1. In the reaction
A_2 (g) + 4 B_2 (g) 2 AB_4 (g), $\Delta H < 0$,
the formation of AB_4 (g) will be favored at
(a) low temperature and high pressure
(b) high temperature and low pressure
(c) low temperature and low pressure
(d) high temperature and high pressure

2. Consider the reaction,
PCl_5 (s) PCl_3 (s) + Cl_2 (g) , in a closed container, at equilibrium. At a fixed temperature, what will be the effect of adding more PCl_5 on the equilibrium concentration of Cl_2 (g)?
(a) it increases
(b) it decreases
(c) it remains unaffected
(d) can not be predicted without the value of Kp

3. For the reaction, N2 (g) + O_2 (g) $\rightarrow$ 2 NO (g), the production of NO will be favored by
(a) high pressures
(b) low pressures
(c) presence of catalyst
(d) high concentration of N_2

4. Consider the gas-phase equilibrium system represented by the equation,
2 H_2O (g) $\rightarrow$ 2 H_2 (g) + O_2 (g);
ΔH = 241.7 kJ.
Which of the following changes will decrease the equilibrium amount of H_2O?
(a) adding more oxygen
(b) increasing the temperature at constant pressure
(c) increasing the pressure at constant temperature
(d) adding catalyst

5. For the reaction, PCl_3 (g) + Cl_2 (g) PCl_5 (g), the value of K_c at 250° is 26. The value of K_p at this temperature will be
(a) 0.61 (b) 0.57
(c) 0.83 (d) 0.46

6. One mole of SO_3 was placed in a litre reaction vessel at a certain temperature. The following equilibrium was established.
2 SO_3 (g) $\rightarrow$ 2 SO_2 (g) + O_2 (g).
At equilibrium, 0.6 moles of SO_2 were found. The equilibrium constant of the reaction will be
(a) 0.36 (b) 0.45

(c) 0.54 (d) 0.67

7. An equilibrium mixture for the reaction
$2\ H_2S\ (g) \rightarrow 2\ H_2\ (g) + S_2\ (g)$ had 1 mole of H_2S, 0.2 mole of H_2 and 0.8 mole of S_2 in a 2 L flask. The value of K_c in mol L^{-1} is
(a) 0.004 (b) 0.080
(c) 0.016 (d) 0.160

8. In which of the following cases does the reaction go farthest to the completion?
(a) $K = 10^2$ (b) $K = 10^{-2}$
(c) $K = 10$ (d) $K = 1$

9. In a chemical equilibrium, the rate constant of the backward reaction is 7.5×10^{-4} and the equilibrium constant is 1.5. So the rate constant for the forward reaction is
(a) 5×10^{-4} (b) 2×10^{-3}
(c) 1.125×10^{-3} (d) 9.0×10^{-4}

10. HI was heated in a sealed tube at 440° C till equilibrium was reached. HI was found to be 22% dissociated. The equilibrium constant for the dissociation is
(a) 0.282 (b) 0.0769
(c) 0.0199 (d) 1.99

11. In a vessel containing SO_3, SO_2 and O_2 at equilibrium some helium gas is introduced so that the total pressure increases while temperature and volume remain constant. According to Le Chatelier's prenciple, the dissociation of SO_3
(a) increases
(b) decreases
(c) remains unaltered
(d) changes unpredictably

12. The reaction which proceeds in the forward direction is
(a) $Fe_2O_3\ (s) + 6\ HCl\ (aq.) = 2FeCl_3(aq.) + 3\ H_2O\ (l)$
(b) $NH_3\ (g) + H_2O\ (l) + NaCl(s) = NH_4Cl(s) + NaOH\ (aq.)$
(c) $SnCl_4(aq.) + Hg_2Cl_2(aq.) = SnCl_2(aq.) + 2HgCl_2\ (aq.)$
(d) $2\ CuI\ (aq.) + I_2\ (s) + 4K + (aq.) = 2Cu^{2+}\ (aq.) + 4\ KI\ (aq.)$

13. The equilibrium constant for the reaction $N_2(g) + O_2(g)$ 2 NO (g) is 4×10^{-4} at 2000 K. In presence of a catalyst, equilibrium is attained ten times faster. Therefore, the equilibrium constant, in presence of the catalyst, at 2000 K is
(a) 40×10^{-4} (b) 4×10^{-4}
(c) 4×10^{-3}
(d) difficult to compoute without more data

14. The oxidation of SO_2 by O_2 to SO_3 is exothermic reaction. The yield of SO_3 will be maximum if
(a) temperature is increased and pressure is kept constant

(b) temperature is reduced and pressure is increased
(c) both temperature and pressure are increased
(d) both temperature and pressure are decreased

15. $CH_3COCH_3(g)$ $CH_3 - CH_3(g) + CO(g)$.Initial pressure of CH_3COCH_3 is 100 mm. When equilibrium is set up mole fraction of CO is 1/3. Hence K_p is
(a) 100 mm (b) 50 mm
(c) 25 mm (d) 150 mm

16. PCl_5 is 40% dissociated when pressure is 2.0 atm. It will be 80% dissociated when the pressure is approximately
(a) 0.2 atm (b) 0.5 atm
(c) 0.3 atm (d) 0.6 atm

17. $N_2(g) + 3\,H_2(g)$ $2\,NH_3(g)$. This is gaseous phase reaction taking place in 1L flask at 127° C. Starting with 1 mole N_2 and 3 mole H_2, equilibrium mixture required 500 ml. of 1 M HCl. Hence K_c is approximately
(a) 0.06 (b) 0.08
(c) 0.03 (d) 2.05

18. $I_2 + I^-$ I_3^-. This reaction is set up in aqueous medium. We started with 1 mole of I_2 and 0.5 mole of I^- in 1L flask. After equilibrium is reached excess of $AgNO_3$ gave 0.25 mole of yellow precipitate . Equilibrium constant is
(a) 1.33 (b) 2.66
(c) 2.00 (d) 3.00

19. In a given system, water and ice are in equilibrium. If pressure is applied to the above system then
(a) more ice is formed
(b) amount of ice and water will remain same
(c) more of ice is melted
(d) either (a) or (c)

20. The decomposition of N_2O_4 to NO_2 is carried out at 280° in chloroform. When equilibrium is reached, 0.2 mole of N_2O_4 and 2×10^{-3} mole of NO_2 are present in a 2 L solution. The equilibrium constant for the reaction N_2O_4 $2\,NO_2$ is
(a) 1×10^{-2} (b) 2×10^{-3}
(c) 1×10^{-5} (d) 2×10^{-5}

Answer Keys

1. (a) 2. (a) 3. (d) 4. (b) 5. (a) 6.(c) 7. (c) 8. (a) 9. (c) 10. (c)
11. (c) 12. (a) 13. (b) 14. (b) 15. (b) 16. (a) 17. (c) 18. (a) 19. (c) 20. (c)