## $K_p$ & $K_c$ Relationship and Characteristics of $K$

**41.** If $K_c$ is the equilibrium constant for the formation of $NH_3$, the dissociation constant of ammonia under the same temperature will be

(a) $K_c$ (b) $\sqrt{K_c}$
(c) $K_c^2$ (d) $1/K_c$

**42.** 3.2 moles of hydrogen iodide were heated in a scaled bulb at 444°C till the equilibrium was reached. The degree of dissociation of *HI* at this temperature was found to be 22%. The number of moles of hydrogen iodide present at equilibrium are

(a) 1.87 (b) 2.496
(c) 4.00 (d) 2.00

**43.** The $K_c$ for $H_{2(g)} + I_{2(g)} \rightleftharpoons 2HI_{(g)}$ is 64. If the volume of the container is reduced to one-half of its original volume, the value of the equilibrium constant will be

(a) + 28 (b) 64
(c) 32 (d) 16

**44.** A reversible reaction $H_2 + Cl_2 \rightleftharpoons 2HCl$is carries out in one litre flask. If the same reaction is carried out in two litre flask, the equilibrium constant will be

(a) Decreased (b) Doubled
(c) Halved (d) Same

**45.** For the reaction

$2NO_{2(g)} \rightleftharpoons 2NO_{(g)} + O_{2(g)}, K_c = 1.8 \times 10^{-6}$ at 185°*C*. At 185°*C* the $K_c$ for

$NO_{(g)} + \frac{1}{2}O_{2(g)} \rightleftharpoons NO_{2(g)}$ is

(a) $1.95 \times 10^{-3}$ (b) $1.95 \times 10^{3}$
(c) $7.5 \times 10^{2}$ (d) $0.9 \times 10^{6}$

**46.** If for $H_{2(g)} + \frac{1}{2}S_{2(S)} \rightleftharpoons H_2S_{(g)}$ and

$H_{2(g)} + Br_{2(g)} \rightleftharpoons 2HBr_{(g)}$

The equilibrium constants are $K_1$ and $K_2$ respectively, the reaction

$Br_{2(g)} + H_2S_{(g)} \rightleftharpoons 2HBr_{(g)} + \frac{1}{2}S_{2(S)}$

would have equilibrium constant

(a) $K_1 \times K_2$ (b) $K_1/K_2$
(c) $K_2/K_1$ (d) $K_2^2/K_1$

**47.** Some solid $NH_4HS$ is placed in a flask containing 0.5 *atm* of $NH_3$, what would be pressures of $NH_3$ and $H_2S$ when equilibrium is reached

$NH_4HS_{(g)} \rightleftharpoons NH_{3(g)} + H_2S_{(g)}, K_p = 0.11$

(a) 6.65 *atm* (b) 0.665 *atm*
(c) 0.0665 *atm* (d) 66.5 *atm*

**48.** In which of the following reactions, increase in the volume at constant temperature don't affect the number of moles at equilibrium.

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

(b) $C_{(g)} + \frac{1}{2}O_{2(g)} \rightarrow CO_{(g)}$

(c) $H_{2(g)} + O_{2(g)} \rightarrow H_2O_{2(g)}$

(d) None of these

**49.** A chemical reaction was carried out at 300 $K$ and 280 $K$. The rate constants were found to be $K_1$ and $K_2$ respectively. The energy of activation is $1.157 \times 10^4\ cal\ mole^{-1}$ and $R = 1.987\ cal$. Then

(a) $K_2 \approx 0.25K_1$ (b) $K_2 \approx 0.5K_1$

(c) $K_2 \approx 4K_1$ (d) $K_2 \approx 2K_1$

**50.** $\Delta n$, the change in the number of moles for the reaction, $C_{12}H_{22}O_{11(s)} + 12O_{2(g)} \rightleftharpoons 12CO_{2(g)} + 11H_2O_{(l)}$ at 25°$C$ is

(a) 0 (b) 2

(c) 4 (d) – 1

**51.** Value of $K_p$ in the reaction $MgCO_{3(s)} \rightleftharpoons MgO_{(s)} + CO_{2(g)}$ is

(a) $K_P = P_{CO_2}$

(b) $K_P = Pco_2 \times \frac{Pco_2 \times P_{MgO}}{P_{MgCO_3}}$

(c) $K_P = \frac{Pco_2 \times P_{MgO}}{P_{MgCO_3}}$

(d) $K_P = \frac{P_{MgCO_3}}{P_{CO_2} \times P_{MgO}}$

**52.** For $N_2 + 3H_2 \rightleftharpoons 2NH_3$ equilibrium constant is $k$ then equilibrium constant for $2N_2 + 6H_2 \rightleftharpoons 4NH_3$ is

(a) $\sqrt{k}$ (b) $k^2$

(c) $k/2$ (d) $\sqrt{k+1}$

**53.** For the reaction, $PCl_{3(g)} + Cl_{2(g)} \rightleftharpoons PCl_{5(g)}$, the value of $K_c$ at 250°$C$ is 26. The value of $K_p$ at this temperature will be

(a) 0.61 (b) 0.57

(c) 0.83 (d) 0.46

**54.** A tenfold increase in pressure on the reaction $N_{2(g)} + 3H_{2(g)} \rightleftharpoons 2NH_{3(g)}$ at equilibrium, makes $K_p$

(a) Unchanged (b) Two times

(c) Four times (d) Ten times

**55.** If equilibrium constant for reaction $2AB \rightleftharpoons A_2 + B_2$, is 49, then the equilibrium constant for reaction $AB \rightleftharpoons \frac{1}{2}A_2 + \frac{1}{2}B_2$, will be

(a) 7 (b) 20

(c) 49 (d) 21

**56.** In the manufacture of ammonia by Haber's process, $N_{2(g)} + 3H_2 \rightleftharpoons 2NH_{3(g)} + 92.3kJ$, which of the following conditions is unfavourable

(a) Increasing the temperature
(b) Increasing the pressure
(c) Reducing the temperature
(d) Removing ammonia as it is formed

57. The chemical equilibrium of a reversible reaction is not influenced by
(a) Pressure
(b) Catalyst
(c) Concentration of the reactants
(d) Temperature

58. Of the following which change will shift the reaction towards the product
$I_2(g) \rightleftharpoons 2I(g),\ \Delta H_r^0(298K) = +150\ kJ$
(a) Increase in concentration of $I$
(b) Decrease in concentration of $I_2$
(c) Increase in temperature
(d) Increase in total pressure

59. For the reaction, $CO_{(g)} + Cl_{2(g)} \rightleftharpoons COCl_{2(g)}$ the $K_p/K_c$ is equal to
(a) $\sqrt{RT}$ (b) $RT$
(c) $1/RT$ (d) $1.0$

60. Consider the following reversible reaction at equilibrium, $2H_2O_{(g)} \rightleftharpoons 2H_{2(g)} + O_{2(g)}$; $\Delta H = 241.7kJ$
Which one of the following changes in conditions will lead to maximum decomposition of $H_2O_{(g)}$
(a) Increasing both temperature and pressure
(b) Decreasing temperature and increasing pressure
(c) Increasing temperature and decreasing pressure
(d) Increasing temperature at constant pressure