_3(g) + Cl_2(g)$ will be

(i) $1.8 \times 10^3 mol L^{-1}$

(ii) 1.8×10^{-3}

(iii) $1.8 \times 10^{-3} L\ mol^{-1}$

(iv) 0.55×10^4

Answer: (ii)

Question: 5

Which of the following statements is incorrect?

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

(ii) The intensity of red colour increases when oxalic acid is added to a solution containing iron (III) nitrate and potassium thiocyanate.

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

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

Answer: (ii)

Question: 6

When hydrochloric acid is added to cobalt nitrate solution at room temperature, the following reaction takes place and the reaction mixture becomes blue. On cooling the mixture it becomes pink. On the basis of this information mark the correct answer.

$$\underset{(pink)}{\left[Co(H_2O)_6\right]^3} + (aq) + 4Cl^-(aq) \rightleftharpoons \underset{(blue)}{[CoCl_4]^{2-}}(aq) + 6H_2O(l)$$

(i) $\Delta H > 0$ for the reaction

(ii) $\Delta H < 0$ for the reaction

(iii) $\Delta H = 0$ for the reaction

(iv) The sign of ΔH cannot be predicted on the basis of this information.

Answer: (i)

Question: 7

The pH of neutral water at $25°C$ is 7.0. As the temperature increases, ionisation of water increases, however, the concentration of H^+ ions and OH^- ions are equal. What will be the pH of pure water at $60°C$?

(i) Equal to 7.0

(ii) Greater than 7.0

(iii) Less than 7.0

(iv) Equal to zero

Answer: (iii)

Question: 8

The ionisation constant of an acid, K_a , is the measure of strength of an acid. The K_a values of acetic acid, hypochlorous acid and formic acid are $1.74 \times 10^{-5}, 3.0 \times 10^{-8}$ and 1.8×10^{-4} respectively. Which of the following orders of $\text{pH of} 0.1\ mol\ dm^{-3}$ solutions of these acids is correct?

(i) Acetic acid > hypochlorous acid > formic acid

(ii) Hypochlorous acid > acetic acid > formic acid

(iii) Formic acid > hypochlorous acid > acetic acid

(iv) Formic acid > acetic acid > hypochlorous acid

Answer: (iv)