K_p & K_c Relationship and Characteristics of K

1. In which of the following reaction, the value of K_p will be equal to K_c
(a) $H_2 + I_2 \rightleftharpoons 2HI$
(b) $PCl_5 \rightleftharpoons PCl_3 + Cl_2$
(c) $2NH_3 \rightleftharpoons N_2 + 3H_2$
(d) $2SO_2 + O_2 \rightleftharpoons 2SO_3$

2. Equilibrium constants K_1 and K_2 for the following equilibria
$NO(g) + \frac{1}{2}O_2 \rightleftharpoons NO_2(g)$
and $2NO_2(g) \rightleftharpoons 2NO(g) + O_2(g)$
are related as
(a) $K_2 = \frac{1}{K_1}$ (b) $K_2 = K_1^2$
(c) $K_2 = \frac{K_1}{2}$ (d) $K_2 = \frac{1}{K_1^2}$

3. For the reaction $PCl_3(g) + Cl_2(g) \rightleftharpoons PCl_5(g)$ at 250^oC, the value of K_c is 26, then the value of K_p on the same temperature will be
(a) 0.61 (b) 0.57
(c) 0.83 (d) 0.46

4. The relation between equilibrium constant K_p and K_c is
(a) $K_c = K_p(RT)^{\Delta n}$
(b) $K_p = K_c(RT)^{\Delta n}$
(c) $K_p = \left(\frac{K_c}{RT}\right)^{\Delta n}$
(d) $K_p - K_c = (RT)^{\Delta n}$

5. $CH_3COOH_{(l)} + C_2H_5OH_{(l)} \rightleftharpoons CH_3COOC_2H_{5(l)} + H_2O_{(l)}$ In the above reaction, one mole of each of acetic acid and alcohol are heated in the presence of little conc. H_2SO_4. On equilibrium being attained
(a) 1 mole of ethyl acetate is formed
(b) 2 mole of ethyl acetate are formed
(c) 1/2 moles of ethyl acetate is formed
(d) 2/3 moles of ethyl acetate is formed

6. If the equilibrium constant of the reaction $2HI \rightleftharpoons H_2 + I_2$ is 0.25, then the equilibrium constant of the reaction $H_2 + I_2 \rightleftharpoons 2HI$ would be
(a) 1.0 (b) 2.0
(c) 3.0 (d) 4.0

7. For $N_2 + 3H_2 \rightleftharpoons 2NH_3 +$ heat
(a) $K_p = K_c \rightleftarrows (RT)$
(b) $K_p = K_c(RT)$
(c) $K_p = K_c(RT)^{-2}$
(d) $K_p = K_c(RT)^{-1}$

8. In the reaction $N_2(g) + 3H_2 \rightleftharpoons 2NH_3(g)$, the value of the equilibrium constant depends on

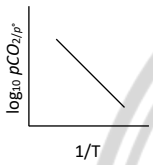
(a) Volume of the reaction vessel

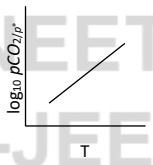
(b) Total pressure of the system

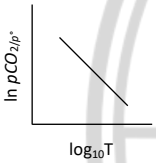
(c) The initial concentration of nitrogen and hydrogen

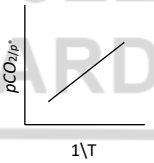
(d) The temperature

9. For the chemical equilibrium, $CaCO_3(s) \rightleftharpoons CaO(s) + CO_2(g)$, ΔH_r° can be determined from which one of the following plots

(a) 

(b) 

(c) 

(d) 

10. In which of the following equilibria, the value of K_p is less than K_c

(a) $H_2 + I_2 \rightleftharpoons 2HI$

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

(c) $N_2 + O_2 \rightleftharpoons 2NO$

(d) $CO + H_2O \rightleftharpoons CO_2 + H_2$

11. Two gaseous equilibria $SO_{2(g)} + \frac{1}{2}O_{2(g)} \rightleftharpoons SO_{3(g)}$ and $2SO_{3(g)} \rightleftharpoons 2SO_{2(g)} + O_{2(g)}$ have equilibrium constants K_1 and K_2 respectively at $298K$. Which of the following relationships between K_1 and K_2 is correct

(a) $K_1 = K_2$ (b) $K_2 = K_1^2$

(c) $K_2 = \frac{1}{K_1^2}$ (d) $K_2 = \frac{1}{K_1}$

12. $H_2 + I_2 \rightleftharpoons 2HI$

In the above equilibrium system if the concentration of the reactants at 25^oC is increased, the value of K_c will

(a) Increase

(b) Decrease

(c) Remains the same

(d) Depends on the nature of the reactants

13. At a given temperature, the equilibrium constant for reaction $PCl_5(g) \rightleftharpoons PCl_3(g) + Cl_2(g)$ is 2.4×10^{-3}. At the same temperature, the equilibrium constant for reaction $PCl_3(g) + Cl_2(g) \rightleftharpoons PCl_5(g)$ is

(a) 2.4×10^{-3}

(b) -2.4×10^{-3}

(c) 4.2×10^{2}

(d) 4.8×10^{-2}

14. For the reaction $C(s) + CO_2(g) \rightleftharpoons 2CO(g)$, the partial pressure of CO_2 and CO 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) 32.0

15. K for the synthesis of HI is 50. K for dissociation of HI is

(a) 50 (b) 5

(c) 0.2 (d) 0.02

16. In which one of the following gaseous equilibria K_p is less than K_c

(a) $N_2O_4 \rightleftharpoons 2NO_2$

(b) $2HI \rightleftharpoons H_2 + I_2$

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

(d) $N_2 + O_2 \rightleftharpoons 2NO$

17. For which of the following reactions $K_p = K_c$

(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) $N_2O_4(g) \rightleftharpoons 2NO_2(g)$

18. For the reaction $H_2(g) + I_2(g) \rightleftharpoons 2HI(g)$ at $721K$ the value of equilibrium constant (K_c) is 50. When the equilibrium concentration of both is $0.5M$, the value of K_p under the same conditions will be

(a) 0.002 (b) 0.2

(c) 50.0 (d) $50/RT$

19. In which of the following reaction $K_p > K_c$

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

(b) $H_2 + I_2 \rightleftharpoons 2HI$

(c) $PCl_3 + Cl_2 \rightleftharpoons PCl_5$

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

20. For the reaction $PCl_5(g) \rightleftharpoons PCl_3(g) + Cl_2(g)$

(a) $K_p = K_c$

(b) $K_p = K_c(RT)^{-1}$

(c) $K_p = K_c(RT)$

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