

# JEE MAIN (Session 2) 2023 Paper Analysis

**CHEMISTRY | 6<sup>th</sup> April 2023\_Shift-2**



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$1756/4818 = 36.45\%$

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$1256/2994 = 41.95\%$

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(2022)

$4818/6653 = 72.41\%$

(2021)

$2994/4087 = 73.25\%$



**NITIN VIJAY (NV Sir)**  
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## SECTION - A

61. Match List I with List II

List I (Natural Amino acid)	List II (One Letter Code)
(A) Arginine	(I) D
(B) Aspartic acid	(II) N
(C) Asparagine	(III) A
(D) Alanine	(IV) R

Choose the correct answer from the options given below:

- (1) (A) – III, (B) – I, (C) – II (D) – IV  
 (2) (A) – IV, (B) – I, (C) – II (D) – III  
 (3) (A) – IV, (B) – I, (C) – III (D) – II  
 (4) (A) – I, (B) – III, (C) – IV (D) – II

Sol. 2

Natural Amino acid	One Letter Code
(i) Arginine	R
(ii) Aspartic acid	D
(iii) Asparagine	N
(iv) Alanine	A

62. Formation of which complex, among the following, is not a confirmatory test of  $Pb^{2+}$  ions

- (1) lead sulphate (2) lead nitrate (3) lead chromate (4) lead iodide

Sol. 2

$\therefore Pb(NO_3)_2$  is a soluble colourless compound so it cannot be used in confirmatory test of  $Pb^{+2}$  ion.

63. The volume of 0.02 M aqueous HBr required to neutralize 10.0 mL of 0.01 M aqueous  $Ba(OH)_2$  is (Assume complete neutralization)

- (1) 5.0 mL (2) 10.0 mL (3) 2.5 mL (4) 7.5 mL

Sol. 2

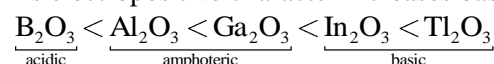
$$\begin{aligned} \text{m.eq. of HBr} &= \text{m.eq. of Ba(OH)}_2 \\ M_1 \times n_1 \times V_1(\text{mL}) &= M_2 \times n_2 \times V_2(\text{mL}) \\ 0.02 \times 1 \times V_1(\text{mL}) &= 0.02 \times 2 \times 10 \\ V_1(\text{mL}) &= 10 \text{ mL} \end{aligned}$$

64. Group-13 elements react with  $O_2$  in amorphous form to form oxides of type  $M_2O_3$  (M = element). Which among the following is the most basic oxide?

- (1)  $Al_2O_3$  (2)  $Tl_2O_3$  (3)  $Ga_2O_3$  (4)  $B_2O_3$

Sol. 2

As electropositive character increases basic character of oxide increases.



65. The IUPAC name of  $K_3[Co(C_2O_4)_3]$  is -

- (1) Potassium tris(oxalate) cobaltate(III) (2) Potassium trioxalatocobalt(III)  
 (3) Potassium trioxalatocobaltate(III) (4) Potassium tris(oxalate)cobalt(III)

Sol. 3

IUPAC name of  $K_3[Co(C_2O_4)_3]$  is Potassium trioxalatocobaltate(III)

66. If the radius of the first orbit of hydrogen atom is  $a_0$ , then de Broglie's wavelength of electron in 3<sup>rd</sup> orbit is

- (1)  $\frac{\pi a_0}{6}$                       (2)  $\frac{\pi a_0}{3}$                       (3)  $6\pi a_0$                       (4)  $3\pi a_0$

Sol. 3

By De-Broglie principle

$$2\pi r = n\lambda$$

$$2\pi \times \frac{n^2}{Z} a_0 = n\lambda$$

$$2\pi \times \frac{n}{Z} a_0 = \lambda$$

$$\lambda = 2\pi \times \frac{3}{1} a_0 = 6\pi a_0$$

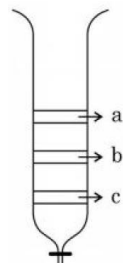
67. The group of chemicals used as pesticide is

- (1) Sodium chlorate, DDT, PAN                      (2) DDT, Aldrin  
(3) Aldrin, Sodium chlorate, Sodium arsinite                      (4) Dieldrin, Sodium arsinite, Tetrachloroethene

Sol. 2

(Fact base) DDT & Aldrin are used as pesticide

68. From the figure of column, chromatography given below, identify incorrect statements.

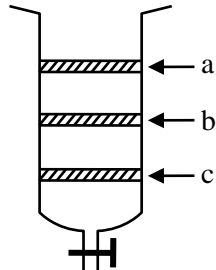


- A. Compound 'c' is more polar than 'a' and 'b'  
B. Compound 'a' is least polar  
C. Compound 'b' comes out of the column before 'c' and after 'a'  
D. Compound 'a' spends more time in the column

Choose the correct answer from the options given below:

- (1) A, B and D only                      (2) A, B and C only                      (3) B and D only                      (D) B, C and D only

Sol. 2



Adsorption of compound  $\propto$  Attraction

$\propto$  Polarity

$\propto$  Spend time in column

$\propto \frac{1}{\text{come out from column}}$

Order of polarity  $\rightarrow a > b > c$

Come out from column order  $\rightarrow c > b > a$

Spend time in column  $\rightarrow a > b > c$

69. Ion having highest hydration enthalpy among the given alkaline earth metal ions is:

- (1)  $\text{Be}^{2+}$                       (2)  $\text{Ba}^{2+}$                       (3)  $\text{Ca}^{2+}$                       (4)  $\text{Sr}^{2+}$

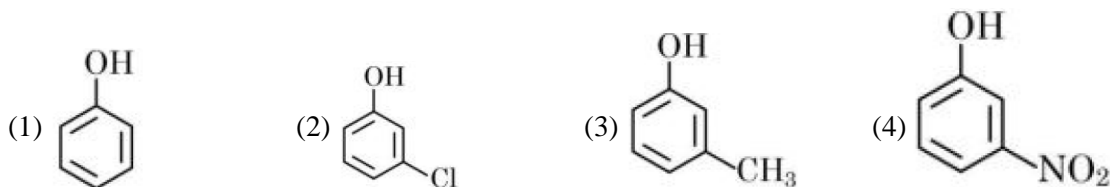
Sol. 1

$$\text{Hydration enthalpy} \propto \frac{1}{\text{size}}$$

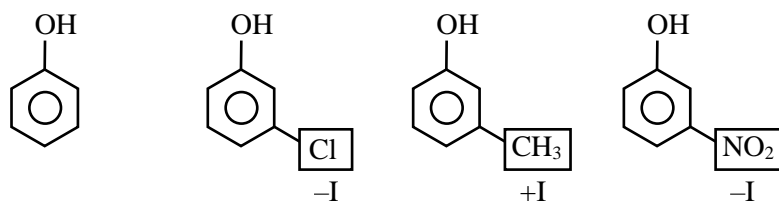
Down the group as size increases hydration enthalpy decreases

$$\text{Order: } \text{Be}^{2+} > \text{Mg}^{2+} > \text{Ca}^{2+} > \text{Sr}^{2+} > \text{Ba}^{2+}$$

70. The strongest acid from the following is



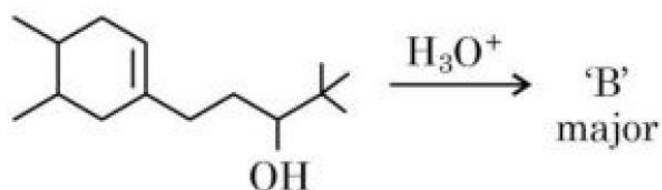
Sol. 4



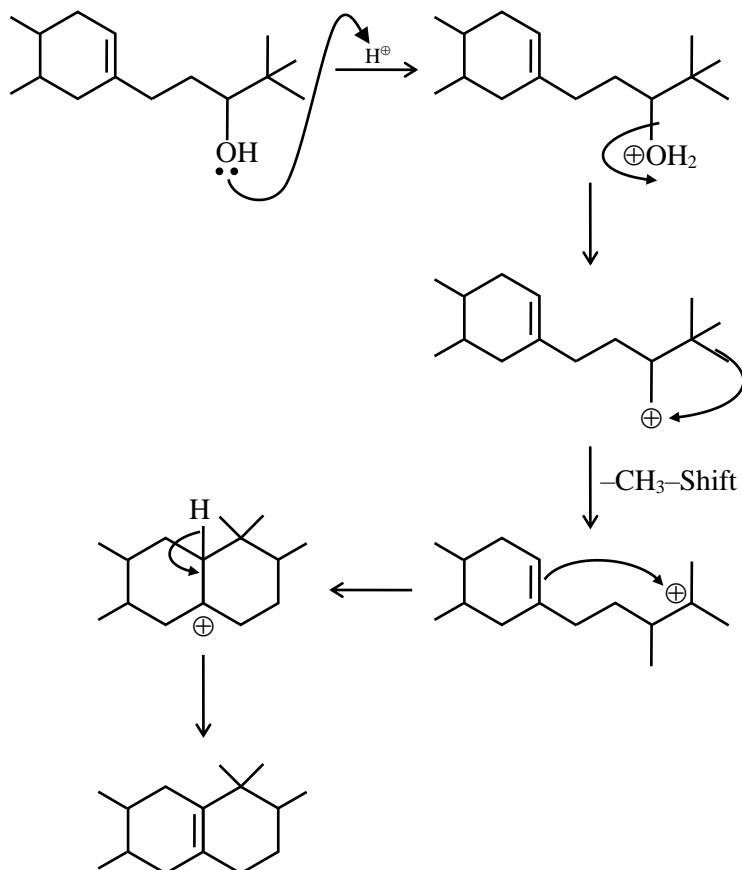
Since  $-\text{I}$  of  $-\text{NO}_2 > \text{Cl}$

So, most acidic will be (4)

71. In the following reaction, 'B' is



Sol. 4



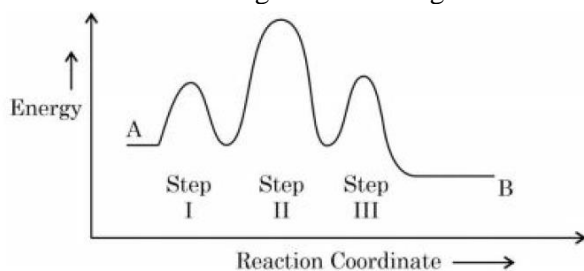
72. Structures of  $\text{BeCl}_2$  in solid state, vapour phase and at very high temperature respectively are:

- (1) Polymeric, Dimeric, Monomeric                      (2) Dimeric, Polymeric, Monomeric  
(3) Monomeric, Dimeric, Polymeric                      (4) Polymeric, Monomeric, Dimeric

Sol. 1

In solid state  $\text{BeCl}_2$  as polymer, in vapour state it form chloro-bridged dimer while above 1200K it is monomer.

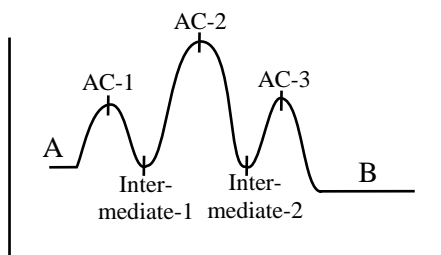
73. Consider the following reaction that goes from A to B in three steps as shown below:



Choose the correct option

	Number of intermediates	Number of Activated complex	Rate determining step
(1)	2	3	II
(2)	3	2	II
(3)	2	3	III
(4)	2	3	I

Sol. 1



Number of Intermediate  $\rightarrow 2$

Number of Activated complex  $\rightarrow 3$

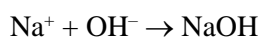
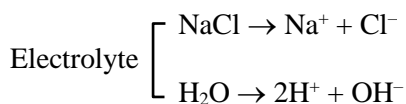
Rate determining step  $\rightarrow \text{II}$

74. The product, which is not obtained during the electrolysis of brine solution is

- (1) HCl                      (2) NaOH                      (3)  $\text{Cl}_2$                       (4)  $\text{H}_2$

Sol. 1

Brine solution ( $\text{NaCl} + \text{H}_2\text{O}$ )



Answer 1 (HCl)

75. Which one of the following elements will remain as liquid inside pure boiling water?

- (1) Li                      (2) Ga                      (3) Cs                      (4) Br

Sol. 2

Li, Cs reacts vigorously with water.

$\text{Br}_2$  changes in vapour state in boiling water (BP =  $58^\circ\text{C}$ )

Ga reacts with water above  $100^\circ\text{C}$  (MP =  $29^\circ\text{C}$ , BP =  $2400^\circ\text{C}$ )

76. Given below are two statements: one is labelled as “**Assertion A**” and the other is labelled as “**Reason R**”

**Assertion A:** In the complex  $\text{Ni}(\text{CO})_4$  and  $\text{Fe}(\text{CO})_5$ , the metals have zero oxidation state.

**Reason R:** Low oxidation states are found when a complex has ligands capable of  $\pi$ -donor character in addition to the  $\sigma$ -bonding.

In the light of the above statement, choose the most appropriate answer from the options given below

- (1) A is not correct but R is correct.  
(2) A is correct but R is not correct  
(3) Both A and R are correct and R is the correct explanation of A  
(4) Both A and R are correct but R is NOT the correct explanation of A.

Sol. 2

Low oxidation state of metals can be stabilized by synergic bonding so ligand has to be  $\pi$ -acceptor.

77. Given below are two statements:

**Statement I:** Morphine is a narcotic analgesic. It helps in relieving pain without producing sleep.

**Statement II:** Morphine and its derivatives are obtained from opium poppy.

In the light of the above statements, choose the correct answer from the options given below

- (1) Statement I is true but statement II is false      (2) Both statement I and statement II are true  
(3) Statement I is false but statement II is true      (4) Both Statement I and Statement II are false

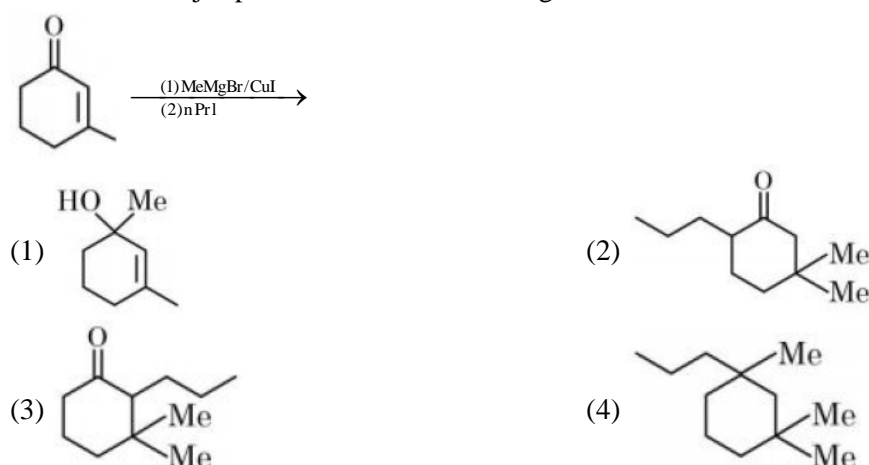
Sol. 3

**Fact**

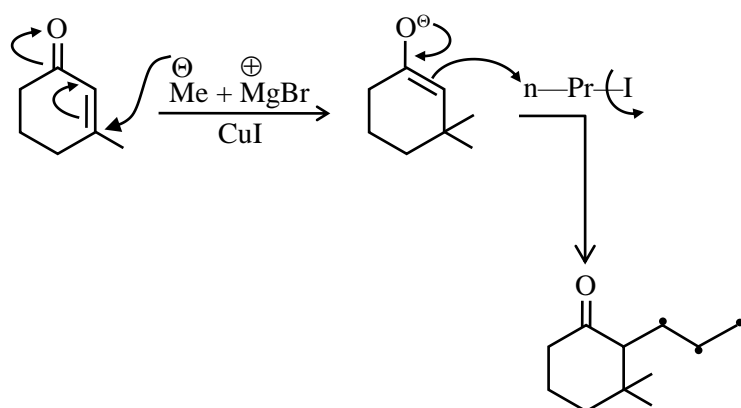
Morphine →

- (i) Morphine is a narcotic analgesic, it help in relieving plan and producing sleep.  
(ii) Morphine and its derivatives are obtained from opium.

78. Find out the major product from the following reaction.



Sol. 3

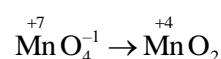


79. During the reaction of permanganate with thiosulphate, the change in oxidation of manganese occurs by value of 3. Identify which of the below medium will favour the reaction

- (1) aqueous neutral      (2) aqueous acidic  
(3) both aqueous acidic and neutral      (4) both aqueous acidic and faintly alkaline

Sol. 1

In neutral or weakly alkaline solution oxidation state of Mn changes by 3 unit



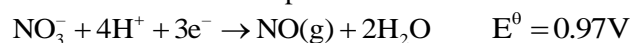


80. Element not present in Nessler's reagent is  
 (1) K (2) N (3) I (4) Hg

Sol. 2  
 Nessler reagent is-  $K_2[HgI_4]$

### SECTION - B

81. The standard reduction potentials at 298 K for the following half cells are given below:



The number of metal(s) which will be oxidized by  $NO_3^-$  in aqueous solution is \_\_\_\_\_

Sol. 3  
 Metal +  $NO_3^- \rightarrow$  Metal Nitrate  
 (V, Fe, Ag)  
 ↓

Less value of reaction potential then 0.97 volt.  
 Answer 3

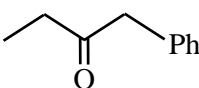
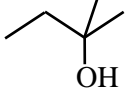
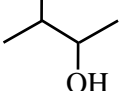
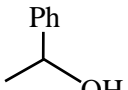
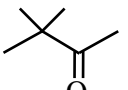
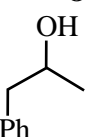
82. Number of crystal system from the following where body centred unit cell can be found, is \_\_\_\_\_  
 Cubic, tetragonal, orthorhombic, hexagonal, rhombohedral, monoclinic, triclinic

Sol. 3  
 BCC present in  $\rightarrow$  Cubic, Tetragonal orthorhombic

83. Among the following the number of compounds which will give positive iodoform reaction is \_\_\_\_\_  
 (a) 1-Phenylbutan-2-one (b) 2-Methylbutan-2-ol  
 (c) 3-Methylbutan-2-ol (d) 1-Phenylethanol  
 (e) 3,3-dimethylbutan-2-one (f) 1-Phenylpropan-2-ol

Sol. 4

#### Iodo form test

- (a)  -NO
- (b)  -NO
- (c)  -Yes
- (d)  -Yes
- (e)  -Yes
- (f)  -Yes

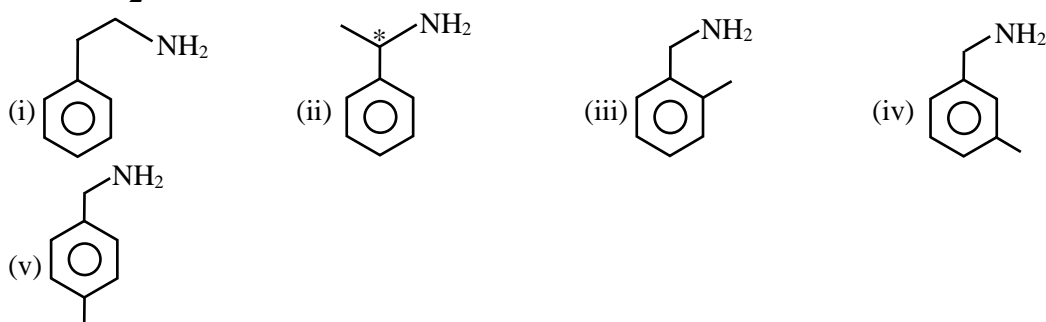
For carbonyl compound  $\begin{array}{|c|} \hline \text{C}-\text{CH}_3 \\ \hline \parallel \\ \text{O} \end{array}$  for alcohol  $\begin{array}{|c|} \hline \text{CH}-\text{CH}_3 \\ \hline | \\ \text{OH} \end{array}$  should be present for iodoform test.

- 84.** Number of isomeric aromatic amines with molecular formula  $C_8H_{11}N$ , which can be synthesized by Gabriel Phthalimide synthesis is \_\_\_\_\_

**Sol. 6**

By Gabriel phthalimide synthesis  $\rightarrow$  i-amine is prepared  
 $C_8H_{11}N \rightarrow$  Should be aromatic & i-amine

$$\begin{aligned} Du &= C + 1 - \frac{H - N}{2} \\ &= 8 + 1 - \frac{11 - 1}{2} \\ &= 9 - \frac{10}{2} = 9 - 5 = 4 \rightarrow \text{it means benzene ring} \end{aligned}$$



- 85.** Consider the following pairs of solution which will be isotonic at the same temperature. The number of pairs of solutions is/are \_\_\_\_\_

- A. 1 M aq. NaCl and 2 M aq. Urea  
 B. 1 M aq.  $CaCl_2$  and 1.5 M aq. KCl  
 C. 1.5 M aq.  $AlCl_3$  and 2 M aq.  $Na_2SO_4$   
 D. 2.5 M aq. KCl and 1 M aq.  $Al_2(SO_4)_3$

**Sol. 4**

- A. 1 M aq. NaCl  $\Rightarrow$  2 M aq. Ions  
 2 M aq. Urea  $\Rightarrow$  2 M aq. Urea } Isotonic
- B. 1 M aq.  $CaCl_2 \Rightarrow$  3 M aq. Ions  
 1.5 M aq. KCl  $\Rightarrow$  3 M aq. Ions } Isotonic
- C. 1.5 M aq.  $AlCl_3 \Rightarrow$  6 M aq. Ions  
 2 M aq.  $Na_2SO_4 \Rightarrow$  6 M aq. Ions } Isotonic
- D. 2.5 M aq. KCl  $\Rightarrow$  5 M aq. Ions  
 1 M aq.  $Al_2(SO_4)_3 \Rightarrow$  5 M aq. Ions } Isotonic

- 86.** The number of colloidal systems from the following, which will have 'liquid' as the dispersion medium, is \_\_\_\_\_

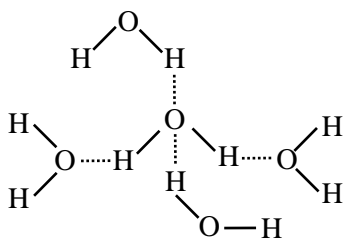
Gem stones, paints, smoke, cheese, milk, hair cream, insecticide sprays, froth, soap lather

**Sol. 5**

**Liquid dispersion medium**

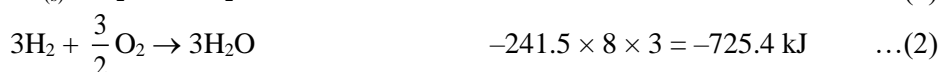
Paints, milk, hair cream, froth, soap lather

87. In an ice crystal, each water molecule is hydrogen bonded to neighbouring molecules.  
Sol. 4



88. Consider the following data  
Heat of combustion of  $\text{H}_2(\text{g})$   $= -241.8 \text{ kJ mol}^{-1}$   
Heat of combustion of  $\text{C}(\text{s})$   $= -393.5 \text{ kJ mol}^{-1}$   
Heat of combustion of  $\text{C}_2\text{H}_5\text{OH}(\text{l})$   $= -1234.7 \text{ kJ mol}^{-1}$   
The heat of formation of  $\text{C}_2\text{H}_5\text{OH}(\text{l})$  is  $(-)$  \_\_\_\_\_  $\text{kJ mol}^{-1}$  (Nearest integer).

Sol. 278



$$\begin{aligned} \text{eq (5)} &= \text{eq (1)} + \text{eq (2)} + \text{eq (4)} \\ &= (-787) + (-725.4) + (1234.7) \\ &= -277.7 = 278 \end{aligned}$$

89. The equilibrium composition for the reaction  $\text{PCl}_3 + \text{Cl}_2 \rightleftharpoons \text{PCl}_5$  at 298 K is given below:

$$[\text{PCl}_3]_{\text{eq}} = 0.2 \text{ mol L}^{-1}, [\text{Cl}_2]_{\text{eq}} = 0.1 \text{ mol L}^{-1}, [\text{PCl}_5]_{\text{eq}} = 0.40 \text{ mol L}^{-1}$$

If 0.2 mol of  $\text{Cl}_2$  is added at the same temperature, the equilibrium concentrations of  $\text{PCl}_5$  is \_\_\_\_\_  $\times 10^{-2} \text{ mol L}^{-1}$

Given:  $K_c$  for the reaction at 298 K is 20

Sol. 49

NTA answer 48

$$K_c = \frac{[\text{PCl}_5]}{[\text{PCl}_3][\text{Cl}_2]} = \frac{0.4}{0.2 \times 0.1} = 20$$

	$\text{PCl}_3$	+	$\text{Cl}_2$	$\rightleftharpoons$	$\text{PCl}_5$
$t_{\text{eq1}}$	0.2 M		0.1 M		0.4 M
$t_{\text{eq2}}$	$0.2 - x$		$0.1 + 0.2 - x$		$0.4 + x$

$$K_c = 20 = \frac{0.4 + x}{(0.2 - x)(0.3 - x)}$$

After solving by quadratic equation. We can get value of x.

$$x = 0.086$$

$$\begin{aligned} [\text{PCl}_5] &= 0.4 + x \\ &= 0.4 + 0.086 \\ &= 0.486 = 48.6 \times 10^{-2} \end{aligned}$$

Ans. 49

90. The number of species having a square planar shape from the following is \_\_\_\_\_  
 $\text{XeF}_4, \text{SF}_4, \text{SiF}_4, \text{BF}_4^-, \text{BrF}_4^-, [\text{Cu}(\text{NH}_3)_4]^{2+}, [\text{FeCl}_4]^{2-}, [\text{PtCl}_4]^{2-}$

Sol. 4

$\text{XeF}_4, \text{BrF}_4^-, [\text{Cu}(\text{NH}_3)_4]^{2+}, [\text{PtCl}_4]^{2-}$  has square planar shape.

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