



**INDIAN SCHOOL MUSCAT**  
**CLASS – 11 CHEMISTRY WORKSHEET –13**  
**EQUILIBRIUM**

1	Give reason: a) Equilibrium can be established only in closed system. b) Chemical equilibrium is dynamic in nature.
2	The value of $K_c = 6.2$ at 750K for the reaction $\text{CO(g)} + \text{H}_2\text{O(g)} \rightleftharpoons \text{CO}_2\text{(g)} + \text{H}_2\text{(g)}$ . If initially the quantities of CO and H <sub>2</sub> O are 2 moles in a 1 liter vessel, What would be the equilibrium concentrations of all the chemicals?
3	The $K_c$ value for the reaction $\text{SO}_2\text{(g)} + \frac{1}{2} \text{O}_2\text{(g)} \rightleftharpoons \text{SO}_3\text{(g)}$ is 72.5. What is the value of $K_c$ for $2\text{SO}_3\text{(g)} \rightleftharpoons 2\text{SO}_2\text{(g)} + \text{O}_2\text{(g)}$ ?
4	If the $K_p$ value for the reaction $\text{CO}_2\text{(g)} + \text{C(s)} \rightleftharpoons 2\text{CO(g)}$ at 1000K is 3, find value of $K_c$ .
5	An equilibrium mixture contains $[\text{PCl}_5] = 0.15$ ; $[\text{PCl}_3] = 0.29$ ; $[\text{Cl}_2] = 0.32$ . If $K_c$ for the dissociation of $\text{PCl}_5$ at the same temperature is 3.5, in which direction is the reaction proceeding?
6	What happens to the concentration of products when the pressure is increased in the following reaction at equilibrium? $2\text{NO}_2\text{(g)} \rightleftharpoons \text{N}_2\text{O}_4\text{(g)}$ ?
7	Calculate the degree of dissociation, pH, and concentration of all species at equilibrium of a 0.05M HCN solution if $K_a = 4.9 \times 10^{-10}$ .
8	If $K_a$ for the weak acid niacin is $1.5 \times 10^{-5}$ , what is $K_b$ for its conjugate base?
9	The pH of an acetic acid solution is 5.6. What is the concentration of the solution if $K_a = 1.8 \times 10^{-7}$ ?
10	Name an acid buffer and an alkaline buffer each.
11	Copper is precipitated as sulphide in the II group while Zn is precipitated as sulphide in the IV group. Explain.
12	What is basic principle behind the systematic analysis of cations and group separation? Explain.
13	Differentiate between



	a) hydrolysis and hydration b) solubility and solubility product
14	Calculate the solubility of $\text{BaSO}_4$ if its $K_{sp}$ value is $1.1 \times 10^{-10}$
15	10ml of 0.1M $\text{CaCl}_2$ is mixed with 15ml of 0.11M $\text{NaF}$ . Predict whether $\text{CaF}_2$ will precipitate if the $K_{sp}$ of $\text{CaF}_2$ is $5.3 \times 10^{-9}$ .
16	Which of the following is more soluble? a) $\text{AgCl}$ or $\text{AgBr}$ [ $K_{sp}$ of $\text{AgCl} = 1.8 \times 10^{-10}$ ; $\text{AgBr} = 5 \times 10^{-13}$ ] b) $\text{AgCN}$ or $\text{Ni(OH)}_2$ [ $K_{sp}$ $\text{AgCN} = 2 \times 10^{-15}$ ; $\text{Ni(OH)}_2 = 6 \times 10^{-17}$ ]
17	State (i) Henry's law (ii) Law of mass action (iii) LeChatelier's principle
18	Classify the following as Lewis acid or Lewis base $\text{H}^+$ , $\text{H}_2\text{O}$ , $\text{NH}_3$ , $\text{BF}_3$ , $\text{Al}^{3+}$ , $\text{BeCl}_2$ , $\text{Cl}^-$
19	Write the formula for the conjugate acid of (i) $\text{F}^-$ (ii) $\text{OH}^-$
20	Write the formula for the conjugate base of $\text{HNO}_2$ , $\text{HClO}_4$ , $\text{OH}^-$
21	A buffer solution contains 0.4mol of ammonium hydroxide and 0.5mol of ammonium chloride to make a buffer solution of 1L. Calculate the pH of the resulting buffer solution. Dissociation constant of ammonium hydroxide at $25^\circ\text{C}$ is $1.81 \times 10^{-5}$