

FINAL JEE-MAIN EXAMINATION – MARCH, 2021

(Held On Wednesday 17th March, 2021) TIME : 3 : 00 PM to 6 : 00 PM

CHEMISTRY

TEST PAPER WITH ANSWER

SECTION-A

- Fructose is an example of :-
(1) Pyranose
(2) Ketohexose
(3) Aldohexose
(4) Heptose
Official Ans. by NTA (2)
- The set of elements that differ in mutual relationship from those of the other sets is :
(1) Li – Mg (2) B – Si
(3) Be – Al (4) Li – Na
Official Ans. by NTA (4)
- The functional groups that are responsible for the ion-exchange property of cation and anion exchange resins, respectively, are :
(1) –SO₃H and –NH₂
(2) –SO₃H and –COOH
(3) –NH₂ and –COOH
(4) –NH₂ and –SO₃H
Official Ans. by NTA (1)
- Match List-I and List-II :

List-I	List-II
(a) Haematite	(i) Al ₂ O ₃ .xH ₂ O
(b) Bauxite	(ii) Fe ₂ O ₃
(c) Magnetite	(iii) CuCO ₃ .Cu(OH) ₂
(d) Malachite	(iv) Fe ₃ O ₄

Choose the correct answer from the options given below :

(1) (a)-(ii), (b)-(iii), (c)-(i), (d)-(iv)
(2) (a)-(iv), (b)-(i), (c)-(ii), (d)-(iii)
(3) (a)-(i), (b)-(iii), (c)-(ii), (d)-(iv)
(4) (a)-(ii), (b)-(i), (c)-(iv), (d)-(iii)
Official Ans. by NTA (4)
- The correct pair(s) of the ambident nucleophiles is (are) :
(A) AgCN/KCN
(B) RCOOAg/RCOOK
(C) AgNO₂/KNO₂
(D) AgI/KI
(1) (B) and (C) only
(2) (A) only
(3) (A) and (C) only
(4) (B) only
Official Ans. by NTA (3)

- The set that represents the pair of neutral oxides of nitrogen is :
(1) NO and N₂O (2) N₂O and N₂O₃
(3) N₂O and NO₂ (4) NO and NO₂
Official Ans. by NTA (1)
- Match List-I with List-II :

List-I	List-II
(a) [Co(NH ₃) ₆] [Cr(CN) ₆]	(i) Linkage isomerism
(b) [Co(NH ₃) ₃ (NO ₂) ₃]	(ii) Solvate isomerism
(c) [Cr(H ₂ O) ₆]Cl ₃	(iii) Co-ordination isomerism
(d) <i>cis</i> -[CrCl ₂ (ox) ₂] ³⁻	(iv) Optical isomerism

Choose the correct answer from the options given below :

(1) (a)-(iii), (b)-(i), (c)-(ii), (d)-(iv)
(2) (a)-(iv), (b)-(ii), (c)-(iii), (d)-(i)
(3) (a)-(ii), (b)-(i), (c)-(iii), (d)-(iv)
(4) (a)-(i), (b)-(ii), (c)-(iii), (d)-(iv)
Official Ans. by NTA (1)
- Primary, secondary and tertiary amines can be separated using :-
(1) Para-Toluene sulphonyl chloride
(2) Chloroform and KOH
(3) Benzene sulphonic acid
(4) Acetyl amide
Official Ans. by NTA (1)
- The common positive oxidation states for an element with atomic number 24, are :
(1) +2 to +6 (2) +1 and +3 to +6
(3) +1 and +3 (4) +1 to +6
Official Ans. by NTA (1)
- Match List-I with List-II :

List-I	List-II
Chemical Compound	Used as
(a) Sucralose	(i) Synthetic detergent
(b) Glyceryl ester of stearic acid	(ii) Artificial sweetener
(c) Sodium benzoate	(iii) Antiseptic
(d) Bithionol	(iv) Food preservative

Choose the correct match :

(1) (a)-(iv), (b)-(iii), (c)-(ii), (d)-(i)
(2) (a)-(ii), (b)-(i), (c)-(iv), (d)-(iii)
(3) (a)-(iii), (b)-(ii), (c)-(iv), (d)-(i)
(4) (a)-(i), (b)-(ii), (c)-(iv), (d)-(iii)
Official Ans. by NTA (2)

11. Given below are two statements :

Statement-I : 2-methylbutane on oxidation with KMnO_4 gives 2-methylbutan-2-ol.


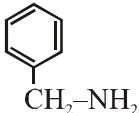

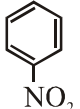
Statement-II : n-alkanes can be easily oxidised to corresponding alcohols with KMnO_4 .

Choose the correct option :

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

Official Ans. by NTA (3)

12. Nitrogen can be estimated by Kjeldahl's method for which of the following compound ?

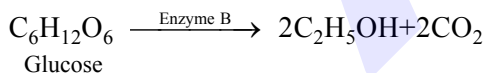
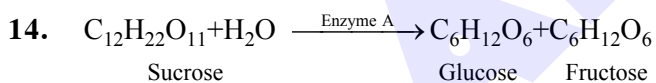
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|--|--|
| (1)  | (2)  |
| (3)  | (4)  |

Official Ans. by NTA (2)

13. Amongst the following, the linear species is :

- | | |
|-------------------|---------------------------|
| (1) NO_2 | (2) Cl_2O |
| (3) O_3 | (4) N_3^- |

Official Ans. by NTA (4)



In the above reactions, the enzyme A and enzyme B respectively are :-

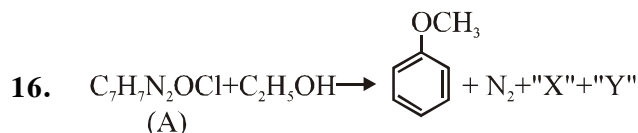
- (1) Amylase and Invertase
- (2) Invertase and Amylase
- (3) Invertase and Zymase
- (4) Zymase and Invertase

Official Ans. by NTA (3)

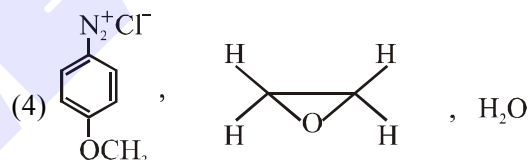
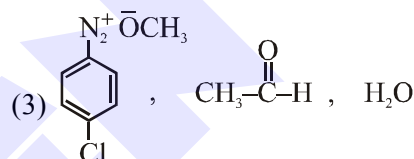
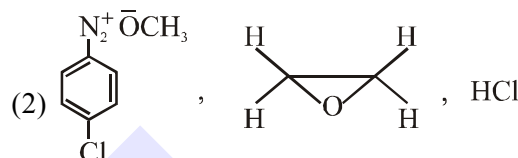
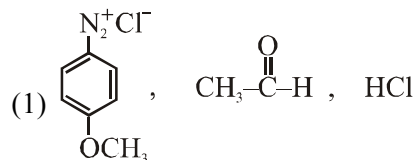
15. One of the by-products formed during the recovery of NH_3 from Solvay process is :

- (1) $\text{Ca}(\text{OH})_2$
- (2) NaHCO_3
- (3) CaCl_2
- (4) NH_4Cl

Official Ans. by NTA (3)



In the above reaction, the structural formula of (A), "X" and "Y" respectively are :



Official Ans. by NTA (1)

17. For the coagulation of a negative sol, the species below, that has the highest flocculating power is :

- | | |
|------------------------|------------------------|
| (1) SO_4^{2-} | (2) Ba^{2+} |
| (3) Na^+ | (4) PO_4^{3-} |

Official Ans. by NTA (2)

18. Which of the following statement(s) is (are) incorrect reason for eutrophication ?

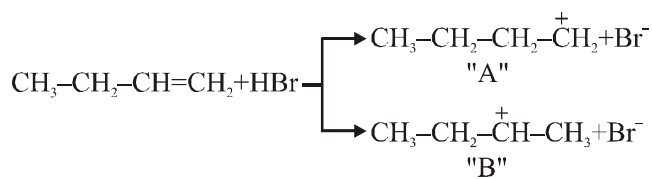
- (A) excess usage of fertilisers
- (B) excess usage of detergents
- (C) dense plant population in water bodies
- (D) lack of nutrients in water bodies that prevent plant growth

Choose the most appropriate answer from the options given below :

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

Official Ans. by NTA (4)

19. Choose the correct statement regarding the formation of carbocations A and B given :-



- (1) Carbocation B is more stable and formed relatively at faster rate
- (2) Carbocation A is more stable and formed relatively at slow rate
- (3) Carbocation B is more stable and formed relatively at slow rate
- (4) Carbocation A is more stable and formed relatively at faster rate

Official Ans. by NTA (1)

20. During which of the following processes, does entropy decrease ?

- (A) Freezing of water to ice at 0°C
- (B) Freezing of water to ice at -10°C
- (C) $\text{N}_2(\text{g}) + 3\text{H}_2(\text{g}) \rightarrow 2\text{NH}_3(\text{g})$
- (D) Adsorption of $\text{CO}(\text{g})$ and lead surface
- (E) Dissolution of NaCl in water

Official Ans. by NTA (1)

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

SECTION-B

1. A KCl solution of conductivity 0.14 S m^{-1} shows a resistance of 4.19Ω in a conductivity cell. If the same cell is filled with an HCl solution, the resistance drops to 1.03Ω . The conductivity of the HCl solution is $\underline{\hspace{1cm}} \times 10^{-2} \text{ S m}^{-1}$. (Round off to the Nearest Integer).

Official Ans. by NTA (57)

2. On complete reaction of FeCl_3 with oxalic acid in aqueous solution containing KOH , resulted in the formation of product A. The secondary valency of Fe in the product A is $\underline{\hspace{1cm}}$.

(Round off to the Nearest Integer).

Official Ans. by NTA (6)

3. The reaction $2\text{A} + \text{B}_2 \rightarrow 2\text{AB}$ is an elementary reaction.

For a certain quantity of reactants, if the volume of the reaction vessel is reduced by a factor of 3, the rate of the reaction increases by a factor of $\underline{\hspace{1cm}}$. (Round off to the Nearest Integer).

Official Ans. by NTA (27)

4. The total number of $\text{C}-\text{C}$ sigma bond/s in mesityl oxide ($\text{C}_6\text{H}_{10}\text{O}$) is $\underline{\hspace{1cm}}$. (Round off to the Nearest Integer).

Official Ans. by NTA (5)

5. A 1 molal $\text{K}_4\text{Fe}(\text{CN})_6$ solution has a degree of dissociation of 0.4. Its boiling point is equal to that of another solution which contains 18.1 weight percent of a non electrolytic solute A. The molar mass of A is $\underline{\hspace{1cm}}$ u. (Round off to the Nearest Integer).

[Density of water = 1.0 g cm^{-3}]

Official Ans. by NTA (85)

6. In the ground state of atomic Fe ($Z = 26$), the spin-only magnetic moment is $\underline{\hspace{1cm}} \times 10^{-1} \text{ BM}$. (Round off to the Nearest Integer).

[Given : $\sqrt{3} = 1.73$, $\sqrt{2} = 1.41$]

Official Ans. by NTA (49)

7. The number of chlorine atoms in 20 mL of chlorine gas at STP is $\underline{\hspace{1cm}} 10^{21}$. (Round off to the Nearest Integer).

[Assume chlorine is an ideal gas at STP

$R = 0.083 \text{ L bar mol}^{-1} \text{ K}^{-1}$, $N_A = 6.023 \times 10^{23}$]

Official Ans. by NTA (1)

8. KBr is doped with 10^{-5} mole percent of SrBr_2 . The number of cationic vacancies in 1 g of KBr crystal is $\underline{\hspace{1cm}} 10^{14}$. (Round off to the Nearest Integer).

[Atomic Mass : $\text{K} : 39.1 \text{ u}$, $\text{Br} : 79.9 \text{ u}$,

$N_A = 6.023 \times 10^{23}$]

Official Ans. by NTA (5)

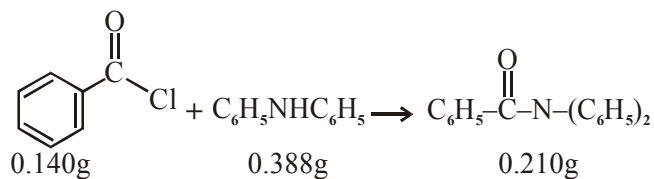
9. Consider the reaction $\text{N}_2\text{O}_4(\text{g}) \rightleftharpoons 2\text{NO}_2(\text{g})$.

The temperature at which $K_C = 20.4$ and $K_P = 600.1$, is _____ K. (Round off to the Nearest Integer).

[Assume all gases are ideal and $R = 0.0831 \text{ L bar K}^{-1} \text{ mol}^{-1}$]

Official Ans. by NTA (354)

10.



Consider the above reaction. The percentage yield of amide product is _____. (Round off to the Nearest Integer).

(Given : Atomic mass : C : 12.0 u, H : 1.0u, N : 14.0 u, O : 16.0 u, Cl : 35.5 u)

Official Ans. by NTA (77)