CHEMISTRY

BOOKS - MODERN PUBLICATION CHEMISTRY (KANNADA ENGLISH)

UNIT TEST 2

Mcqs

1. Give an expression for the work done in a reversible isothermal expansion of an ideal gas.

A. Zero

B. $-2.303 \quad \mathrm{R} \log \frac{V_2}{V_1}$

C. $-2.303 \quad \mathrm{RT} \log \frac{V_2}{V_1}$

D. $2.303 \quad \mathrm{RT} \log \frac{V_2}{V_1}$

Answer: C

Watch Video Solution

2. The enthalpy of combustion of carbon to $CO_2(g)$ is $-393.5 kJ mol^{-1}$. The heat released upon the formation of 35.2 g of CO_2 from carbon and dioxygen is :

A. 491.87 kJ

B. 245.94 kJ

C. 31.48 kJ

D. 314.8 kJ

Answer: D

Watch Video Solution

3. (i) $aA + bB \Leftrightarrow cC + dD : K_1$

(ii) $ncC + ndD \Leftrightarrow naA + nbB : K_2$

K_1 and K_2 are releated as :

A. $K_2 = \frac{n}{K_1}$

B. $K_2 = (K_1)^n$

C. $K_2 = (K_1)^{\frac{1}{n}}$

D. $K_2 = \frac{1}{K_1^n}$

Answer: D

Watch Video Solution

4. At a certain temperature and a total pressure of 10^5 Pa, iodine vapours contain 40% by volume of iodine atoms.

$I_2(g) \Leftrightarrow 2I(g)$

K_p for the equilibrium reaction is :

A. 0.6×10^5

B. 2.67×10^4

C. 1.98×10^4

D. 2.67×10^3

Answer: B

Watch Video Solution

5. In which of the following reactions, the forward reaction is favoured by increase of pressure ?

A. $N_2 + O_2 \Leftrightarrow 2NO$

B. $2HI \Leftrightarrow H_2 + I_2$

C. $2NO_2 \Leftrightarrow N_2O_4$

D. $PCl_5 \Leftrightarrow PCl_3 + Cl_2$

Answer: C

Watch Video Solution

6. What will happen to equilibrium :

Ice $\Leftrightarrow$ Water

If pressure is applied :

A. water changes to vapours

B. large amount of water forms

C. large amount of ice forms

D. no change

Answer: C

Watch Video Solution

7. The enthalpy of neutralisation of NaOH with HCl is 57. 1 kJ while with CH_3COOH, it is - 55 kJ. This happens because

A. acetic acid is an organic acid

B. acetic acid is litle soluble in water

C. acetic acid is a weak acid and requires lesser sodium hydroxide for neutralisation

D. some heat is required to ionise acetic acid completely.

Answer: D

Watch Video Solution

8. Which of the following expresion is true ?

A. $\Delta_f H^\circ(CO, g) = \frac{1}{2}\Delta_f H^\circ(CO_2, g)$

B. $\Delta_f H^\circ(CO, g) = \Delta_f H^\circ$ (C, graphite) $+ \frac{1}{2}\Delta_f H^\circ(O_2, g)$

C. $\Delta_f H^\circ(CO, g) = \Delta_f H^\circ(CO_2, g) - \frac{1}{2}\Delta_f H^\circ(O_2, g)$

D. $\Delta_f H^\circ(CO, g) = \Delta_c H^\circ$ (C, graphite) $- \Delta_c H^\circ(CO, g)$

Answer: D

Watch Video Solution

9. Two moles of PCl_5 were introduced in a 2L, flask and heated at 600 K to attain the equilibrium, PCl_5 was found to be 40% dissociated into PCl_3 and Cl_2. K_c for the reaction is :

A. 2.67×10^4

B. 2.67×10^{-1}

C. 2.67×10^{-3}

D. 2.67×10^{-2}

Answer: B

Watch Video Solution

10. At a certain temperature K_w is 9.55×10^{-14}. The pH of water at this temperature is :

A. 6.51

B. 4.28

C. 6.42

D. 4.62

Answer: A

Watch Video Solution

11. Identify the correct statement regarding a spontaneous process :

A. Endothermic processes are never spontaneous.

B. Exothermic processes are always spontaneous.

C. Lowering of energy in the reaction process is the only criterion for spontaneity.

D. For a spontaneous process in an isolated system, the change in entropy is positive.

Answer: D

Watch Video Solution

12. In a fuel cell methanol is used as fuel and oxygen is used as an oxidiser. The reaction is :

$$CH_3OH(l) + \frac{3}{2}O_2(g) \rightarrow CO_2(g) + 2H_2O(l)$$

At 298 K, standard Gibb's energies of formation for $CH_3OH(l)$, $H_2O(l)$ and $CO_2(g)$ are -166.2, -237.2 and

-394.4 kJ/mol respectively. If standard enthalpy of combustion of methanol is - 726 kJ/mol, effeciency of the fuel cell will be :

A. $80\ \%$

B. $87\ \%$

C. $90\ \%$

D. $97\ \%$

Answer: D

Watch Video Solution

13. K_p for the reaction :

$CO_2(g) + H_2(g) \Leftrightarrow CO(g) + H_2O(g)$ is found to be 16 at a given temperature. Originally equal number of moles of H_2

and

$CO_2(g) were replaced \in the flask. At equilibrium, the pressure of$ H_(2) $is 1.20 atm. W\hat{i}s the \partial presure of$ CO_(2) and H_(2)O` ?

A. 1.20 atm. each

B. 2.40 atm. each

C. 4.80 atm each

D. 9.60 atm each

Answer: C

Watch Video Solution

14. If K_{sp} of MOH is 1×10^{-10}, then pH of its aqueous solution will be :

A. 3

B. 6

C. 9

D. 12

Answer: C

Watch Video Solution

15. For an ideal gas undergoing isothermal change :

A. $q = \omega$

B. $\Delta U = 0$

C. $\Delta U = q \neq \omega$

D. $\Delta U = q$

Answer: B

Watch Video Solution

16. A gas absorbs 120 J of heat and expands against an external pressure of 1.10 atm from a volume of 0.52 to 2.0 L. The change in internal energy is (1 L atm = 101.3 J) :

A. $-167.1J$

B. $-47.1J$

C. $-287.1J$

D. 287.1 J

Answer: B

Watch Video Solution

17. The difference between heats of reaction at constant pressure and constant volume for the reaction :

$2C_6H_6(l) + 15O_2(g) \rightarrow 12CO_2(g) + 6H_2O(l)$ at $25^\circ C$ is :

A. -7.43 kJ

B. $+3.72$ kJ

C. -3.72 kJ

D. $+7.43$ kJ

Answer: C

Watch Video Solution

18. The heat of formation of Fe_2O_3 is -824.2 kJ mol^{-1}. ΔH for the reaction $2Fe_2O_3(s) \rightarrow 4Fe(s) + 3O_2(g)$ is :

A. -412.1 kJ

B. -1648.4 kJ

C. -3296.8 kJ

D. 1648.4 kJ

Answer: D

Watch Video Solution

19. What will be the pOH of $0.5 \times 10^{-4} M H_2SO_4$ solution ?

A. 4

B. 8

C. 10

D. 2

Answer: C

Watch Video Solution

20. For a weak base, the concentration of OH^- ion at concentration 'c' would be

(disociation constant $= K_b$)

A. $\sqrt{\frac{K_b}{c}}$

B. $\frac{K_b}{\sqrt{c}}$

C. $\sqrt{K_b \times c}$

D. $\sqrt{K_\omega / K_b c}$

Answer: C

Watch Video Solution

21. Four grams of sodium hydroxide have been added to $10^3 L$ tank of water. The pH of resulting solution is :

A. 10

B. 4

C. 11

D. 12

Answer: A

Watch Video Solution

22. The ratio of K_p / K_c for the reaction :

$N_2(g) + O_2(g) \Leftrightarrow 2NO(g)$ is

A. 4

B. 0.25

C. 0.5

D. 1

Answer: D

Watch Video Solution

23. For the reaction :

$A + B \rightarrow C$

the initial concentration of A and B are 2 and 1 moles per littre. At equilibrium, the concentration of B has been found to be 0.5 mol/litre. The K for the reaction is :

A. 0.5

B. 2.0

C. 1.0

D. 1.5

Answer: C

Watch Video Solution

24. For the reaction : $N_2 + 3H_2 \Leftrightarrow 2NH_3$, equal number of moles of N_2 and H_2 were taken in a 1L flask. Which of the following is correct at equilibrium ?

A. $[H_2] = [N_2]$

B. $[H_2] > [N_2]$

C. $[H_2] < [N_2]$

D. $[H_2]$ and $[N_2] = 0$

Answer: C

Watch Video Solution

25. The equilibrium constant for the reaction

$2SO_2(g) + O_2(g) \Leftrightarrow 2SO_3(g)$

is 256 at 1000 K. The equilibrium constant for the reaction :

$SO_3(g) \Leftrightarrow SO_2(g) + 1/2O_2(g)$ is :

A. 16

B. 1/256

C. 256

D. $1/16$

Answer: D

Watch Video Solution

Watch Video Solution

26. The value of K for the reaction :

$2A(g) \Leftrightarrow B(g) + C(g) +$ Heat

at 750 K and 10 atm is 3.96. The value of K at 750 K and 15 atm is :

A. 5.94

B. 2.97

C. 3.96

D. 2.64

Answer: C

Watch Video Solution

27. When CO_2 dissolves in water, the following equilibrium is established :

for which $K_c = 3.95 \times 10^{-7}$ and pH = 6.0. What would be the ratio of $\left[HCO_3^-\right] / [CO_2]$?

A. 3.95×10^{-14}

B. 0.395

C. 9.95×10^{-7}

D. 3.95×10^{-13}

Answer: B

Watch Video Solution

28. HI was heated in a sealed tube at $400^{\circ}C$ till the equilibrium was reached. HI was found to be 22% decomposed. The equilibrium for decomposition is :

A. 0.282

B. 0.0796

C. 0.0199

D. 1.99

Answer: C

Watch Video Solution

29. The equilibrium $SO_2Cl_2(g) \Leftrightarrow SO_2(g) + Cl_2(g)$ is attained at $25^{\circ}C$ in a closed container and an inert gas

helium is introduced. Which of the following statements is correct ?

A. Concentration of SO_2, Cl_2 and SO_2Cl_2 changes

B. Concentration of SO_2 is reduced

C. More Cl_2 is formed

D. None is correct

Answer: D

Watch Video Solution

30. The equilibrium constant, K_c for the reaction :

$H_2 + I_2 \Leftrightarrow 2HI$ at 700 K is 49. What is the equilibrium constant for the reaction :

$HI \Leftrightarrow \frac{1}{2}H_2 + \frac{1}{2}I_2$ at the same temperature ?

A. 49

B. 0.02

C. 1.43

D. 0.143

Answer: D

Watch Video Solution

31. Solubility of BaF_2 in a solution of $Ba(NO_3)_2$ will be represented by the concentration term :

A. $\left[Ba^{2+}\right]$

B. $\left[F^-\right]$

C. $\frac{1}{2}\left[F^-\right]$

D. $2\left[NO_3^-\right]$

Answer: C

Watch Video Solution

32. The following equilibrium are given :

$N_2 + 3H_2 \Leftrightarrow 2NH_3 : K_1$

$N_2 + O_2 \Leftrightarrow 2NO : K_2$

$H_2 + \frac{1}{2}O_2 \Leftrightarrow H_2O : K_3$

The equilibrium constant of the reaction :

$2NH_3 + \frac{5}{2}O_2 \Leftrightarrow 2NO + 3H_2O$

in terms of K_1, K_2 and K_3 is :

A. $K_1 . K_2 . K_3$

B. $K_1 . K_2 / K_3$

C. $K_1 K_3^2 / K_2$

D. $K_2 . K_3^2 / K_1$

Answer: D

Watch Video Solution

33. For a sparingly soluble salt $A_p B_q$ the relationship between its solubility product (L_S) and its solubility (S) is :

A. $L_S = S^{p+q} p^q q^q$

B. $L_S = S^{p+q} p^q q^p$

C. $L_S = S^{pq} p^p q^p$

D. $L_S = S^{pq} (pq)^{q+p}$

Answer: A

Watch Video Solution

34. The K_{sp} of CuS, Ag_2S and HgS are 10^{-31}, 10^{-44} and 10^{-54} respectively. The solubility of these hydrides are in the order :

A. $Ag_2S > CuS > HgS$

B. $Ag_2S > HgS > CuS$

C. $CuS > Ag_2S > HgS$

D. $CuS < Ag_2S < HgS$

Answer: A

Watch Video Solution

35. 500 ml of vessel contains 1.5 M each of A, B, C and D at equilibrium. If 0.5 M each of C and D are taken out, value of K_c for

$A + B \Leftrightarrow C + D$

will be :

A. 1.0

B. $1/9$

C. $4/9$

D. $8/9$

Answer: A

Watch Video Solution

36. If K_1 and K_2 are the respective equilibrium constants for the two reactions :

$XeF_6(g) + H_2O(g) \Leftrightarrow XeOF_4(g) + 2HF(g)$

$XeO_4(g) + XeF_6(g) \Leftrightarrow XeOF_4(g) + XeO_3F_2(g)$

The equilibrium constant for the reaction :

$XeO_4(g) + 2HF(g) \Leftrightarrow XeO_3F_2(g) + H_2O(g)$ will be :

A. K_1 / K_2^2

B. $K_1 . K_2$

C. K_1 / K_2

D. K_2 / K_1

Answer: D

Watch Video Solution

37. Solubility of an AB_2 type electrolyte is 5.0×10^{-5} mol L^{-1}. K_{sp} for the electrolyte AB_2 is :

A. 5×10^{-12}

B. 25×10^{-10}

C. 1×10^{-13}

D. 5×10^{-13}

Answer: D

Watch Video Solution

38. For the hydrolysis of a salt of weak acid and weak base, the hydrolysis constant is :

A. K_ω / K_b

B. K_ω / K_a

C. $K_\omega / K_a . K_b$

D. $K_a . K_b$

Answer: C

Watch Video Solution

39. The pK_a of a weak acid is 4.8. What should be the ratio of [Acid]/[Salt] of a buffer if pH = 5.8 is required ?

A. 0.1

B. 4.0

C. 4.3

D. 3.3

Answer: A

Watch Video Solution

40. A solution which is 0.001 M each in Mn^{2+}, Fe^{2+}, Zn^{2+} and Hg^{2+} is treated with 10^{-16} M sulphide ion. If K_{sp} of MnS, FeS, ZnS and HgS are 10^{-15}, 10^{-23}, 10^{-20} and 10^{-54} respectively, which one will precipitate first ?

A. FeS

B. MgS

C. HgS

D. ZnS

Answer: C

Watch Video Solution

Watch Video Solution

41. Which of the following pairs constitutes a buffer ?

A. NaOH and NaCl

B. HNO_3 and NH_4NO_3

C. HCl and KCl

D. HNO_2 and $NaNO_2$

Answer: C

Watch Video Solution

42. The pH of a solution obtained by mixing 50 mL of 1N HCl and 30 mL of 1 N NaOH is [log 2.5 = 0.3979]

A. 0.979

B. 0.6021

C. 12.042

D. 1.2042

Answer: B

Watch Video Solution

43. Molar heat capacity of water at equilibrium with ice at constant pressure is :

A. Zero

B. infinity

C. $40.45 kJ mol^{-1}$

D. $75.48kJmol^{-1}$

Answer: B

Watch Video Solution

44. If the concentration of OH^- ions in the reaction

$Fe(OH)_3(s) \Leftrightarrow Fe^{3+}(aq) + 3OH^-(aq)$

is decreased by 1/4 times, then equilibrium concentration of Fe^{3+} will increase by

A. 8 times

B. 16 times

C. 64 times

D. 4 times

Answer: C

Watch Video Solution

45. $10^{-6}M$ NaOH is diluted to 100 times. The pH of the diluted base is

A. between 5 and 6

B. between 6 and 7

C. between 10 and 11

D. between 7 and 8

Answer: D

Watch Video Solution

46. 1 mole of helium is expanded from 1 atm to 0.1 atm at $30^{\circ}C$. Assuming ideal behaviour, ΔS for the process is :

A. $38.3JK^{-1}$

B. $76.6JK^{-1}$

C. $19.15JK^{-1}$

D. $100JK^{-1}$

Answer: C

Watch Video Solution

47. What would be the solubility of AgCl in 0.1 M NaCl solution ? $\left(K_{sp} \text{ for } AgCl = 1.2 \times 10^{-10}\right)$

A. AgCl will precipitate first

B. AgI will precipitate first

C. AgBr will precipitate first

D. AgBr and AgI will precipitate together

Answer: B

Watch Video Solution

48. What would be the solubility of AgCl in 0.1 M NaCl solution ? $\left(K_{sp} \text{ for } \mathrm{AgCl} = 1.2 \times 10^{-10}\right)$

A. 0.1 M

B. $1.2 \times 10^{-9} M$

C. $1.2 \times 10^{-6} M$

D. $1.2 \times 10^{-10} M$

Answer: B

Watch Video Solution

49. The pH of a buffer solution of $0.1MCH_3COOH$ and $0.01MCH_3COONa$ is $(pK_a(CH_3COOH) = 4.745)$:

A. 4.745

B. 5.745

C. 3.745

D. 10.255

Answer: C

Watch Video Solution

50. The equilibrium constant for the reaction $H_2 + I_2 \Leftrightarrow 2HI$ at 650 K is 40. If 0.5 mole of each of hydrogen and iodine are added to the system at equilibrium, the value of equilibrium constant will be :

A. 20

B. 60

C. 40

D. 80

Answer: C

Watch Video Solution

51. 1.6 mol of PCl_5 is placed in a 4 litre vessel. When the temperature is increased to 500 K, the PCl_5 decomposes as

$PCl_5 \Leftrightarrow PCl_3 + Cl_2$

At equilibrium 1.20 mol of PCl_5 remains' K_c for the reaction is :

A. 0.013

B. 0.050

C. 0.067

D. 0.033

Answer: A

Watch Video Solution

52. For the reaction : $I_2(g) \Leftrightarrow 2I(g), K_c = 37.6 \times 10^{-6}$ at 1000 K. If 1.0 mole of I_2 is introduced into a 1.0 litre flask at 1000 K at equilibrium, then

A. Conc. Of $I_2(g)$ is less than that of I(g)

B. Conc. of $I_2(g)$ is much larger than that of I(g)

C. $[I_2] = [I]$

D. $[I_2 = 1/2[I]$

Answer: B

Watch Video Solution

53. 3 moles of A and 4 moles of B are mixed together and allowed to come into equilibrium according to the following reaction :

$A(g) + 4B(g) \Leftrightarrow 2C(g) + 3D(g)$

When equilibrium is reached, there is 1 mole of C. The equilibrium extent of the reaction is

A. $1/4$

B. $1/3$

C. $1/2$

D. 1

Answer: C

Watch Video Solution

54. What is the $\left[OH^{-}\right]$ in the final solution prepared by mixing 20 mL of 0.050 M HCl with 30.0 mL of $0.10MBa(OH)_2$?

A. 0.40 M

B. 0.0050 M

C. 0.12 M

D. 0.10 M

Answer: D

Watch Video Solution

55. Solubility of CaF_2 in terms of its solubility product is given by

A. $s = (K_{sp})^{1/3}$

B. $s = (K_{sp}/2)^{1/3}$

C. $s = (K_{sp}/4)^{1/3}$

D. $s = (K_{sp}/2)^{1/2}$

Answer: C

Watch Video Solution

56. The enthalpy change on freezing of 1.0 mol of water at $10^\circ C$ to ice at $-10^\circ C$ is : $\Delta_{fus}.\ H^\circ = 6.03 kJmol^{-1}$ at $0^\circ C$

$C_p[H_2O(l)] = 75.3 Jmol^{-1}K^{-1}$

$C_p[H_2O(s)] = 36.8 Jmol^{-1}K^{-1}$

A. $-0.368 kJmol^{-1}$

B. $-5.645 kJmol^{-1}$

C. $0.753 kJmol^{-1}$

D. $-11.390 kJmol^{-1}$

Answer: B

Watch Video Solution

57. The value of K_c for the reaction :

$3O_2(g) \Leftrightarrow 2O_3(g)$ is 2.0×10^{-50} at $25^\circ C$. If equilibrium concentration of O_2 in air at $25^\circ C$ is 1.6×10^{-2}, the concentration of O_3 is :

A. $2.86 \times 10^{-28} M$

B. $8.192 \times 10^{-56} M$

C. $1.43 \times 10^{-14} M$

D. $1.6 \times 10^{-2} M$

Answer: A

Watch Video Solution

58. Nitric oxide reacts with bromine as :

$2NO(g) + Br_{2(g)} \Leftrightarrow 2NOBr(g)$

When 0.087 mol of NO and 0.0437 mol of Br_2 are mixed in a closed container at constant temperature, 0.0518 mol of NaBr is obtained at equilibrium. The equilibrium constant is :

A. 12.86

B. 121.66

C. 2.1×10^4

D. 1.6×10^3

Answer: B

Watch Video Solution

59. What is the maximum volume of water required to dissolve 1g of $CaSO_4$ at $298K$, $K_{sp}(CaSO_4) = 9.1 \times 10^{-6}$.

A. 5.0 L

B. 8.6 L

C. $3.0 \times 10^{-3} L$

D. 2.44 L

Answer: D

Watch Video Solution

60. K_b for NH_4OH is 1.81×10^{-5}. The pH of $0.01 M NH_4Cl$ solution at $25^\circ C$ is :

A. 4.82

B. 3.93

C. 5.63

D. 4.26

Answer: C

Watch Video Solution