Chemical Equilibrium

Std. XII **Time: 30 mts**
CHEMISTRY **Max.Marks: 25**

1. State of chemical equilibrium is
   a Dynamic b Stationary c None d Both
2. The equilibrium constants for the reaction, $2A \rightleftharpoons B$ and $B \rightleftharpoons 2A$ are K_1 and K_2 respectively. Then
   a $k_1 = 2k_2$ b $k_1 = 1/k_2$ c $k_2 = (k_1)^2$ d $k_1 = 1/k_2^2$
3. The ratio of the rate constants of forward to reverse reaction in an equilibrium is
   a Equilibrium constants b Rate coefficient
   c Equilibrium coefficients d Reaction quotient
4. The maximum yield of ammonia in the equilibrium
   $$N_{2(g)} + 3H_{2(g)} \rightleftharpoons 2NH_{3(g)}$$
   is obtained in the process having
   a Low pressure and high temperature
   b Low pressure and low temperature
   c High pressure and high temperature
   d High pressure and low temperature
5. In the reversible reaction $2HI \rightleftharpoons H_2 + I_2$, k_p is
   a Greater than k_c b less than k_c
   c Equal to k_c d 0
6. The unit of equilibrium constant k_c for homogeneous gas reaction
   $4NH_{3(g)} + 5O_{2(g)} \rightleftharpoons 4NO_{(g)} + 6H_2O_{(g)}$ is
   a $(\text{mol dm}^{-3})^{-1}$ b (mol dm^{-3})
   c $(\text{mol dm}^{-3})^{-10}$ d $(\text{mol dm}^{-3})^{-9}$
7. $H_2 + I_2 \rightleftharpoons 2$ HI this equilibrium is not affected by _____
   a Pressure b Temperature
   c Concentration of H_2 and I_2 d None of these
8. For the equilibrium $2H_2O_{(g)} + 2Cl_{2(g)} \rightleftharpoons 4HCl_{(g)} + 5O_{2(g)}$ the value of k_p and k_c are related as
   a $k_p = k_c$ b $k_p > k_c$
   c $k_p < k_c$ d $k_p = k_c = 0$
9. The relationship between equilibrium constants of formation and dissociation is
   a $k_c = k'_c$ b $k_c\, k'_c = 1$
   c $\frac{k_c}{k'_c} = 0$ d $k'_c = k_c\,(RT)^{\Delta ng}$
10. If k_c for the reaction $H_{2(g)} + I_{2(g)} \rightleftharpoons 2HI_{(g)}$ 50.46 at 458°C, the value of k_p is
    a 50.46 b 0.0198 c 100.92 d 25.23
11. Two moles of ammonia gas are introduced into a previously evacuated 1.0 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 $27/16\,(\text{mole dm}^{-3})^2$ b $27/8\,(\text{mole dm}^{-3})^2$
    c $27/4\,(\text{mole dm}^{-3})^2$ d None of these

12. The catalyst used in Haber's process is
a V_2O_5 b Fe c SO_3 d P_2O_5

13. 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

14. When k_c is less than Q at the same temperature and pressure, then
a Forward reaction is favoured b Reverse reaction is favoured
c The reaction is at equilibrium d The reaction has stopped

15. Δng for the equilibrium $H_2O_{2(g)} \rightleftharpoons H_2O_{(g)} + 1/2\ O_{2(g)}$ is
a 1/2 b 3/2 c $-1/2$ d 1

16. The degree of dissociation of PCl_5 at 1 atm and 298 K is 0.2. The value of k_p is
a 0.42 atm b 0.24 atm c 0.48 atm d 0.042 atm

17. For the equilibrium $2\ SO_{2(g)} + O_{2(g)} \rightleftharpoons 2\ SO_{3(g)}$ the formation constant of SO_3 at 600°C is 800 $mol^{-1}\ dm^3$, then the dissociation constant of the reverse reaction at the same temperature is
a 800 $mol^{-1}\ dm^3$ b $1.25 \times 10^{-3}\ mol\,dm^{-3}$
c 800 $mol\ dm^{-3}$ d $1.25 \times 10^{-3}\ mol\,dm^{-3}$

18. The relationship between k_p and k_c in the equilibrium
$2\ SO_{2(g)} + O_{2(g)} \rightleftharpoons 2\ SO_{3(g)}$ is
a $k_p = k_c \times RT$ b $k_p = k_c \times (RT)^2$ c $k_p \times RT = k_c$ d $k_p = k_c\,(RT)^{-2}$

19. For which of the equilibrium reaction $k_p = k_c$?
a $H_{2(g)} + I_{2(g)} \rightleftharpoons 2HI_{(g)}$ b $N_{2_2(g)} + O_{2(g)} \rightleftharpoons 2\ NO_{(g)}$
c $CO_{(g)} + H_2O_{(g)} \rightleftharpoons CO_{2(g)} + H_{2(g)}$ d All the above

20. The anhydride of H_2SO_4 is
a SO_2 b $H_2S_2O_7$ c H_2SO_3 d SO_3

21. The correct relation between k_p and k_c for the reaction $aX + bY \rightleftharpoons bM + aN$, in gaseous state is
a $k_p = k_c\,(RT)^{a+b}$ b $k_c = k_p\,(RT)^{a+b}$
c $k_p = k_c\,(RT)$ d $k_p = k_c$

22. The mole ratio of SO_2 and O_2 in contact process is
a 1:2 b 2:1 c 3:1 d 1:3

23. The maximum yield of ammonia in Haber's process is nearly
a 47% b 73% c 27% d 37%

24. Catalyst used in the manufacture of SO_3 is
a moist V_2O_5 b dry V_2O_5
c porous V_2O_5 d Fe

25. Which of the following equilibrium would be affected by an increase in pressure?
a $H_{2(g)} + I_{2(g)} \rightleftharpoons 2\ HI_{(g)}$ b $N_{2(g)} + O_{2(g)} \rightleftharpoons 2\ NO_{(g)}$
c $N_{2(g)} + 3\ H_{2(g)} \rightleftharpoons 2\ NH_{3(g)}$ d $CO_{(g)} + H_2O_{(g)} \rightleftharpoons CO_{2(g)} + H_{2(g)}$