Chemistry [DPP]

Chemical Equilibrium

1. Which of the following reaction goes in forward direction :-

(A) $Fe_2O_3 + 6HCl \rightarrow 2FeCl_3 + 3H_2O$

(B) $NH_3 + H_2O + NaCl \rightleftharpoons NH_4Cl + NaOH$

(C) $SnCl_4 + Hg_2Cl_2 \rightleftharpoons SnCl_2 + 2HgCl_2$

(D) $2Cu + 2I_2 + 4K^+ \rightleftharpoons 2Cu^{+2} + 4KI$

2. Which of the following is a characteristic of a reversible reaction:

(A) Number of moles of reactants and products are equal.

(B) It can be influenced by a catalyst

(C) It can never proceed to completion

(D) None of the above

3. 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

4. x $\rightleftharpoons$ y reaction is said to be in equilibrium, when :-
(A) Only 10% conversion x to y is just
(B) Complete conversion of x to y has taken place
(C) Conversion of x to y is only 50% complete
(D) The rate of change of x to y is just equal to the rate of change of y to x in the system

5. In the chemical reaction $N_2 + 3H_2 \rightleftharpoons 2NH_3$ at equilibrium, state whether :-

(A) Equal volumes of N_2 & H_2 are reacting

(B) Equal masses of N_2 & H_2 are reacting

(C) The reaction has stopped

(D) The same amount of ammonia is formed as is decomposed into N_2 and H_2

6. The role of catalyst in a chemical reaction is :-

(A) To help attain equilibrium in a shorter time.

(B) To lower the activation energy.

(C) To shift the equilibrium in such a way as to increase the concentration of the product

(D) Both A & B

7. Active mass of 5 g CaO :-

(A) 56 (B) 1

(C) 3.5 (D) 2

8. Ratio of active masses of 22g CO_2, 3g H_2 and 7g N_2 in a gaseous mixture:-

(A) 22 : 3 : 7 (B) 0.5: 3 : 7

(C) 1 : 3 : 1 (D) 1 : 3 : 0.5

9. The equilibrium concentration of $[B]_e$ for the reversible reaction A $\rightleftharpoons$ B can be evaluated by the expression:-

(A) $K_c[A]_e^{-1}$ (B) $\frac{k_f}{k_b}[A]_e^{-1}$

(C) $k_f k_b^{-1}[A]_e$ (D) $k_f k_b [A]^{-1}$

10. At 1000 K, the value of K_p for the reaction :
$A(g) + 2B(g) \rightleftharpoons 3C(g) + D(g)$
is 0.05 atm The value of K_c in terms of R would be
(A) 20000 R (B) 0.02 R
(C) 5×10^{-5} R (D) $5 \times 10^{-5} \times R^{-1}$

11. Match List –I (hypothetical reactions) with List–II (ratio $\frac{K_P}{K_C}$ for the given reactions) and select the correrct answer using the code given below the lists :-

(a) $A_2(g) + 3B_2(g) \rightleftharpoons 2AB_3(g)$
(i) $(RT)^{-2}$

(b) $A_2(g) + B_2(g) \rightleftharpoons 2AB(g)$
(ii) $(RT)^0$

(c) $A(s) + 1.5\ B_2(g) \rightleftharpoons AB_3(g)$
(iii) $(RT)^{\frac{1}{2}}$

(d) $AB_2(g) \rightleftharpoons AB(g) + 0.5\ B_2(g)$
(iv) $(RT)^{-\frac{1}{2}}$

CODES :

	a	b	c	d
(A)	(i)	(ii)	(iii)	(iv)
(B)	(ii)	(i)	(iv)	(iii)
(C)	(i)	(iv)	(iii)	(ii)
(D)	(i)	(ii)	(iv)	(iii)

12. 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) 2×10^{-3} (B) 5×10^{-4}

(C) 1.12×10^{-3} (D) 9.0×10^{-4}

13. For which reaction is $K_p = K_c$:-

(A) $2NOCl(g) \rightleftharpoons 2NO(g) + Cl_2(g)$

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

(C) $H_2(g) + Cl_2(g) \rightleftharpoons 2HCl(g)$

(D) $2SO_2(g) + O_2(g) \rightleftharpoons 2SO_3(g)$

14. For the reaction

$CuSO_4.5H_2O_{(s)} \rightleftharpoons CuSO_4 \cdot 3H_2O_{(s)} + 2H_2O_{(g)}$

Which one is correct representation:–

(A) $K_p = p^2_{(H_2O)}$

(B) $K_c = [H_2O]^2$

(C) $K_p = K_c(RT)^2$

(D) All

15. $\log \frac{K_p}{K_c} + \log RT = 0$ is true relationship for the following reaction:-

(A) $PCl_5 \rightleftharpoons PCl_3 + Cl_2$

(B) $2SO_2 + O_2 \rightleftharpoons 2SO_3$

(C) $N_2 + 3H_2 \rightleftharpoons 2NH_3$

(D) (B) and (C) both

16. For the reaction $C(s) + CO_2(g) \rightleftharpoons 2CO(g)$ the partial pressure of CO and CO_2 are 2.0 and 4.0 atm. respectively at equilibrium. The K_P for the reaction is

(A) 0.5 (B) 4.0
(C) 8.0 (D) 1

17. For which reaction at 298 K, the value of $\frac{K_p}{K_c}$ is maximum and minimum respectively:-

(a) $N_2O_4 \rightleftharpoons 2NO_2$

(b) $2SO_2 + O_2 \rightleftharpoons 2SO_3$

(c) $X + Y \rightleftharpoons 4Z$

(d) $A + 3B \rightleftharpoons 7C$

(A) d, c (B) d, b
(C) c, b (D) d, a

18. In this reaction $Ag^+ + 2NH_3 \rightleftharpoons Ag(NH_3)_2^+$ at 298K molar concentration of Ag^+, $Ag(NH_3)_2^+$ and NH_3 is 10^{-1}, 10^{-1} , and 10^3. The value of K_C at 298K for this equilibrium :-

(A) 10^{-6} (B) 10^6

(C) 2×10^{-3} (D) 2×10^6

19. For reaction $2NOCl(g) \rightleftharpoons 2NO(g) + Cl_2(g)$, K_C at 427°C is 3×10^{-6} L^{-1} mol. The value of K_P is nearly :–

(A) 7.50×10^{-5} (B) 2.50×10^{-5}

(C) 2.50×10^{-4} (D) 1.75×10^{-4}

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

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

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

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

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

ANSWER KEY

1.	A	**2.**	C	**3.**	D
4.	D	**5.**	D	**6.**	D
7.	B	**8.**	D	**9.**	C
10.	D	**11.**	D	**12.**	C
13.	C	**14.**	D	**15.**	B
16.	D	**17.**	B	**18.**	A
19.	D	**20.**	A		