JEE Main January 2024

Question Paper With Text Solution

27 January | Shift-2

CHEMISTRY

MATRIX

JEE Main & Advanced | XI-XII Foundation| VI-X Pre-Foundation

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1. Given below are two statements :

Statement (I) : Oxygen being the first memeber of group 16 exhibits only – 2 oxidation state.

Statement (II) : Down the group 16 stability of + 4 oxidation state decreases and + 6 oxidation state increases.

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

(1) Statement I is incorrect but Statement II is correct

(2) Both Statement I and Statement II are incorrect

(3) Both Statement I and Statement II are correct

(4) Statement I is correct but Statement II is incorrect

Question ID: 533543532

Ans. Official Answer NTA (2)

Sol.

2. The quantity which changes with temperature is :

(1) Molarity (2) Molality (3) Mole fraction (4) Mass percentage

Question ID: 533543529

Ans. Official Answer NTA (1)

Sol.

3. Which structure of protein remains intact after coagulation of egg white on boiling ?

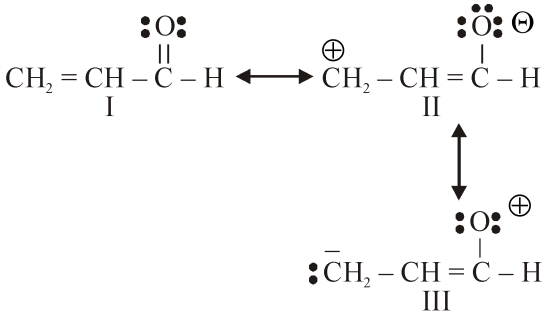
(1) Primary (2) Quaternary (3) Secondary (4) Tertiary

Question ID: 533543545

Ans. Official Answer NTA (1)

Sol.

4. The order of relative stability of the contributing structure is :



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

(1) I = II = III (2) III > II > I (3) I > II > III (4) II > I > III

Question ID: 533543537

Ans. Official Answer NTA (3)

Sol.

5. The final product A, formed in the following reaction sequence is :

$$Ph-CH=CH_2 \xrightarrow[(iii)HBr]{\substack{(i)BH_3 \\ (ii)H_2O_2,\ ^{\ominus}OH \\ (iii)HBr \\ (iv)Mg,\ ether,\ then\ HCHO/H_3O^+}} A$$

(1) $Ph-CH_2-CH_2-CH_3$

(2) $Ph-CH_2-CH_2-CH_2-OH$

(3) $Ph-\underset{\displaystyle CH_2OH}{\underset{|}{CH}}-CH_3$

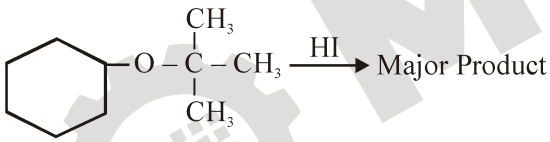
(4) $Ph-\underset{\displaystyle CH_3}{\underset{|}{CH}}-CH_3$

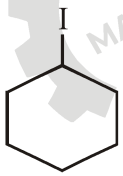
Question ID: 533543541

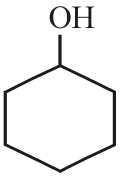
Ans. Official Answer NTA (2)

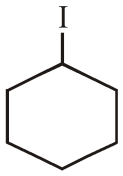
Sol.

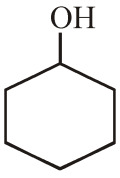
6. Major product formed in the following reaction is a mixture of :



(1)  and $(CH_3)_3Cl$

(2)  and $(CH_3)_3COH$

(3)  and $(CH_3)_3COH$

(4)  and $CH_3-\underset{\displaystyle CH_3}{\underset{|}{C}}-I$

Question ID: 533543542

Ans. Official Answer NTA (4)

Sol.

7. Identify from the following species in which d^2sp^3 hybridization is shown by central atom :

(1) SF_6 (2) BrF_5 (3) $[Pt(Cl_4)]^{2-}$ (4) $[Co(NH_3)_6]^{3+}$

Question ID: 533543528

Ans. Official Answer NTA (4)

Sol.

8. Which of the following statements is not correct about rusting of iron ?

(1) Rusting of iron is envisaged as setting up of electrochemical cell on the surface of iron object.

(2) Coating of iron surface by tin prevents rusting, even if the tin coating is peeling off.

(3) When pH lies above 9 or 10, rusting of iron does not take place.

(4) Dissolved acidis oxides SO_2, NO_2 in water act as catalyst in the process of rusting.

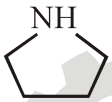
Question ID: 533543530

Ans. Official Answer NTA (2)

Sol.

9. Identify B formed in the reaction.

$$Cl-(CH_2)_4-Cl \xrightarrow{\text{excess } NH_3} A \xrightarrow{NaOH} B + H_2O + NaCl$$

(1) 

(2) $H_2N-(CH_2)_4-NH_2$

(3) 

(4) $Cl\overset{+}{N}H_3-(CH_2)_4-\overset{+}{N}H_3Cl^-$

Question ID: 533543544

Ans. Official Answer NTA (2)

Sol.

10. Which of the following cannot function as an oxidising agent ?

(1) SO_4^{2-} (2) MnO_4^- (3) N^{3-} (4) BrO_3^-

Question ID: 533543531

Ans. Official Answer NTA (3)

Sol.

11. Identity the incorrect pair from the following :

(1) Photography - AgBr

(2) Wacker process - Pt Cl_2

(3) Haber process - Iron

(4) Polythene preparation - $TiCl_4$, $Al(CH_3)_3$

Question ID: 533543533

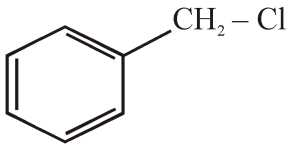
Ans. Official Answer NTA (2)

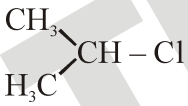
Sol.

12. Which among the following halide / s will not show S_N1 reaction :

(A) $H_2C = CH - CH_2Cl$

(B) $CH_3 - CH = CH - Cl$

(C) 

(D) 

Choose the **most appropriate** answer from the options given below :

(1) (B) and (C) only

(2) (A), (B) and (D) only

(3) (B) only

(4) (A) and (B) only

Question ID: 533543540

Ans. Official Answer NTA (3)

Sol.

13. Given below are two statments :

Statement (I) : In the Lanthanoids, the formation Ce^{+4} is favoured by its noble gas configuration.

Statement (II) : Ce^{+4} is a strong oxidant reverting to the common + 3 state.

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

(1) statement I is false but statment II is true

(2) both statement I and statment II are true

(3) statement I is true but statement II is false

(4) both statement I and statment II are false

Question ID: 533543534

Ans. Official Answer NTA (2)

Sol.

14. The molecular formula of second homologue in the homologous series of mono carboxylic acids is ..... .

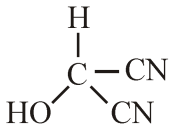
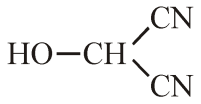
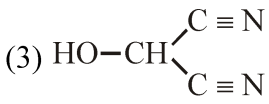
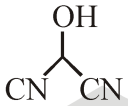
(1) $C_2H_4O_2$ (2) $C_3H_6O_2$ (3) $C_2H_2O_2$ (4) CH_2O

Question ID: 533543535

Ans. Official Answer NTA (1)

Sol.

15. Bond line formula of $HOCH(CN)_2$ is :

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

Question ID: 533543536

Ans. Official Answer NTA (4)

Sol.

16. The technique used for purification of steam volatile water immiscible substance is :

(1) fractional distillation under reduced pressure (2) fractional distillation

(3) distillation (4) steam distillation

Question ID: 533543538

Ans. Official Answer NTA (4)

Sol.

17. Choose the correct option having all the elements with d^{10} electronic configuration from the following :

(1) ^{28}Ni, ^{24}Cr, ^{26}Fe, ^{29}Cu (2) ^{27}Co, ^{28}Ni, ^{26}Fe, ^{24}Cr

(3) ^{29}Cu, ^{30}Zn, ^{48}Cd, ^{47}Ag (4) ^{46}Pd, ^{28}Ni, ^{26}Fe, ^{24}Cr

Question ID: 533543527

Ans. Official Answer NTA (3)

Sol.

18. The incorrect statment regarding conformations of ethane is :

(1) The dihedral angle in staggered conformation is 60°.

(2) Ethane has infinite number of conformations.

(3) Eclipsed conformation is the most stable conformation.

(4) The conformations of ethane are inter - convertible to one-another.

Question ID: 533543539

Ans. Official Answer NTA (3)

Sol.

19. Phenolic group can be identified by a positive :

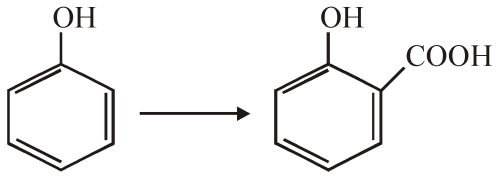
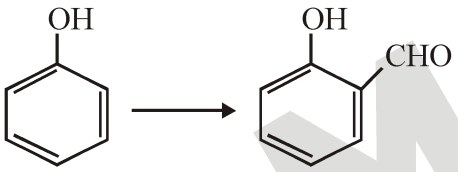
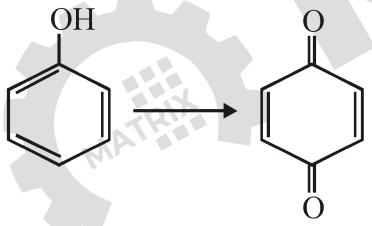
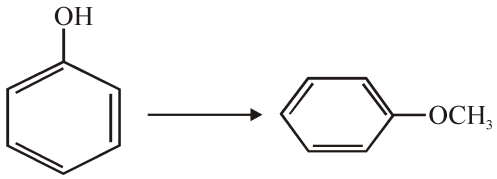
(1) Carbylamine test (2) Lucas test (3) Phthalein dye test (4) Tollen's test

Question ID: 533543546

Ans. Official Answer NTA (3)

Sol.

20. Match List - I with List - II.

List - I (Reaction)	**List-II (Reagent (s))**
(A) 	(I) $Na_2Cr_2O_7, H_2SO_4$
(B) 	(II) (i) NaOH (ii) CH_3Cl
(C) 	(III) (i) NaOH, $CHCl_3$, (ii) NaOH (iii) HCl
(D) 	(IV) (i) NaOH, (ii) CO_2, (iii) HCl

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

(1) (A)-(IV), (B)-(III), (C)-(I), (D)-(II) (2) (A)-(II), (B)-(III), (C)-(I), (D)-(IV)

(3) (A)-(II), (B)-(I), (C)-(III), (D)-(II) (4) (A)-(IV), (B)-(I), (C)-(III), (D)-(II)

Question ID: 533543543

Ans. Official Answer NTA (1)

Sol.

21. The number of non-polar molecules from the following is_____ .

$HF, H_2O, SO_2, H_2, CO_2, CH_4, NH_3, HCl, CHCl_3, BF_3$

Question ID: 533543548

Ans. Official Answer NTA (4)

Sol.

22. The hydrogen electrode is dipped in a solution of pH = 3 at 25°C. The potential of the electrode will be – _____ $\times 10^{-2}$V.

Question ID: 533543550

Ans. Official Answer NTA (18)

Sol.

23. Total number of ions from the following with noble gas configuration is _____ .

Sr^{2+}(z = 38), Cs^{+} (z = 55), La^{2+} (z = 57), Pb^{2+} (z = 82), Yb^{2+} (z = 70) and Fe^{2+} (z = 26)

Question ID: 533543552

Ans. Official Answer NTA (3)

Sol.

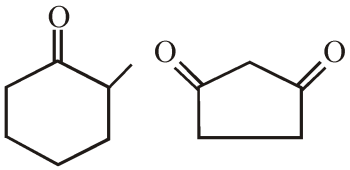
24. Volume of 3 M NaOH (formula weight 40 g mol^{-1}) which can be prepared from 84g of NaOH is _____ $\times 10^{-1}$ dm^3.

Question ID: 533543547

Ans. Official Answer NTA (7)

Sol.

25. Total number of compounds with Chiral carbon atoms from following is _____.



$CH_3 - CH_2 - CH(NO_2) - COOH$

$CH_3 - CH_2 - CHBr - CH_2 - CH_3$

$CH_3 - CH(I) - CH_2 - NO_2$

$CH_3 - CH_2 - CH(OH) - CH_2OH$

$CH_3 - \underset{\underset{I}{|}}{CH} - CH(I) - CH_2H_5$

Question ID: 533543555

Ans. Official Answer NTA (5)

Sol.

26. Time required for completion of 99.9% of a First order reaction is _____ times of half life ($t_{1/2}$) of the reaction.

Question ID: 533543551

Ans. Official Answer NTA (10)

Sol.

27. 9.3 g of aniline is subjected to reaction with excess of acetic anhydride to prepare acetanilide. The mass of acetanilide produced if the reaction is 100% completed is _____ $\times 10^{-1}$ g.

Question ID: 533543556

Ans. Official Answer NTA (135)

Sol.

28. The Spin only magnetic moment value of square planar complex $[Pt(NH_3)_2Cl(NH_2CH_3)]Cl$ is _____ B.M. (Nearest integer)
(Given atomic number for Pt = 78)

Question ID: 533543554

Ans. Official Answer NTA (0)

Sol.

29. 1 mole of PbS is oxidised by "X" moles of O_3 to get "Y" moles of O_2. X + Y = _____.

Question ID: 533543553

Ans. Official Answer NTA (8)

Sol.

30. For a certain thermochemical reaction M $\rightarrow$ N at T = 400 K, ΔH^{Θ} = 77.2 kJ mol^{-1}, ΔS = 122 JK^{-1}, log equilibrium constant (log K) is - _____ $\times 10^{-1}$.

Question ID: 533543549

Ans. Official Answer NTA (37)

Sol.