

**FINAL JEE-MAIN EXAMINATION – APRIL, 2023**

**(Held On Thursday 06<sup>th</sup> April, 2023)**

**TIME : 3 : 00 PM to 6 : 00 PM**

**CHEMISTRY**

**TEST PAPER WITH SOLUTION**

**SECTION-A**

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

- (1) Be<sup>2+</sup>
- (2) Ba<sup>2+</sup>
- (3) Sr<sup>2+</sup>
- (4) Ca<sup>2+</sup>

**Official Ans. by NTA (1)**

**Ans. (1)**

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

Down the group as size increases hydration enthalpy decreases

Order : Be<sup>2+</sup> > Mg<sup>2+</sup> > Ca<sup>2+</sup> > Sr<sup>2+</sup> > Ba<sup>2+</sup>

62. The IUPAC name of K<sub>3</sub>[Co(C<sub>2</sub>O<sub>4</sub>)<sub>3</sub>] is :-

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

**Official Ans. by NTA (1)**

**Ans. (1)**

Sol. IUPAC name of K<sub>3</sub>[Co(C<sub>2</sub>O<sub>4</sub>)<sub>3</sub>] is

Potassium trioxalatocobaltate(III)

63. Match List I with List II

List I	List II
Natural Amino acid	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)–IV, (B)–I, (C)–III, (D)–II
- (2) (A)–I, (B)–III, (C)–IV, (D)–II
- (3) (A)–III, (B)–I, (C)–II, (D)–IV
- (4) (A)–IV, (B)–I, (C)–II, (D)–III

**Official Ans. by NTA (4)**

**Ans. (4)**

Sol. Factual.

64. Element not present in Nessler's reagent is:-

- (1) Hg
- (2) I
- (3) K
- (4) N

**Official Ans. by NTA (4)**

**Ans. (4)**

Sol. Nessler reagent is – K<sub>2</sub>[HgI<sub>4</sub>]

65. Structure of BeCl<sub>2</sub> in solid state, vapour phase and at very high temperature respectively are :-

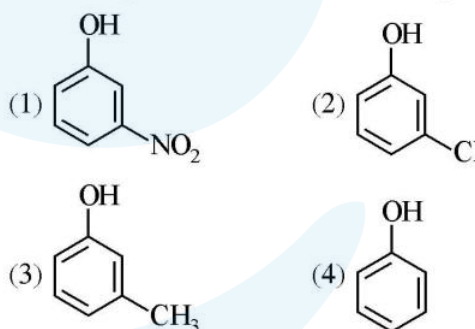
- (1) Dimeric, Polymeric, Monomeric
- (2) Polymeric, Dimeric, Monomeric
- (3) Monomeric, Dimeric, Polymeric
- (4) Polymeric, Monomeric, Dimeric

**Official Ans. by NTA (2)**

**Ans. (2)**

Sol. In solid state BeCl<sub>2</sub> as polymer, in vapour state it form chloro-bridged dimer while above 1200K it is monomer.

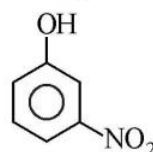
66. The strongest acid from the following is



**Official Ans. by NTA (1)**

**Ans. (1)**

Sol. Strongest acid from the following is

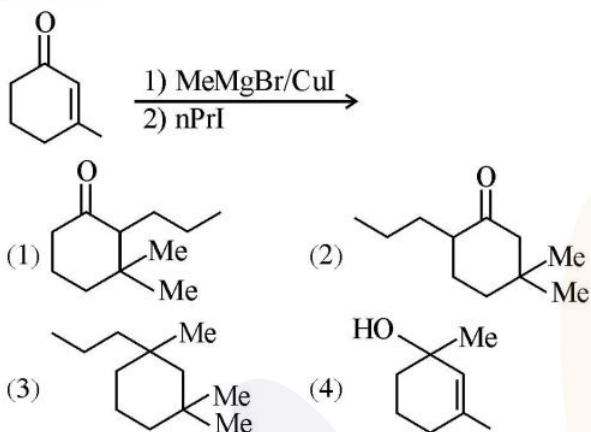


–NO<sub>2</sub> group has more EWG nature so more acidic,



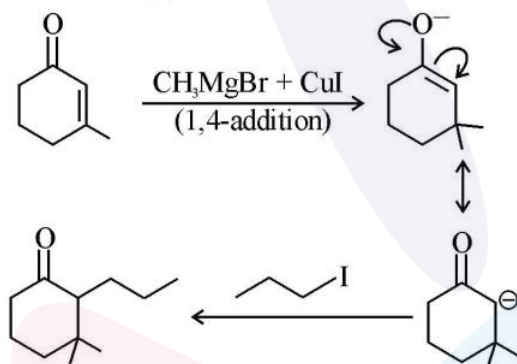


71. Find out the major product from the following reaction



Official Ans. by NTA (1)

Ans. (1)



Sol.

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

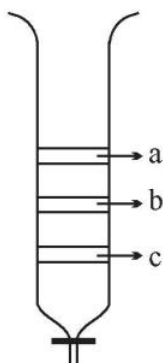
- (1) lead chromate
- (2) lead iodide
- (3) lead nitrate
- (4) lead sulphate

Official Ans. by NTA (3)

Ans. (3)

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

73. 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 C only
- (2) B, C and D only
- (3) A, B and D only
- (4) B and D only

Official Ans. by NTA (1)

Ans. (1)

74. 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 false
- (3) Both Statement I and Statement II are true
- (4) Statement I is false but Statement II is true

Official Ans. by NTA (4)

Ans. (4)

Sol. **Statement-I**- Morphine relieves in pain and produce sleep (incorrect)

**Statement-II** - Correct

75. 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) 2.5 mL
- (2) 5.0 mL
- (3) 10.0 mL
- (4) 7.5 mL

Official Ans. by NTA (3)

Ans. (3)

Sol.  $N_1V_1 = N_2V_2$   
 $\Rightarrow 0.02v_1 = 0.02 \times 10$   
 $\Rightarrow v_1 = 10\text{ml}$

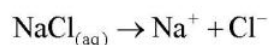
76. The product, which is not obtained during the electrolysis of brine solution is

- (1) NaOH
- (2) Cl<sub>2</sub>
- (3) H<sub>2</sub>
- (4) HCl

Official Ans. by NTA (4)

Ans. (4)

Sol. Brine is aq. Solution of NaCl



Cathode reaction



Anode reaction



So HCl will not form during electrolysis.

77. The group of chemicals used as pesticide is

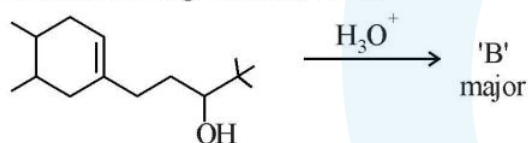
- (1) Sodium chlorate, DDT, PAN
- (2) Aldrin, Sodium chlorate, Sodium arsenite
- (3) DDT, Aldrin
- (4) Dieldrin, Sodium arsenite, Tetrachloroethene

Official Ans. by NTA (3)

Ans. (3)

Sol. Pesticides → D.D.T and Aldrin

78. In the following reaction, 'B' is

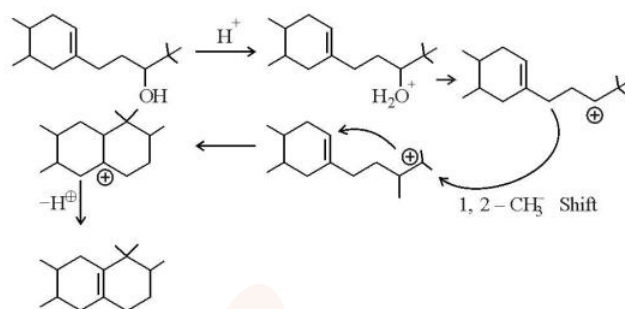


- (1)
- (2)
- (3)
- (4)

Official Ans. by NTA (2)

Ans. (2)

Sol.



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

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

Official Ans. by NTA (2)

Ans. (2)

Sol. Li, Cs reacts vigorously with water.

Br<sub>2</sub> changes in vapour state in boiling water (BP = 58°C)

Ga reacts with water above 100°C (MP = 29°C, BP = 2400°C)

80. If the radius of the first orbit of hydrogen atom a<sub>0</sub>, 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)  $3\pi a_0$

Official Ans. by NTA (3)

Ans. (3)

Sol.  $(r_3)_H = \frac{a_0 n^2}{Z} = a_0 \times 3^2 = 9a_0$

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

$$\Rightarrow 2\pi \times 9a_0 = 3\lambda$$

$$\Rightarrow \lambda = 6\pi a_0$$

**SECTION-B**

**81.** In an ice crystal, each water molecule is hydrogen bonded to .....neighbouring molecules.

**Official Ans. by NTA (4)**

**Ans. (4)**

**Sol.** In ice each water molecule is hydrogen bonded with four other water molecules.

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

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

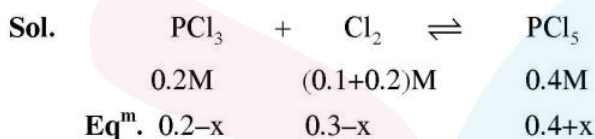
$$[\text{PCl}_5]_{\text{eq}} = 0.40 \text{ mol L}^{-1}$$

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

**Official Ans. by NTA (48)**

**Ans. (49)**



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

$$\Rightarrow x \approx 0.086$$

$$[\text{PCl}_5]_{\text{eq}} = 0.486\text{M} = 48.6 \times 10^{-2} \text{ M}$$

**83.** 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.  $\text{CaCl}_2$  and 1.5 M aq. KCl

**C.** 1.5 M aq.  $\text{AlCl}_3$  and 2 M aq.  $\text{Na}_2\text{SO}_4$

**D.** 2.5 M aq. KCl and 1 M aq.  $\text{Al}_2(\text{SO}_4)_3$

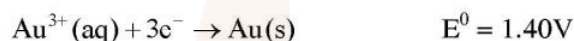
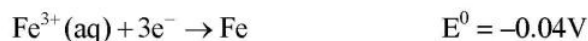
**Official Ans. by NTA (4)**

**Ans. (4)**

**Sol.**  $\pi = icRT$

**A, B, C and D are isotonic pairs.**

**84.** The standard reduction potential at 298 K for the following half cells are given below :-



The number of metal(s) which will be oxidized by  $\text{NO}_3^-$  in aqueous solution is \_\_\_\_\_.

**Official Ans. by NTA (3)**

**Ans. (3)**

**Sol.** Metal having lower SRP than 0.97V will be oxidised by  $\text{NO}_3^-$ .

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

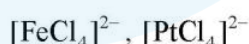
Gem stones, paints, smoke, cheese, milk, hair cream, insecticide sprays, froth, soap lather.

**Official Ans. by NTA (5)**

**Ans. (5)**

**Sol.** Paints, milk, hair cream, froth, soap lather.

**86.** The number of species having a square planar shape from the following is \_\_\_\_\_



**Official Ans. by NTA (4)**

**Ans. (4)**

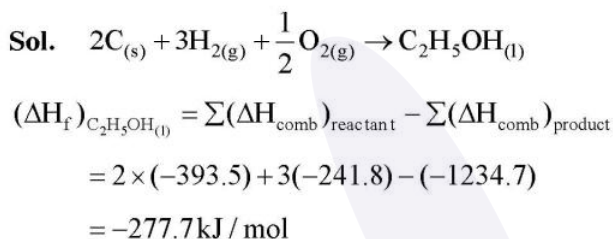
**Sol.**  $\text{XeF}_4, \text{BrF}_4^-, [\text{Cu}(\text{NH}_3)_4]^{2+}, [\text{PtCl}_4]^{2-}$  has square planar shape.



87. 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)

Official Ans. by NTA (278)

Ans. (278)

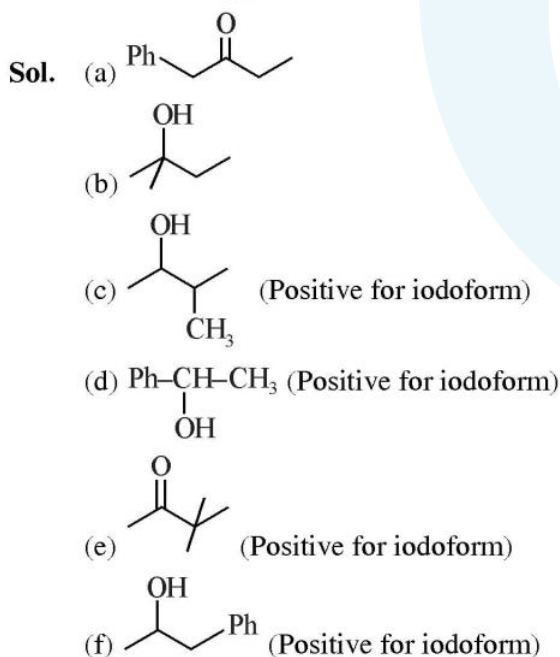


88. Among the following, the number of compounds which will give positive iodoform reaction is \_\_\_\_\_

- (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

Official Ans. by NTA (4)

Ans. (4)

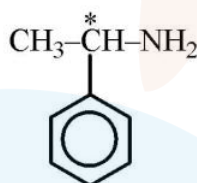
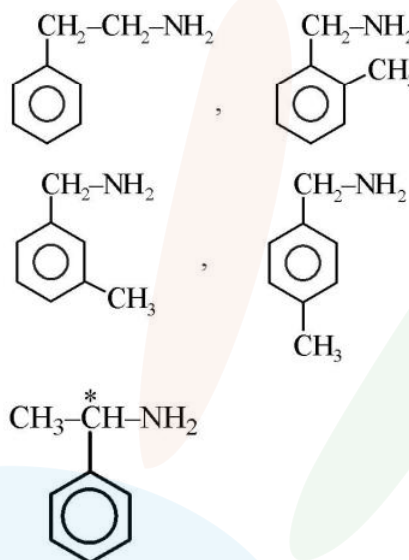


89. Number of isomeric aromatic amines with molecular formula  $\text{C}_8\text{H}_{11}\text{N}$ , which can be synthesized by Gabriel Phthalimide synthesis is \_\_\_\_\_

Official Ans. by NTA (5)

Ans. (6)

Sol.



(d + 1)

90. Number of crystal systems from the following where body centred unit cell can be found, is.....

Cubic, tetragonal, orthorhombic, hexagonal, rhombohedral, monoclinic, triclinic.

Official Ans. by NTA (3)

Ans. (3)

- Sol. Cubic, tetragonal and orthorhombic have body centered unit cell.