

**FINAL JEE-MAIN EXAMINATION – JULY, 2022**
**(Held On Thursday 28<sup>th</sup> July, 2022)**
**TIME : 9 : 00 AM to 12 : 00 NOON**
**CHEMISTRY**
**TEST PAPER WITH ANSWER**

1. Identify the incorrect statement from the following.
- (A) A circular path around the nucleus in which an electron moves is proposed as Bohr's orbit.
- (B) An orbital is the one electron wave function ( $\Psi$ ) in an atom.
- (C) The existence of Bohr's orbits is supported by hydrogen spectrum.
- (D) Atomic orbital is characterised by the quantum numbers  $n$  and  $l$  only

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

2. Which of the following relation is not correct ?
- (A)  $\Delta H = \Delta U - P\Delta V$  (B)  $\Delta U = q + W$
- (C)  $\Delta S_{\text{sys}} + \Delta S_{\text{surr}} \geq 0$  (D)  $\Delta G = \Delta H - T\Delta S$

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

3. Match List-I with List-II.

|     | List-I  |       | List-II                          |
|-----|---|-------|----------------------------------|
| (A) | $\text{Cd(s)} + 2\text{Ni(OH)}_3\text{(s)} \rightarrow \text{CdO(s)} + 2\text{Ni(OH)}_2\text{(s)} + \text{H}_2\text{O(l)}$                | (I)   | Primary battery                  |
| (B) | $\text{Zn(Hg)} + \text{HgO(s)} \rightarrow \text{ZnO(s)} + \text{Hg(l)}$  | (II)  | Discharging of secondary battery |
| (C) | $2\text{PbSO}_4\text{(s)} + 2\text{H}_2\text{O(l)} \rightarrow \text{Pb(s)} + \text{PbO}_2\text{(s)} + 2\text{H}_2\text{SO}_4\text{(aq)}$ | (III) | Fuel cell                        |
| (D) | $2\text{H}_2\text{(g)} + \text{O}_2\text{(g)} \rightarrow 2\text{H}_2\text{O(l)}$   | (IV)  | Charging of secondary battery    |

Choose the correct answer from the options given below :

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

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

4. Match List-I with List-II.

|     | List-I<br>Reaction  |       | List-II<br>Catalyst               |
|-----|---|-------|-----------------------------------|
| (A) | $4\text{NH}_3\text{(g)} + 5\text{O}_2\text{(g)} \rightarrow 4\text{NO(g)} + 6\text{H}_2\text{O(g)}$   | (I)   | $\text{NO(g)}$                    |
| (B) | $\text{N}_2\text{(g)} + 3\text{H}_2\text{(g)} \rightarrow 2\text{NH}_3\text{(g)}$   | (II)  | $\text{H}_2\text{SO}_4\text{(l)}$ |
| (C) | $\text{C}_{12}\text{H}_{22}\text{O}_{11}\text{(aq)} + \text{H}_2\text{O(l)} \rightarrow \text{C}_6\text{H}_{12}\text{O}_6\text{ (Glucose)} + \text{C}_6\text{H}_{12}\text{O}_6\text{ (Fructose)}$ | (III) | $\text{Pt(s)}$                    |
| (D) | $2\text{SO}_2\text{(g)} + \text{O}_2\text{(g)} \rightarrow 2\text{SO}_3\text{(g)}$  | (IV)  | $\text{Fe(s)}$                    |

Choose the correct answer from the options given below :

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

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

5. In which of the following pairs, electron gain enthalpies of constituent elements are nearly the same or identical ?

- (A) Rb and Cs (B) Na and K
- (C) Ar and Kr (D) I and At

Choose the correct answer from the options given below :

- (A) (A) and (B) only
- (B) (B) and (C) only
- (C) (A) and (C) only
- (D) (C) and (D) only

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

6. Which of the reaction is suitable for concentrating ore by leaching process ?

- (A)  $2\text{Cu}_2\text{S} + 3\text{O}_2 \rightarrow 2\text{Cu}_2\text{O} + 2\text{SO}_2$
- (B)  $\text{Fe}_3\text{O}_4 + \text{CO} \rightarrow 3\text{FeO} + \text{CO}_2$
- (C)  $\text{Al}_2\text{O}_3 + 2\text{NaOH} + 3\text{H}_2\text{O} \rightarrow 2\text{Na}[\text{Al}(\text{OH})_4]$
- (D)  $\text{Al}_2\text{O}_3 + 6\text{Mg} \rightarrow 6\text{MgO} + 4\text{Al}$

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

**Allen Ans. (C)**

7. The metal salts formed during softening of hardwater using Clark's method are :

- (A)  $\text{Ca}(\text{OH})_2$  and  $\text{Mg}(\text{OH})_2$
- (B)  $\text{CaCO}_3$  and  $\text{Mg}(\text{OH})_2$
- (C)  $\text{Ca}(\text{OH})_2$  and  $\text{MgCO}_3$
- (D)  $\text{CaCO}_3$  and  $\text{MgCO}_3$

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

**Allen Ans. (B)**

8. Which of the following statement is incorrect ?

- (A) Low solubility of  $\text{LiF}$  in water is due to its small hydration enthalpy.
- (B)  $\text{KO}_2$  is paramagnetic.
- (C) Solution of sodium in liquid ammonia is conducting in nature.
- (D) Sodium metal has higher density than potassium metal

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

**Allen Ans. (A)**

9. Match List-I with List-II, match the gas evolved during each reaction.

|     | List-I  |       | List-II       |
|-----|---|-------|---------------|
| (A) | $(\text{NH}_4)_2\text{Cr}_2\text{O}_7 \xrightarrow{\Delta}$ | (I)   | $\text{H}_2$  |
| (B) | $\text{KMnO}_4 + \text{HCl} \rightarrow$                    | (II)  | $\text{N}_2$  |
| (C) | $\text{Al} + \text{NaOH} + \text{H}_2\text{O} \rightarrow$  | (III) | $\text{O}_2$  |
| (D) | $\text{NaNO}_3 \xrightarrow{\Delta}$                        | (IV)  | $\text{Cl}_2$ |

Choose the correct answer from the options given below :

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

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

**Allen Ans. (C)**

10. Which of the following has least tendency to liberate  $\text{H}_2$  from mineral acids ?

- (A) Cu (B) Mn
- (C) Ni (D) Zn

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

**Allen Ans. (A)**

11. Given below are two statements :

**Statement I :** In polluted water values of both dissolved oxygen and BOD are very low.

**Statement II :** Eutrophication results in decrease in the amount of dissolved oxygen.

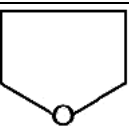
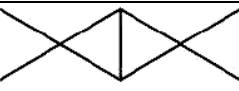
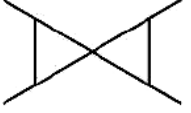
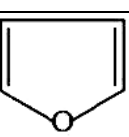
In the light of the above statements, choose the most appropriate answer from the options given below :

- (A) Both Statement I and Statement II are 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 (D)**

**Allen Ans. (D)**

12. Match List-I with List-II.

|     | List-I  |       | List-II                          |
|-----|---|-------|----------------------------------|
| (A) |  | (I)   | Spiro compound                   |
| (B) |  | (II)  | Aromatic compound                |
| (C) |  | (III) | Non-planar Heterocyclic compound |
| (D) |  | (IV)  | Bicyclo compound                 |

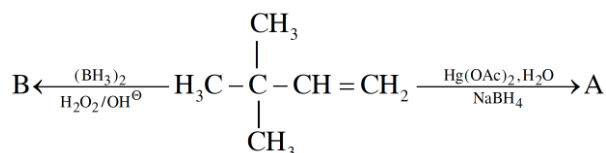
Choose the correct answer from the options given below :

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

Official Ans. by NTA (C)

Allen Ans. (C)

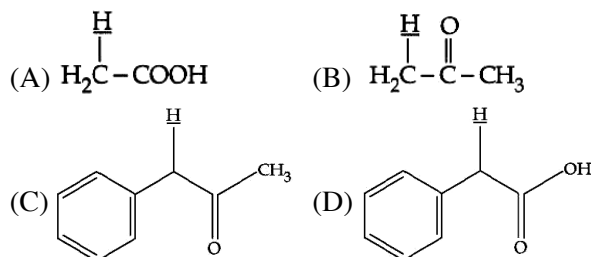
13. Choose the correct option for the following reactions.



- (A) 'A' and 'B' are both Markovnikov addition products.  
 (B) 'A' is Markovnikov product and 'B' is anti-Markovnikov product.  
 (C) 'A' and 'B' are both anti-Markovnikov products.  
 (D) 'B' is Markovnikov and 'A' is anti-Markovnikov product.

Official Ans. by NTA (B)

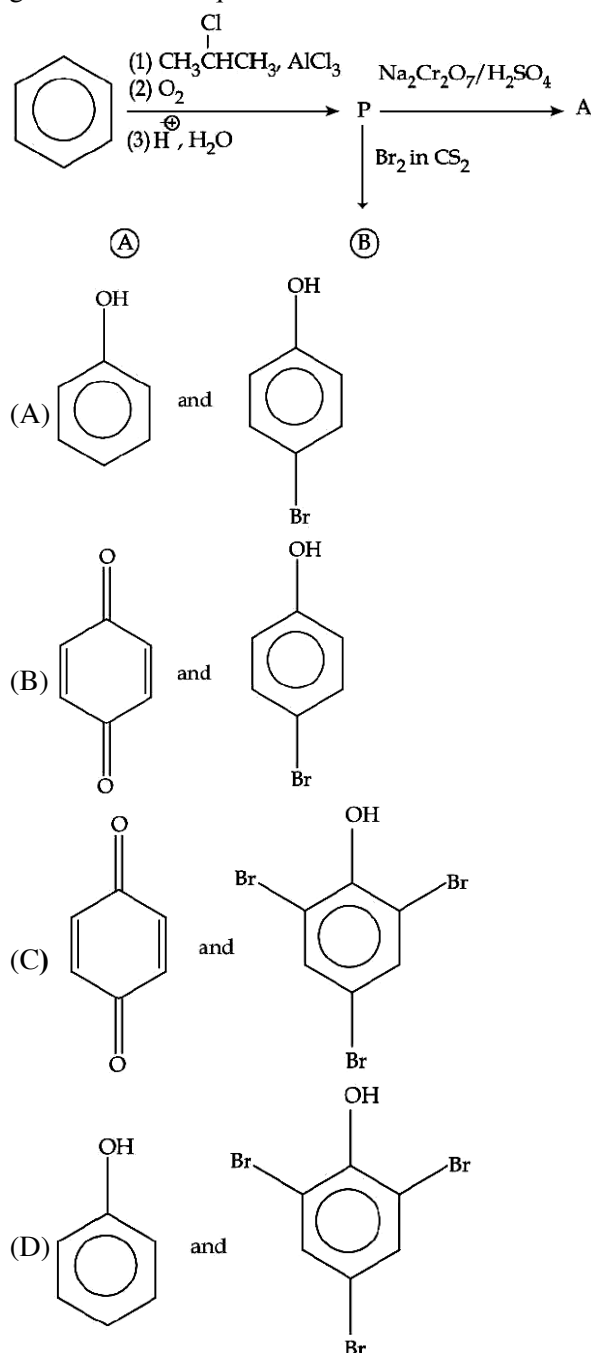
Allen Ans. (B)

 14. Among the following marked proton of which compound shows lowest  $\text{pK}_a$  value ?


Official Ans. by NTA (C)

Allen Ans. (C)

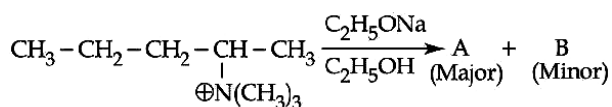
15. Identify the major product A and B for the below given reaction sequence.



Official Ans. by NTA (B)

Allen Ans. (B)

16. Identify the correct statement for the below given transformation.



(A) A -  $\text{CH}_3\text{CH}_2\text{CH}=\text{CH}-\text{CH}_3$ ,

B -  $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}=\text{CH}_2$ ,

Saytzeff products

(B) A -  $\text{CH}_3\text{CH}_2\text{CH}=\text{CH}-\text{CH}_3$ ,

B -  $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}=\text{CH}_2$ ,

Hafmann products

(C) A -  $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}=\text{CH}_2$ ,

B -  $\text{CH}_3\text{CH}_2\text{CH}=\text{CHCH}_3$ ,

Hofmann products

(D) A -  $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}=\text{CH}_2$ ,

B -  $\text{CH}_3\text{CH}_2\text{CH}=\text{CHCH}_3$ ,

Saytzeff products

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

**Allen Ans. (C)**

17. Terylene polymer is obtained by condensation of :

(A) Ethane-1, 2-diol and Benzene-1, 3

dicarboxylic acid

(B) Propane-1, 2-diol and Benzene-1, 4

dicarboxylic acid

(C) Ethane-1, 2-diol and Benzene-1, 4

dicarboxylic acid

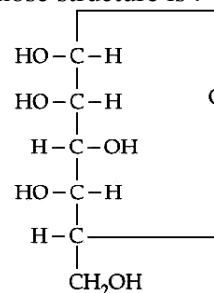
(D) Ethane-1, 2-diol and Benzene-1, 2

dicarboxylic acid

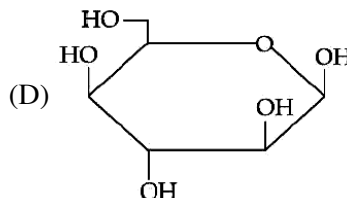
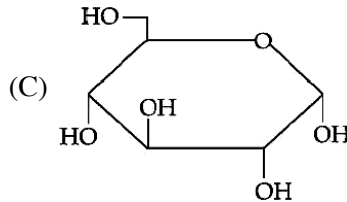
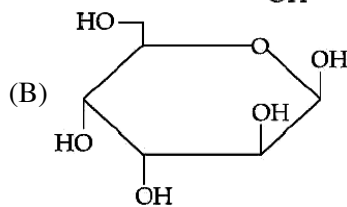
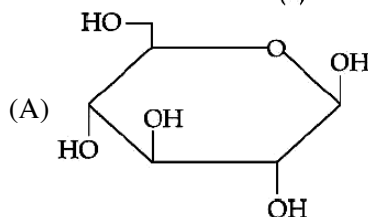
**Official Ans. by NTA (C)**

**Allen Ans. (C)**

18. For the below given cyclic hemiacetal (X), the correct pyranose structure is :



(X)



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

**Allen Ans. (D)**

19. Statements about Enzyme Inhibitor Drugs are given below :

(A) There are Competitive and Non-competitive inhibitor drugs.

(B) These can bind at the active sites and allosteric sites.

(C) Competitive Drugs are allosteric site blocking drugs.

(D) Non-competitive Drugs are active site blocking drugs.

Choose the correct answer from the options given below :

(A) (A), (D) only

(B) (A), (C) only

(C) (A), (B) only

(D) (A), (B), (C) only

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

**Allen Ans. (C)**

20. For kinetic study of the reaction of iodide ion with  $\text{H}_2\text{O}_2$  at room temperature :
- (A) Always use freshly prepared starch solution.  
 (B) Always keep the concentration of sodium thiosulphate solution less than that of KI solution.  
 (C) Record the time immediately after the appearance of blue colour.  
 (D) Record the time immediately before the appearance of blue colour.  
 (E) Always keep the concentration of sodium thiosulphate solution more than that of KI solution.

Choose the correct answer from the options given below :

- (A) (A), (B), (C) only  
 (B) (A), (D), (E) only  
 (C) (D), (E) only  
 (D) (A), (B), (E) only

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

**Allen Ans. (A)**

### SECTION-B

1. In the given reaction,
- $$\text{X} + \text{Y} + 3\text{Z} \rightleftharpoons \text{XYZ}_3$$
- if one mole of each of X and Y with 0.05 mol of Z gives compound  $\text{XYZ}_3$ . (Given : Atomic masses of X, Y and Z are 10, 20 and 30 amu, respectively).  
 The yield of  $\text{XYZ}_3$  is \_\_\_\_\_ g.  
 (Nearest integer)
- Official Ans. by NTA (2)**
- Allen Ans. (2)**

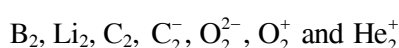
2. An element M crystallises in a body centred cubic unit cell with a cell edge of 300 pm. The density of the element is  $6.0 \text{ g cm}^{-3}$ . The number of atoms present in 180 g of the element is \_\_\_\_\_  $\times 10^{23}$ .

(Nearest integer)

**Official Ans. by NTA (22)**

**Allen Ans. (22)**

3. The number of paramagnetic species among the following is \_\_\_\_\_.



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

**Allen Ans. (4)**

4. 150 g of acetic acid was contaminated with 10.2 g ascorbic acid ( $\text{C}_6\text{H}_8\text{O}_6$ ) to lower down its freezing point by  $(x \times 10^{-1})^\circ\text{C}$ . The value of x is \_\_\_\_\_.

(Nearest integer) [Given  $K_f = 3.9 \text{ K kg mol}^{-1}$ ;

Molar mass of ascorbic acid =  $176 \text{ g mol}^{-1}$ ]

**Official Ans. by NTA (15)**

**Allen Ans. (15)**

5.  $K_a$  for butyric acid ( $\text{C}_3\text{H}_7\text{COOH}$ ) is  $2 \times 10^{-5}$ . The pH of 0.2 M solution of butyric acid is \_\_\_\_\_  $\times 10^{-1}$ .  
 (Nearest integer) [Given  $\log 2 = 0.30$ ]

**Official Ans. by NTA (27)**

**Allen Ans. (27)**

6. For the given first order reaction



the half life of the reaction is 0.3010 min. The ratio of the initial concentration of reactant to the concentration of reactant at time 2.0 min will be equal to \_\_\_\_\_. (Nearest integer)

**Official Ans. by NTA (100)**

**Allen Ans. (100)**

7. The number of interhalogens from the following having square pyramidal structure is :

$\text{ClF}_3$ ,  $\text{IF}_7$ ,  $\text{BrF}_5$ ,  $\text{BrF}_3$ ,  $\text{I}_2\text{Cl}_6$ ,  $\text{IF}_5$ ,  $\text{ClF}$ ,  $\text{ClF}_5$

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

**Allen Ans. (3)**

8. The disproportionation of  $\text{MnO}_4^{2-}$  in acidic medium resulted in the formation of two manganese compounds A and B. If the oxidation state of Mn in B is smaller than that of A, then the spin-only magnetic moment ( $\mu$ ) value of B in BM is \_\_\_\_\_. (Nearest integer)

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

**Allen Ans. (4)**

9. Total number of relatively more stable isomer(s) possible for octahedral complex  $[\text{Cu}(\text{en})_2(\text{SCN})_2]$  will be \_\_\_\_\_.

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

**Allen Ans. (3)**

10. On complete combustion of 0.492 g of an organic compound containing C, H and O, 0.7938 g of  $\text{CO}_2$  and 0.4428 g of  $\text{H}_2\text{O}$  was produced. The % composition of oxygen in the compound is \_\_\_\_\_.

**Official Ans. by NTA (46)**

**Allen Ans. (46)**