

**FINAL JEE-MAIN EXAMINATION – JULY, 2022**

 (Held On Wednesday 27<sup>th</sup> July, 2022)

TIME : 3 : 00 PM to 6 : 00 PM

**CHEMISTRY**
**TEST PAPER WITH ANSWER**
**SECTION-A**

1. The correct decreasing order of energy, for the orbitals having, following set of quantum numbers:

(A)  $n = 3, l = 0, m = 0$

(B)  $n = 4, l = 0, m = 0$

(C)  $n = 3, l = 1, m = 0$

(D)  $n = 3, l = 2, m = 1$

(A)  $(D) > (B) > (C) > (A)$

(B)  $(B) > (D) > (C) > (A)$

(C)  $(C) > (B) > (D) > (A)$

(D)  $(B) > (C) > (D) > (A)$

**Official Ans. by NTA (A)**
**Allen Ans. (A)**

2. Match List-I with List-II

**List-I**

(A)  $\Psi_{MO} = \Psi_A - \Psi_B$

(B)  $\mu = Q \times r$

(C)  $\frac{N_b - N_a}{2}$

(D)  $\Psi_{MO} = \Psi_A + \Psi_B$

**List-II**

(I) Dipole moment

(II) Bonding molecular orbital

(III) Anti-bonding

molecular orbital

(IV) Bond order

(A) (A)-(II), (B)-(I), (C)-(IV), (D)-(III)

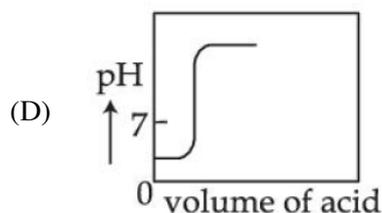
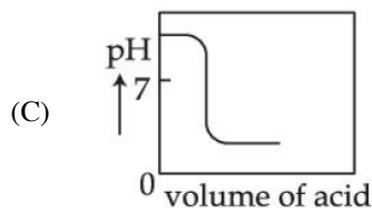
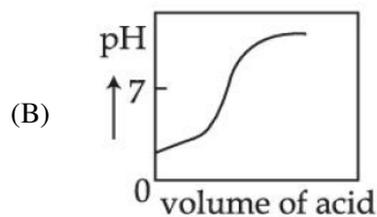
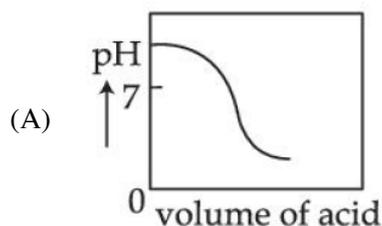
(B) (A)-(III), (B)-(IV), (C)-(I), (D)-(II)

(C) (A)-(III), (B)-(I), (C)-(IV), (D)-(II)

(D) (A)-(III), (B)-(IV), (C)-(II), (D)-(I)

**Official Ans. by NTA (C)**
**Allen Ans. (C)**

3. The Plot of pH-metric titration of weak base  $\text{NH}_4\text{OH}$  vs strong acid  $\text{HCl}$  looks like:


**Official Ans. by NTA (A)**
**Allen Ans. (A)**

4. Given below are two statements:

**Statement I:** For KI, molar conductivity increases steeply with dilution.

**Statement II:** For carbonic acid, molar conductivity increases slowly with dilution.

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

 (A) Both **Statement I** and **Statement II** are true

 (B) Both **Statement I** and **Statement II** are false

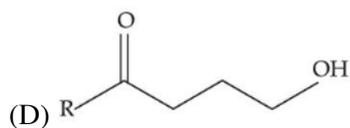
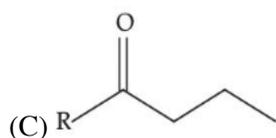
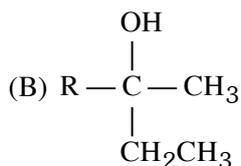
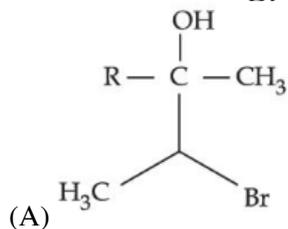
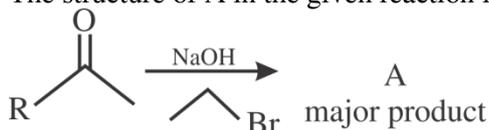
 (C) **Statement I** is true but **Statement II** is false

 (D) **Statement I** is false but **Statement II** is true

**Official Ans. by NTA (B)**
**Allen Ans. (B)**

5. Given below are two statements: one is labelled as **Assertion (A)** and the other is labelled as **Reason (R)**  
**Assertion (A)** : Dissolved substances can be removed from a colloidal solution by diffusion through a parchment paper.  
**Reason (R)** : Particles in a true solution cannot pass through parchment paper but the colloidal particles can pass through the parchment paper.  
 In the light of the above statements, choose the correct answer from the options given below:  
 (A) Both (A) and (R) are correct and (R) is the correct explanation of (A)  
 (B) Both (A) and (R) are correct but (R) is not the correct explanation of (A)  
 (C) (A) is correct but (R) is not correct  
 (D) (A) is not correct but (R) is correct  
**Official Ans. by NTA (C)**  
**Allen Ans. (C)**
6. Outermost electronic configurations of four elements A, B, C, D are given below:  
 (A)  $3s^2$  (B)  $3s^2 3p^1$   
 (C)  $3s^2 3p^3$  (D)  $3s^2 3p^4$   
 The **correct** order of first ionization enthalpy for them is:  
 (A) (A) < (B) < (C) < (D)  
 (B) (B) < (A) < (D) < (C)  
 (C) (B) < (D) < (A) < (C)  
 (D) (B) < (A) < (C) < (D)  
**Official Ans. by NTA (B)**  
**Allen Ans. (B)**
7. An element A of group 1 shows similarity to an element B belonging to group 2. If A has maximum hydration enthalpy in group 1 then B is:  
 (A) Mg (B) Be (C) Ca (D) Sr  
**Official Ans. by NTA (A)**  
**Allen Ans. (A)**
8. Given below are two statements: one is labelled as **Assertion (A)** and the other is labelled as **Reason (R)**  
**Assertion (A)** : Boron is unable to form  $BF_6^{3-}$   
**Reason (R)** : Size of B is very small.  
 In the light of the above statements, choose the **correct** answer from the options given below:  
 (A) Both (A) and (R) are true and (R) is the correct explanation of (A)  
 (B) Both (A) and (R) are true but (R) is **not** the correct explanation of (A)  
 (C) (A) is true but (R) is false  
 (D) (A) is false but (R) is true  
**Official Ans. by NTA (B)**  
**Allen Ans. (B)**
9. In neutral or alkaline solution,  $MnO_4^-$  oxidises thiosulphate to:  
 (A)  $S_2O_7^{2-}$  (B)  $S_2O_8^{2-}$   
 (C)  $SO_3^{2-}$  (D)  $SO_4^{2-}$   
**Official Ans. by NTA (D)**  
**Allen Ans. (D)**
10. Low oxidation state of metals in their complexes are common when ligands:  
 (A) have good  $\pi$  -accepting character  
 (B) have good  $\sigma$  -donor character  
 (C) are having good  $\pi$  -donating ability  
 (D) are having poor  $\sigma$  -donating ability  
**Official Ans. by NTA (A)**  
**Allen Ans. (A)**
11. Given below are two statements:  
**Statement I** : The non bio-degradable fly ash and slag from steel industry can be used by cement industry.  
**Statement II** : The fuel obtained from plastic waste is lead free.  
 In the light of the above statements, choose the **most appropriate** answer from the options given below:  
 (A) Both **Statement I** and **Statement II** are correct  
 (B) Both **Statement I** and **Statement II** are incorrect  
 (C) **Statement I** is correct but **Statement II** is incorrect  
 (D) **Statement I** is incorrect but **Statement II** is correct  
**Official Ans. by NTA (A)**  
**Allen Ans. (A)**

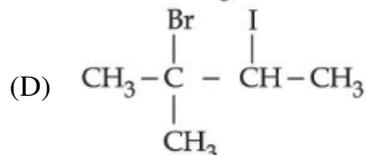
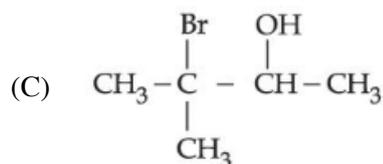
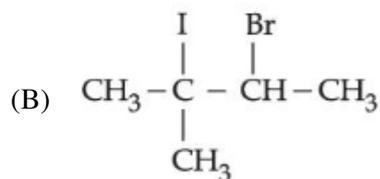
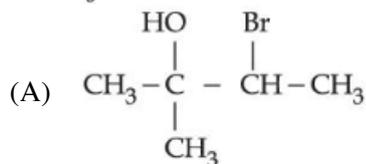
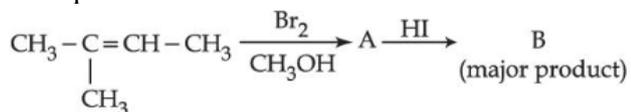
12. The structure of A in the given reaction is:



Official Ans. by NTA (C)

Allen Ans. (C)

13. Major product 'B' of the following reaction sequence is:

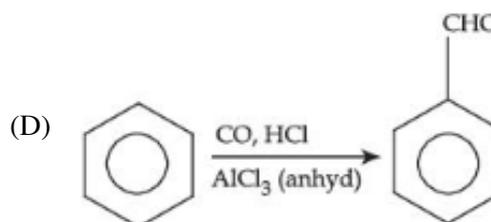
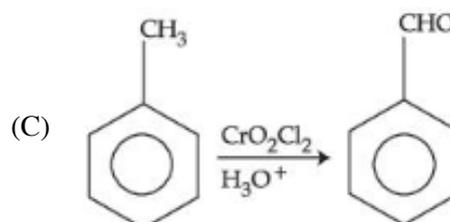
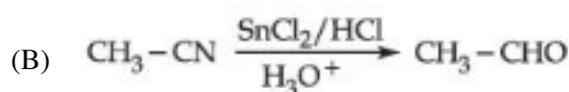
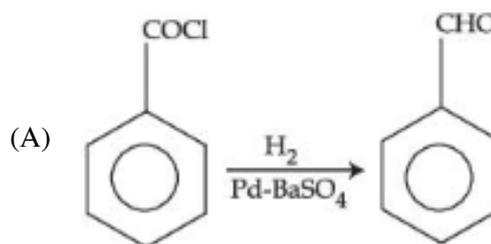


Official Ans. by NTA (B)

Allen Ans. (B)

14. Match List-I with List-II.

List-I



List-II

(I) Gatterman Koch reaction

(II) Etard reaction

(III) Stephen reaction

(IV) Rosenmund reaction

Choose the **correct** answer from the options given below:

(A) (A)-(IV), (B)-(III), (C)-(II), (D)-(I)

(B) (A)-(I), (B)-(II), (C)-(III), (D)-(IV)

(C) (A)-(II), (B)-(III), (C)-(IV), (D)-(I)

(D) (A)-(III), (B)-(II), (C)-(I), (D)-(IV)

Official Ans. by NTA (A)

Allen Ans. (A)

15. Match List-I with List-II.

**List-I**

(Polymer)

(A) Neoprene

(B) Teflon

(C) Acrilan

(D) Natural rubber

**List-II**

(Monomer)

(I) Acrylonitrile

(II) Chloroprene

(III) Tetrafluoroethene

(IV) Isoprene

Choose the correct answer from the option given below:

(A) (A)-(II), (B)-(III), (C)-(I), (D)-(IV)

(B) (A)-(II), (B)-(I), (C)-(III), (D)-(IV)

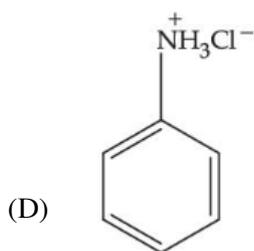
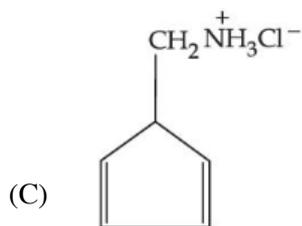
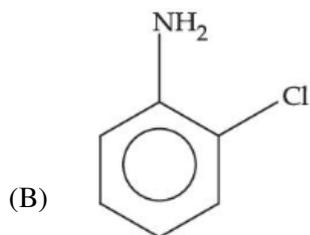
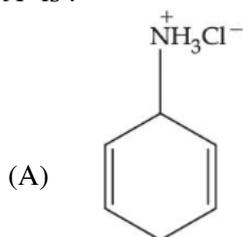
(C) (A)-(II), (B)-(I), (C)-(IV), (D)-(III)

(D) (A)-(I), (B)-(II), (C)-(III), (D)-(IV)

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

**Allen Ans. (A)**

16. An organic compound 'A' contains nitrogen and chlorine. It dissolves readily in water to give a solution that turns litmus red. Titration of compound 'A' with standard base indicates that the molecular weight of 'A' is  $131 \pm 2$ . When a sample of 'A' is treated with aq. NaOH, a liquid separates which contains N but not Cl. Treatment of the obtained liquid with nitrous acid followed by phenol gives orange precipitate. The compound 'A' is :



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

**Allen Ans. (D)**

17. Match List-I with List-II

**List-I**

(A) Glucose + HI

(B) Glucose + Br<sub>2</sub> water

(C) Glucose + acetic anhydride

(D) Glucose + HNO<sub>3</sub>

**List-II**

(I) Gluconic acid

(II) Glucose pentacetate

(III) Saccharic acid

(IV) Hexane

Choose the correct answer from the options given below:

(A) (A)-(IV), (B)-(I), (C)-(II), (D)-(III)

(B) (A)-(IV), (B)-(III), (C)-(II), (D)-(I)

(C) (A)-(III), (B)-(I), (C)-(IV), (D)-(II)

(D) (A)-(I), (B)-(III), (C)-(IV), (D)-(II)

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

**Allen Ans. (A)**

18. Which of the following enhances the lathering property of soap?

(A) Sodium stearate

(B) Sodium carbonate

(C) Sodium rosinate

(D) Trisodium phosphate

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

**Allen Ans. (C)**

19. Match List-I with List-II

**List-I (Mixture)**

(A) Chloroform & Aniline

(B) Benzoic acid & Naphthalene

(C) Water & Aniline

(D) Naphthalene & Sodium chloride

**List-II (Purification Process)**

(I) Steam distillation

(II) Sublimation

(III) Distillation

(IV) Crystallisation

(A) (A)-(IV), (B)-(III), (C)-(I), (D)-(II)

(B) (A)-(III), (B)-(I), (C)-(IV), (D)-(II)

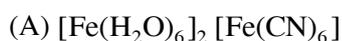
(C) (A)-(III), (B)-(IV), (C)-(II), (D)-(I)

(D) (A)-(III), (B)-(IV), (C)-(I), (D)-(II)

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

**Allen Ans. (D)**

20.  $\text{Fe}^{3+}$  cation gives a prussian blue precipitate on addition of potassium ferrocyanide solution due to the formation of:



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

**Allen Ans. (D)**

### SECTION-B

1. The normality of  $\text{H}_2\text{SO}_4$  in the solution obtained on mixing 100 mL of 0.1 M  $\text{H}_2\text{SO}_4$  with 50 mL of 0.1 M NaOH is  $\text{_____} \times 10^{-1}$  N. (Nearest Integer)

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

**Allen Ans. (1)**

2. for a real gas at  $25^\circ\text{C}$  temperature and high pressure (99 bar) the value of compressibility factor is 2, so the value of Vander Waal's constant 'b' should be  $\text{_____} \times 10^{-2}$  L mol $^{-1}$  (Nearest integer) (Given  $R = 0.083$  L bar K $^{-1}$  mol $^{-1}$ )

**Official Ans. by NTA (25)**

**Allen Ans. (25)**

3. A gas (Molar mass = 280 g mol $^{-1}$ ) was burnt in excess  $\text{O}_2$  in a constant volume calorimeter and during combustion the temperature of calorimeter increased from 298.0 K to 298.45 K. If the heat capacity of calorimeter is 2.5 kJ K $^{-1}$  and enthalpy of combustion of gas is 9 kJ mol $^{-1}$  then amount of gas burnt is  $\text{_____}$  g. (Nearest Integer)

**Official Ans. by NTA (35)**

**Allen Ans. (35)**

4. When a certain amount of solid A is dissolved in 100 g of water at  $25^\circ\text{C}$  to make a dilute solution, the vapour pressure of the solution is reduced to one-half of that of pure water. The vapour pressure of pure water is 23.76 mmHg. The number of moles of solute A added is  $\text{_____}$ . (Nearest Integer)

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

**Allen Ans. (3 or 6)**

5. [A]  $\rightarrow$  [B]

Reactant

Product

If formation of compound [B] follows the first order of kinetics and after 70 minutes the concentration of [A] was found to be half of its initial concentration. Then the rate constant of the reaction is  $x \times 10^{-6}$  s $^{-1}$ . The value of x is  $\text{_____}$ . (Nearest Integer)

**Official Ans. by NTA (165)**

**Allen Ans. (165)**

6. Among the following ores Bauxite, Siderite, Cuprite, Calamine, Haematite, Kaolinite, Malachite, Magnetite, Sphalerite, Limonite, Cryolite, the number of principal ores if (of) iron is  $\text{_____}$ .

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

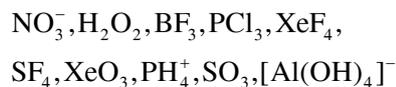
**Allen Ans. (4)**

7. The oxidation state of manganese in the product obtained in a reaction of potassium permanganate and hydrogen peroxide in basic medium is  $\text{_____}$ .

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

**Allen Ans. (4)**

8. The number of molecule(s) or ion(s) from the following having non-planar structure is\_\_\_\_\_.



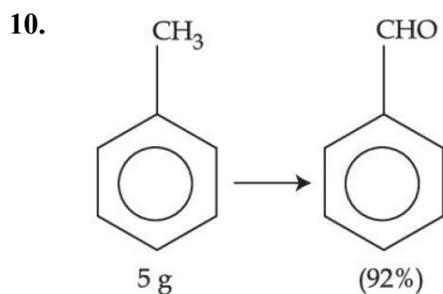
**Official Ans. by NTA (6)**

**Allen Ans. (6)**

9. The spin only magnetic moment of the complex present in Fehling's reagent is\_\_\_\_\_ B.M. (Nearest integer).

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

**Allen Ans. (2)**



In the above reaction, 5 g of toluene is converted into benzaldehyde with 92% yield. The amount of benzaldehyde produced is\_\_\_\_\_  $\times 10^{-2}$  g. (Nearest integer)

**Official Ans. by NTA (530)**

**Allen Ans. (530)**