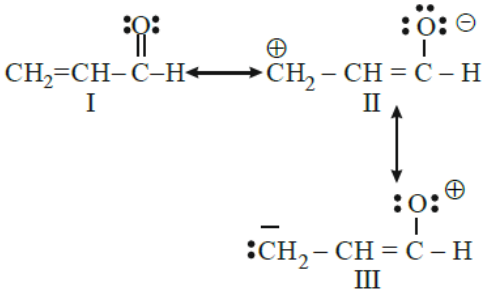
JEE-MAIN EXAM JANUARY, 2024

Date: - 27-01-2024 (SHIFT-2)

CHEMISTRY

SECTION-A

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

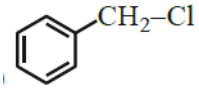
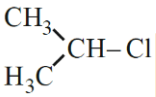


Choose the correct answer from the options given below:

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

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

(3) (B) and (C) only (4) (B) only

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

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

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

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

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

4. Given below are two statements :

Statement (I) : In the Lanthanoids, the formation of 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 Statement II is true

(2) Both Statement I and Statement II are true

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

(4) Both Statement I and Statement II are false

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

(1) ^{27}Co, ^{28}Ni, ^{26}Fe, ^{24}Cr (2) ^{29}Cu, ^{30}Zn, ^{48}Cd, ^{47}Ag

(3) ^{46}Pd, ^{28}Ni, ^{26}Fe, ^{24}Cr (4) ^{28}Ni, $^{24}_{2}Cr$, ^{26}Fe, ^{29}Cu

6. Phenolic group can be identified by a positive:

(1) Phthalein dye test (2) Lucas test

(3) Tollen's test (4) Carbylamine test

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

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

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

(1) Fractional distillation

(2) Fractional distillation under reduced pressure

(3) Distillation

(4) Steam distillation

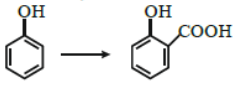
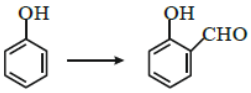
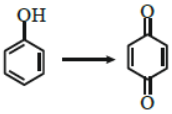
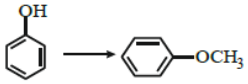
9. The final product A, formed in the following reaction sequence is:

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

(1) $Ph-CH_2-CH_2-CH_3$ (2) $Ph-\underset{\displaystyle CH_3}{\overset{\displaystyle |}{CH}}-CH_3$

(3) $Ph-\underset{\displaystyle CH_2OH}{\overset{\displaystyle |}{CH}}-CH_3$ (4) $Ph-CH_2-CH_2-CH_2-OH$

10. Match List-I with List-II.

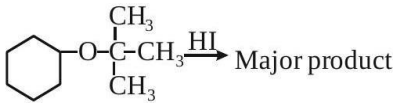
List – I (Reaction)	**List – II (Reagent(s))**
(A) 	(I) $Na_2Cr_2O_7$, H_2SO_4
(B) 	(II) (i) NaOH (ii) CH_3Cl
(C) 	(III) (i) NaOH, $CHCl_3$ (ii) NaOH (iii) HCl
(D) 	(IV) (i) NaOH (ii) CO_2 (iii) HCl

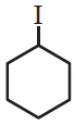
Choose the correct answer from the options given below:

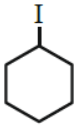
(1) (A)-(IV), (B)-(I), (C)-(III), (D)-(II) (2) (A)-(II), (B)-(III), (C)-(I), (D)-(IV)

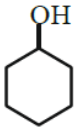
(3) (A)-(II), (B)-(I), (C)-(III), (D)-(IV) (4) (A)-(IV), (B)-(III), (C)-(I), (D)-(II)

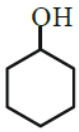
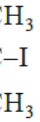
11. Major product formed in the following reaction is a mixture of:



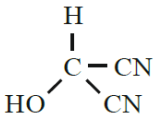
(1)  and $(CH_3)_3CI$

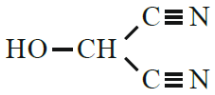
(2)  and $(CH_3)_3COH$

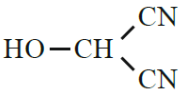
(3)  and $(CH_3)_3COH$

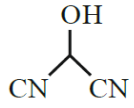
(4)  and 

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

(1) 

(2) 

(3) 

(4) 

13. Given below are two statements:

Statement (I) : Oxygen being the first member 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 above statements, choose the most appropriate answer from the options given below:

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

(2) Both Statement I and Statement II are correct

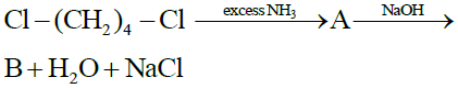
(3) Both Statement I and Statement II are incorrect

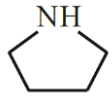
(4) Statement I is incorrect but Statement II is correct

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

(1) $[Co(NH_3)_6]^{3+}$ (2) BrF_5 (3) $[Pt(Cl)_4]^{2-}$ (4) SF_6

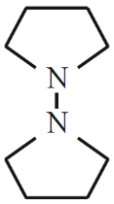
15. Identify B formed in the reaction.



(1) 

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

(3) $ClNH_3-(CH_2)_4-NH_3Cl^-$

(4) 

16. The quantity which changes with temperature is :

(1) Molarity (2) Mass percentage

(3) Molality (4) Mole fraction

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

(1) Primary (2) Tertiary

(3) Secondary (4) Quaternary

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

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

19. The incorrect statement regarding conformations of ethane is:

(1) Ethane has infinite number of conformations

(2) The dihedral angle in staggered conformation is 60°

(3) Eclipsed conformation is the most stable conformation.

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

20. Identity the incorrect pair from the following:

(1) Photography - $AgBr$

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

(3) Haber process - Iron

(4) Wacker process $-PtCl_2$

SECTION-B

21. 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 $Fe^{2+}(Z = 26)$

22. The number of non-polar molecules from the following is

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

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

24. 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 $Pt = 78$)

25. For a certain thermochemical reaction $M \rightarrow N$ at $T = 400\ K, \Delta H^\ominus = 77.2\ kJ\ mol^{-1}, \Delta S = 122 JK^{-1}$, log equilibrium constant $(\log K)$ is $\times 10^{-1}$.

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

27. 1 mole of PbS is oxidised by " X " moles of O_3 to get " Y " moles of O_2. $X + Y =$

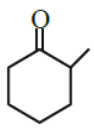
28. The hydrogen electrode is dipped in a solution of $pH = 3$ at $25^{\circ}C$. The potential of the electrode will be _____$\times 10^{-2}$ V.

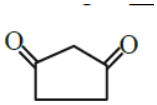
$\left(\frac{2.303RT}{F} = 0.059 \text{ V}\right)$

29. 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.

(Given molar mass in $gmol^{-1}$ $N: 14, O: 16, C: 12, H: 1$)

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





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

$CH_3 - CH_2 - CHBr - CH_2 - CH_3$

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

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

$CH_3 - \underset{|}{CH} - CH(I) - C_2H_5$

NTA ANSWERS

1.	**(1)**	**2.**	**(4)**	**3.**	**(1)**	**4.**	**(2)**	**5.**	**(2)**	**6.**	**(1)**	**7.**	**(2)**
8.	**(4)**	**9.**	**(4)**	**10.**	**(4)**	**11.**	**(4)**	**12.**	**(4)**	**13.**	**(3)**	**14.**	**(1)**
15.	**(2)**	**16.**	**(1)**	**17.**	**(1)**	**18.**	**(1)**	**19.**	**(3)**	**20.**	**(4)**	**21.**	**(2)**
22.	**(4)**	**23.**	**(10)**	**24.**	**(0)**	**25.**	**(37)**	**26.**	**(7)**	**27.**	**(8)**	**28.**	**(18)**
29.	**(135)**	**30.**	**(5)**										