K_p & K_c Relationship and Characteristics of K

21. The equilibrium constant of the reaction $H_2(g) + I_2(g) \rightleftharpoons 2HI(g)$ is 64. If the volume of the container is reduced to one fourth of its original volume, the value of the equilibrium constant will be

(a) 16 (b) 32

(c) 64 (d) 128

22. For the following gaseous reaction $H_2 + I_2 \rightleftharpoons 2HI$, the equilibrium constant

(a) $K_p > K_c$ (b) $K_p < K_c$

(c) $K_p = K_c$ (d) $K_p = 1/K_c$

23. For the reaction

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

$(K_c = 1.8 \times 10^{-6} \text{at} 184°C)$

$(R = 0.0831 kJ/(mol.K))$

When K_p and K_c are compared at 184°C it is found that

(a) K_p is greater than K_c

(b) K_p is less than K_c

(c) $K_p = K_e$

(d) Whether K_p is greater than, less than or equal to K_c depends upon the total gas pressure

24. In equilibrium $CH_3COOH + H_2O \rightleftharpoons CH_3COO + H_3^+O$ The equilibrium constant may change when

(a) CH_3COO^- are added

(b) CH_3COOH is added

(c) Catalyst is added

(d) Mixture is heated

25. For reaction $2NOCl(g) \rightleftharpoons 2NO(g) + Cl_2(g)$, K_C at 427°C is $3 \times 10^{-6} L\ mol^{-1}$. 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}

26. For which one of the following reactions $K_p = K_c$

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

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

(c) $PCl_5 \rightleftharpoons PCl_3 + Cl_2$

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

27. The equilibrium constant for the reversible reaction, $N_2 + 3H_2 \rightleftharpoons 2NH_3$ is K and for the reaction $\frac{1}{2}N_2 + \frac{3}{2}H_2 \rightleftharpoons NH_3$ the equilibrium constant is K'. K and K' will be related as

(a) $K = K'$ (b) $K' = \sqrt{K}$

(c) $K = \sqrt{K'}$ (d) $K \times K' = 1$

28. The equilibrium constant (K_p) for the reaction $PCl_5(g) \rightarrow PCl_3(g) + Cl_2(g)$ is 16. If the volume of the container is reduced to one half its original volume, the value of K_p for the reaction at the same temperature will be

(a) 32 (b) 64

(c) 16 (d) 4

29. $2NO_2 \rightleftharpoons 2NO + O_2; K = 1.6 \times 10^{-12}$

$NO + \frac{1}{2}O_2 \rightleftharpoons NO_2 K' = ?$

(a) $K' = \frac{1}{K^2}$

(b) $K' = \frac{1}{K}$

(c) $K' = \frac{1}{\sqrt{K}}$

(d) None of these

30. The value of K_p for the following reaction $2H_2S(g) \rightleftharpoons 2H_2(g) + S_2(g)$ is 1.2×10^{-2} at 106.5^oC. The value of K_c for this reaction is

(a) 1.2×10^{-2}

(b) $< 1.2 \times 10^{-2}$

(c) 83

(d) $> 1.2 \times 10^{-2}$

31. Which statement for equilibrium constant is true for the reaction $A + B \rightleftharpoons C$

(a) Not changes with temperature

(b) Changes when catalyst is added

(c) Increases with temperature

(d) Changes with temperature

32. The equilibrium constant for the reaction $N_2 + 3H_2 \rightleftharpoons 2NH_3$ is K, then the equilibrium constant for the equilibrium $NH_3 \rightleftharpoons \frac{1}{2}N_2 + \frac{3}{2}H_2$ is

(a) $1/K$ (b) $1/K^2$

(c) $\sqrt{K}$ (d) $\frac{1}{\sqrt{K}}$

33. Which of the following statements regarding a chemical equilibrium is wrong

(a) An equilibrium can be shifted by altering the temperature or pressure

(b) An equilibrium is dynamic

(c) The same state of equilibrium is reached whether one starts with the reactants or the products

(d) The forward reaction is favoured by the addition of a catalyst

34. The reaction between N_2 and H_2 to form ammonia has $K_c = 6 \times 10^{-2}$ at the temperature 500°C. The numerical value of K_p for this reaction is

(a) 1.5×10^{-5} (b) 1.5×10^{5}

(c) 1.5×10^{-6} (d) 1.5×10^{6}

35. For the gaseous phase reaction
$2NO \rightleftharpoons N_2 + O_2 \Delta H^\circ = +43.5 kcal mol^{-1}$
Which statement is correct
(a) *K* varies with addition of *NO*
(b) *K* decrease as temperature decreases
(c) *K* Increases as temperature decreases
(d) *K* is independent of temperature

36. For the reversible reaction,
$N_{2(g)} + 3H_{2(g)} \rightleftharpoons 2NH_{3(g)}$
at 500°C, the value of K_P is 1.44×10^{-5} when partial pressure is measured in atmospheres. The corresponding value of K_c with concentration in mole *litre*$^{-1}$, is
(a) $1.44 \times 10^{-5}/(0.082 \times 500)^{-2}$
(b) $1.44 \times 10^{-5}/(8.314 \times 773)^{-2}$
(c) $1.44 \times 10^{-5}/(0.082 \times 773)^{2}$
(d) $1.44 \times 10^{-5}/(0.082 \times 773)^{-2}$

37. A chemical reaction is catalyzed by a catalyst *X*. Hence *X*]
(a) Reduces enthalpy of the reaction
(b) Decreases rate constant of the reaction
(c) Increases activation energy of the reaction
(d) Does not affect equilibrium constant of reaction

38. At 490°*C*, the equilibrium constant for the synthesis of *HI* is 50, the value of *K* for the dissociation of *HI* will be
(a) 20.0 (b) 2.0
(c) 0.2 (d) 0.02

39. In which of the following case K_p is less than K_c
(a) $H_2 + Cl_2 \rightleftharpoons 2HCl$
(b) $2SO_2 + O_2 \rightleftharpoons 2SO_3$
(c) $N_2 + O_2 \rightleftharpoons 2NO$
(d) $PCl_5 \rightleftharpoons PCl_3 + Cl_2$

40. $CaCO_{3(s)} \rightleftharpoons CaO_{(s)} + CO_{2(g)}$ which of the following expression is correct
(a) $K_P = (P_{CaO} + P_{CO_2}/P_{CaCO_3})$
(b) $K_P = P_{CO_2}$
(c) $K_P \times (P_{CaO} \times P_{CO_2}).P_{CaCO_3}$
(d) $\frac{K_p[CaO][CO_2]}{[CaCO_3]}$