

FINAL JEE-MAIN EXAMINATION – FEBRUARY, 2021

(Held On Friday 26th February, 2021) TIME : 3 : 00 PM to 6 : 00 PM

CHEMISTRY

TEST PAPER WITH ANSWER

SECTION-A

1. Which of the following forms of hydrogen emits low energy β^- particles?

- (1) Deuterium ${}^2_1\text{H}$ (2) Tritium ${}^3_1\text{H}$
(3) Protium ${}^1_1\text{H}$ (4) Proton H^+

Official Ans. by NTA (2)

2. Given below are two statements :one is labelled as Assertion A and the other is labelled as Reason R

Assertion A : In TlI_3 , isomorphous to CsI_3 , the metal is present in +1 oxidation state.

Reason R : Tl metal has fourteen f electrons in the electronic configuration.

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

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

Official Ans. by NTA (4)

3. Match List-I with List-II

List-I **List-II**

- (a) Sucrose (i) β -D-Galactose and β -D-Glucose
(b) Lactose (ii) α -D-Glucose and β -D-Fructose
(c) Maltose (iii) α -D-Glucose and α -D-Glucose

Choose the correct answer from the options given below :

Options :

- (1) (a) \rightarrow (i), (b) \rightarrow (iii), (c) \rightarrow (ii)
(2) (a) \rightarrow (iii), (b) \rightarrow (i), (c) \rightarrow (iii)
(3) (a) \rightarrow (ii), (b) \rightarrow (i), (c) \rightarrow (iii)
(4) (a) \rightarrow (iii), (b) \rightarrow (ii), (c) \rightarrow (i)

Official Ans. by NTA (3)

4. A. Phenyl methanamine
B. N,N-Dimethylaniline
C. N-Methyl aniline
D. Benzenamine

Choose the correct order of basic nature of the above amines.

- (1) $\text{A} > \text{C} > \text{B} > \text{D}$ (2) $\text{D} > \text{C} > \text{B} > \text{A}$
(3) $\text{D} > \text{B} > \text{C} > \text{A}$ (4) $\text{A} > \text{B} > \text{C} > \text{D}$

Official Ans. by NTA (4)

5. The correct order of electron gain enthalpy is

- (1) $\text{S} > \text{Se} > \text{Te} > \text{O}$ (2) $\text{Te} > \text{Se} > \text{S} > \text{O}$
(3) $\text{O} > \text{S} > \text{Se} > \text{Te}$ (4) $\text{S} > \text{O} > \text{Se} > \text{Te}$

Official Ans. by NTA (1)

6. In $\overset{1}{\text{C}}\text{H}_2 = \overset{2}{\text{C}} = \overset{3}{\text{C}}\text{H} - \overset{4}{\text{C}}\text{H}_3$ molecule, the hybridization of carbon 1,2,3 and 4 respectively are :

- (1) $\text{sp}^3, \text{sp}, \text{sp}^3, \text{sp}^3$ (2) $\text{sp}^2, \text{sp}^2, \text{sp}^2, \text{sp}^3$
(3) $\text{sp}^2, \text{sp}, \text{sp}^2, \text{sp}^3$ (4) $\text{sp}^2, \text{sp}^3, \text{sp}^2, \text{sp}^3$

Official Ans. by NTA (3)

7. Seliwanoff test and Xanthoproteic test are used for the identification of _____ and _____ respectively

- (1) Aldoses, ketoses (2) Proteins, ketoses
(3) Ketoses, proteins (4) Ketoses, aldoses

Official Ans. by NTA (3)

8. 2,4-DNP test can be used to identify :

- (1) Amine (2) Aldehyde
(3) Ether (4) Halogens

Official Ans. by NTA (2)

9. Ceric ammonium nitrate and CHCl_3 / alc. KOH are used for the identification of functional groups present in _____ and _____ respectively.

- (1) Alcohol, phenol (2) Amine, alcohol
(3) Alcohol, amine (4) Amine, phenol

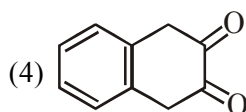
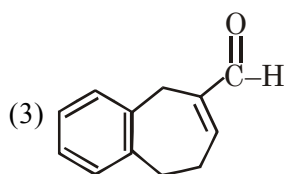
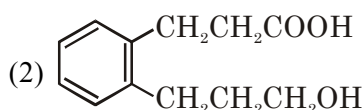
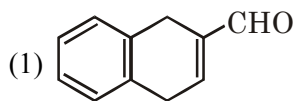
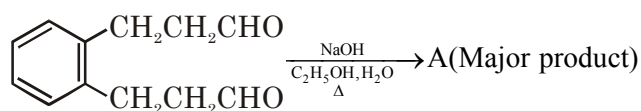
Official Ans. by NTA (3)

10. Which pair of oxides is acidic in nature?

- (1) $\text{B}_2\text{O}_3, \text{CaO}$ (2) $\text{B}_2\text{O}_3, \text{SiO}_2$
(3) $\text{N}_2\text{O}, \text{BaO}$ (4) CaO, SiO_2

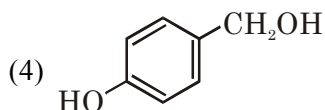
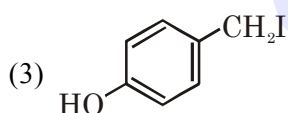
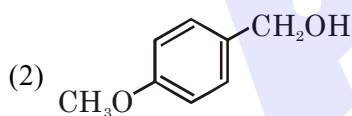
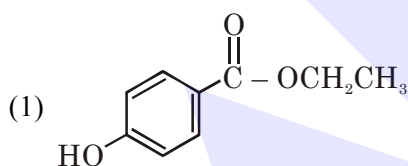
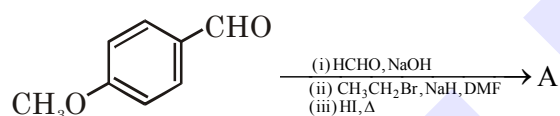
Official Ans. by NTA (2)

11. Identify A in the given chemical reaction,



Official Ans. by NTA (3)

12. Identify A in the following chemical reaction



Official Ans. by NTA (3)

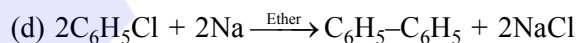
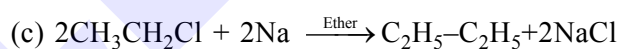
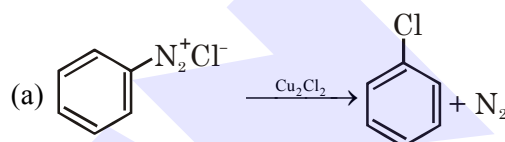
13. Calgon is used for water treatment. Which of the following statement is NOT true about Calgon?

- (1) Calgon contains the 2nd most abundant element by weight in the Earth's crust.
- (2) It is polymeric compound and is water soluble.
- (3) It is also known as Graham's salt
- (4) It does not remove Ca^{2+} ion by precipitation.

Official Ans. by NTA (1)

14. Match List-I with List-II

List-I



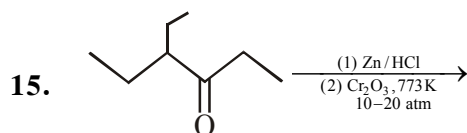
List-II

- (i) Wurtz reaction
- (ii) Sandmeyer reaction
- (iii) Fittig reaction
- (iv) Gatterman reaction

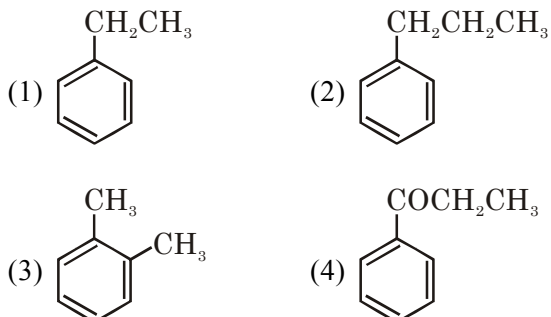
Choose the correct answer from the options given below :

- (1) (a) \rightarrow (iii), (b) \rightarrow (i), (c) \rightarrow (iv), (d) \rightarrow (ii)
- (2) (a) \rightarrow (ii), (b) \rightarrow (i), (c) \rightarrow (iv), (d) \rightarrow (iii)
- (3) (a) \rightarrow (ii), (b) \rightarrow (iv), (c) \rightarrow (i), (d) \rightarrow (iii)
- (4) (a) \rightarrow (iii), (b) \rightarrow (iv), (c) \rightarrow (i), (d) \rightarrow (ii)

Official Ans. by NTA (3)



considering the above reaction, the major product among the following is :



Official Ans. by NTA (1)

16. Match List-I with List-II.

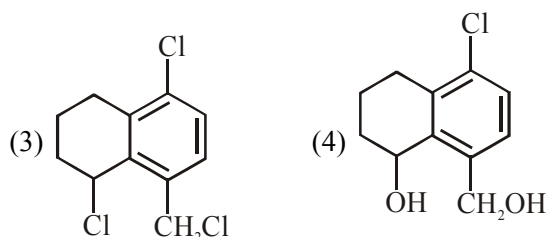
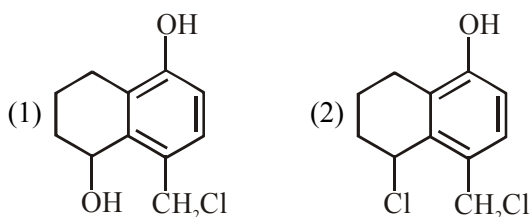
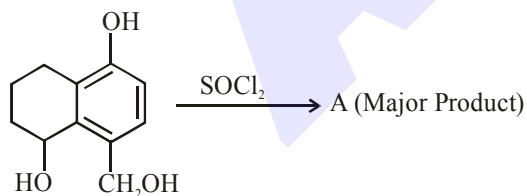
List-I (Molecule)	List-II (Bond order)
(a) Ne ₂	(i) 1
(b) N ₂	(ii) 2
(c) F ₂	(iii) 0
(d) O ₂	(iv) 3

Choose the correct answer from the options given below :

- (1) (a)→(iii), (b)→(iv), (c)→(i), (d)→(ii)
 (2) (a)→(i), (b)→(ii), (c)→(iii), (d)→(iv)
 (3) (a)→(ii), (b)→(i), (c)→(iv), (d)→(iii)
 (4) (a)→(iv), (b)→(iii), (c)→(ii), (d)→(i)

Official Ans by NTA (1)

17. Identify A in the given reaction.



Official Ans by NTA (2)

18. Match List-I with List-II.

List-I	List-II
(a) Siderite	(i) Cu
(b) Calamine	(ii) Ca
(c) Malachite	(iii) Fe
(d) Cryolite	(iv) Al
	(v) Zn

Choose the correct answer from the options given below :

- (1) (a)→(iii), (b)→(i), (c)→(v), (d)→(ii)
 (2) (a)→(i), (b)→(ii), (c)→(v), (d)→(iii)
 (3) (a)→(iii), (b)→(v), (c)→(i), (d)→(iv)
 (4) (a)→(i), (b)→(ii), (c)→(iii), (d)→(iv)

Official Ans by NTA (3)

19. The nature of charge on resulting colloidal particles when FeCl₃ is added to excess of hot water is :

- (1) Positive
 (2) Sometimes positive and sometimes negative
 (3) Neutral
 (4) Negative

Official Ans by NTA (1)

20. Match List-I with List-II.

List-I	List-II
(a) Sodium Carbonate	(i) Deacon
(b) Titanium	(ii) Castner-Kellner
(c) Chlorine	(iii) Van-Arkel
(d) Sodium hydroxide	(iv) Solvay

Choose the correct answer from the options given below :

- (1) (a)→(iv), (b)→(iii), (c)→(i), (d)→(ii)
 (2) (a)→(i), (b)→(iii), (c)→(iv), (d)→(ii)
 (3) (a)→(iv), (b)→(i), (c)→(ii), (d)→(iii)
 (4) (a)→(iii), (b)→(ii), (c)→(i), (d)→(iv)

Official Ans by NTA (1)

SECTION-II

1. The NaNO_3 weighed out to make 50 mL of an aqueous solution containing 70.0 mg Na^+ per mL is _____. (Rounded off to the nearest integer)

[Given : Atomic weight in g mol^{-1} – Na : 23 ; N : 14 ; O : 16]

Official Ans by NTA (13)

2. Emf of the following cell at 298 K in V is $x \times 10^{-2}$. $\text{Zn}|\text{Zn}^{2+} (0.1 \text{ M})||\text{Ag}^+ (0.01 \text{ M})|\text{Ag}$
The value of x is _____. (Rounded off to the nearest integer)

[Given : $E_{\text{Zn}^{2+}/\text{Zn}}^0 = -0.76 \text{ V}$; $E_{\text{Ag}^+/\text{Ag}}^0 = +0.80 \text{ V}$; $\frac{2.303RT}{F} = 0.059$]

Official Ans by NTA (147)

3. When 12.2 g of benzoic acid is dissolved in 100 g of water, the freezing point of solution was found to be -0.93°C ($K_f(\text{H}_2\text{O}) = 1.86 \text{ K kg mol}^{-1}$). The number (n) of benzoic acid molecules associated (assuming 100% association) is _____.

Official Ans by NTA (2)

4. The average S–F bond energy in kJ mol^{-1} of SF_6 is _____. (Rounded off to the nearest integer)

[Given : The values of standard enthalpy of formation of $\text{SF}_6(\text{g})$, $\text{S}(\text{g})$ and $\text{F}(\text{g})$ are -1100 , 275 and 80 kJ mol^{-1} respectively.]

Official Ans by NTA (309)

5. A ball weighing 10 g is moving with a velocity of 90 ms^{-1} . If the uncertainty in its velocity is 5%, then the uncertainty in its position is _____ $\times 10^{-33} \text{ m}$. (Rounded off to the nearest integer)

[Given : $h = 6.63 \times 10^{-34} \text{ Js}$]

Official Ans by NTA (1)

6. The number of octahedral voids per lattice site in a lattice is _____. (Rounded off to the nearest integer)

Official Ans by NTA (1)

7. In mildly alkaline medium, thiosulphate ion is oxidized by MnO_4^- to "A". The oxidation state of sulphur in "A" is _____.

Official Ans by NTA (6)

8. The number of stereoisomers possible for $[\text{Co}(\text{ox})_2(\text{Br})(\text{NH}_3)]^{2-}$ is _____. [ox = oxalate]

Official Ans by NTA (3)

9. If the activation energy of a reaction is 80.9 kJ mol^{-1} , the fraction of molecules at 700 K, having enough energy to react to form products is e^{-x} . The value of x is _____.

(Rounded off to the nearest integer)

[Use $R = 8.31 \text{ J K}^{-1} \text{ mol}^{-1}$]

Official Ans by NTA (14)

10. The pH of ammonium phosphate solution, if pK_a of phosphoric acid and pK_b of ammonium hydroxide are 5.23 and 4.75 respectively, is _____.

Official Ans by NTA (7)