JEE-MAIN EXAM APRIL, 2024

Date: - 08-04-2024 (SHIFT-2)

CHEMISTRY

SECTION-A

1. In qualitative test for identification of presence of phosphorous, the compound is heated with an oxidising agent. Which is further treated with nitric acid and ammonium molybdate respectively. The yellow coloured precipitate obtained is :

(1) $Na_3PO_4 \cdot 12MoO_3$ (2) $(NH_4)_3PO_4 \cdot 12(NH_4)_2MoO_4$

(3) $(NH_4)_3PO_4 \cdot 12MoO_3$ (4) $MoPO_4.21NH_4NO_3$

2. For a reaction $A \xrightarrow{K_1} B \xrightarrow{K_2} C$

If the rate of formation of B is set to be zero then the concentration of B is given by :

(1) $K_1\ K_2[\ A]$ (2) $(K_1 - K_2)[A]$ (3) $(K_1 + K_2)[A]$ (4) $(K_1/K_2)[A]$

3. When ψ_A and Ψ_B are the wave functions of atomic orbitals, then σ^* is represented by :

(1) $\psi_A - 2\psi_B$ (2) $\psi_A - \psi_B$ (3) $\psi_A + 2\psi_B$ (4) $\psi_A + \psi_B$

4. Which one the following compounds will readily react with dilute $NaOH$?

(1) $C_6H_5CH_2OH$ (2) C_2H_5OH (3) $(CH_3)_3COH$ (4) C_6H_5OH

5. The shape of carbocation is :

(1) trigonal planar (2) diagonal pyramidal

(3) tetrahedral (4) diagonal

6. Given below are two statements :

Statement (I) : S_N2 reactions are 'stereospecific', indicating that they result in the formation only one stereo-isomers as the product.

Statement (II) : S_N1 reactions generally result in formation of product as racemic mixtures. In the light of the above statements, choose the correct answer from the options given below :

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

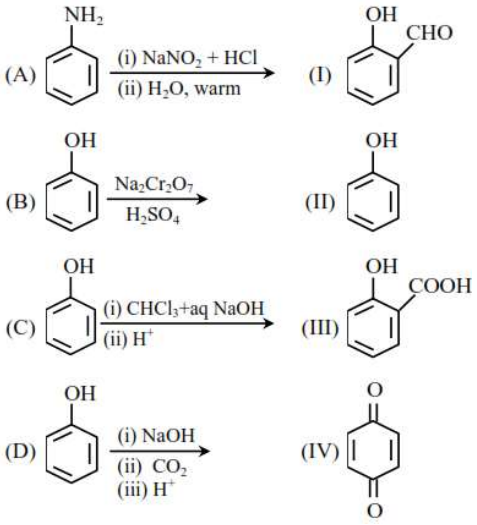
(2) Statement I is false but Statement II is true

(3) Both Statement I and Statement II is true

(4) Both Statement I and Statement II is false

7. Match List-I with List-II

List-I (Reactions) **List-II (Products)**



Choose the correct answer from the options given below :

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

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

8. Match List-I with List-II.

List-I (Test)	**List-II (Identification)**
(A) Bayer's test	(I) Phenol
(B) Ceric ammonium nitrate test	(II) Aldehyde
(C) Phthalein dye test	(III) Alcoholic-OH group
(D) Schiff's test	(iv) Unsaturation

Choose the correct answer from the options given below :

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

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

9. Identify the incorrect statements about group 15 elements :

(A) Dinitrogen is a diatomic gas which acts like an inert gas at room temperature.

(B) The common oxidation states of these elements are $-3, +3$ and +5 .

(C) Nitrogen has unique ability to form $p\pi - p\pi$ multiple bonds.

(D) The stability of +5 oxidation states increases down the group.

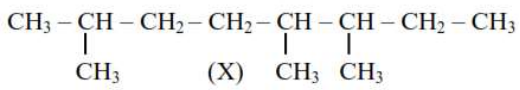
(E) Nitrogen shows a maximum covalency of 6.

Choose the correct answer from the options given below.

(1) (A), (B), (D) only (2) (A), (C), (E) only

(3) (B), (D), (E) only (4) (D) and (E) only

10. IUPAC name of following hydrocarbon (X) is :



(1) 2-Ethyl-3,6-dimethylheptane (2) 2-Ethyl-2,6-diethylheptane

(3) 2,5,6-Trimethyloctane (4) 3,4,7-Trimethyloctane

11. The equilibrium $Cr_2O_7^{2-} \rightleftharpoons 2CrO_4^{2-}$ is shifted to the right in :

(1) an acidic medium (2) a basic medium

(3) a weakly acidic medium (4) a neutral medium

12. Given below are two statements :

Statement (I) : A Buffer solution is the mixture of a salt and an acid or a base mixed in any particular quantities.

Statement (II) : Blood is naturally occurring buffer solution whose pH is maintained by $H_2CO_3/HCO_3^{\ominus}$ concentrations.

In the light of the above statements, choose the correct answer from the options given below.

(1) Statement I is false but Statement II is true (2) Both Statement I and Statement II is true

(3) Both Statement I and Statement II is false (4) Statement I is true but Statement II is false

13. The correct sequence of acidic strength of the following aliphatic acids in their decreasing order is :

$CH_3CH_2COOH, CH_3COOH, CH_3CH_2CH_2COOH, HCOOH$

(1) $HCOOH > CH_3COOH > CH_3CH_2COOH > CH_3CH_2CH_2COOH$

(2) $HCOOH > CH_3CH_2CH_2COOH > CH_3CH_2COOH > CH_3COOH$

(3) $CH_3CH_2CH_2COOH > CH_3CH_2COOH > CH_3COOH > HCOOH$

(4) $CH_3COOH > CH_3CH_2COOH > CH_3CH_2CH_2COOH > HCOOH$

14. Given below are two statements :

Statement (I) : All the following compounds react with p-toluenesulfonyl chloride.

$C_6H_5NH_2$ $(C_6H_5)_2NH$ $(C_6H_5)_3N$

Statement (II) : Their products in the above reaction are soluble in aqueous NaOH.

In the light of the above statements, choose the correct answer from the options given below.

(1) Both Statement I and Statement II is false

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

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

(4) Both Statement I and Statement II is true

15. The emf of cell $Tl\left|\underset{(0.001M)}{Tl^+}\right|\left|\underset{(0.01\ m)}{Cu^{2+}}\right|Cu$ is 0.83 V at 298 K. It could be increased by :

(1) increasing concentration of Tl^+ions

(2) increasing concentration of both $Tl^+$and Cu^{2+} ions

(3) decreasing concentration of both $Tl^+$and Cu^{2+} ions

(4) increasing concentration of Cu^{2+} ions

16. Identify the correct statements about p-block elements and their compounds.

(A) Non metals have higher electronegativity than metals.

(B) Non metals have lower ionisation enthalpy than metals.

(C) Compounds formed between highly reactive nonmetals and highly reactive metals are generally ionic.

(D) The non-metal oxides are generally basic in nature.

(E) The metal oxides are generally acidic or neutral in nature.

(1) (D) and (E) only (2) (A) and (C) only

(3) (B) and (E) only (4) (B) and (D) only

17. Given below are two statements :

Statement (I) : Kjeldahl method is applicable to estimate nitrogen in pyridine.

Statement (II) : The nitrogen present in pyridine can easily be converted into ammonium sulphate in Kjeldahl method.

In the light of the above statements, choose the correct answer from the options given below.

(1) Both Statement I and Statement II is false

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

(3) Both Statement I and Statement II is true

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

18. The reaction;

$$\frac{1}{2}H_{2(g)} + AgCl_{(s)} \rightarrow H^{+}_{(aq)} + Cl^{-}_{(aq)} + Ag_{(s)}$$

occurs in which of the following galvanic cell :

(1) $Pt|H_{2(g)}|HCl_{(soln.)}|AgCl_{(s)}|Ag$

(2) $Pt|H_{2(g)}|HCl_{(soln.)}|AgNO_{3(aq)}|Ag$

(3) $Pt|H_{2(g)}|KCl_{(soln.)}|AgCl_{(s)}|Ag$

(4) $Ag|AgCl_{(s)}|KCl_{(soln.)}|AgNO_{3\,(aq.)}|Ag$

19. Given below are two statements :

Statement (I) : Fusion of MnO_2 with KOH and an oxidising agent gives dark green K_2MnO_4.

Statement (II) : Manganate ion on electrolytic oxidation in alkaline medium gives permanganate ion.

In the light of the above statements, choose the correct answer from the options given below.

(1) Both Statement I and Statement II is true

(2) Both Statement I and Statement II is false

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

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

20. Match List-I with List-II.

List-I (Complex ion)	**List-li** (Spin only magnetic moment in B.M.)
(A) $[Cr(NH_3)_6]^{3+}$	(I) 4.90
(B) $[NiCl_4]^{2-}$	(II) 3.87
(C) $[CoF_6]^{3-}$	(III) 0.0
(D) $[Ni(CN)_4]^{2-}$	(IV) 2.83

Choose the correct answer from the options given below :

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

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

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

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

SECTION-B

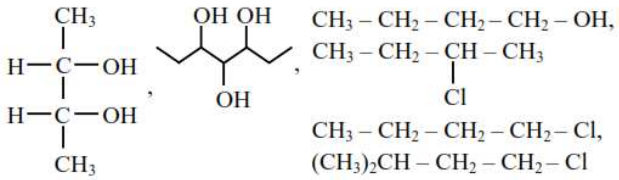
21. $\Delta_{vap}\ H^{\ominus}$ for water is $+40.49\ kJ\ mol^{-1}$ at 1 bar and $100°C$. Change in internal energy for this vapourisation under same condition is_____kJ mol^{-1}. (Integer answer)

(Given $R = 8.3JK^{-1}\ mol^{-1}$)

22. Number of molecules having bond order 2 from the following molecule is _____.

$C_2, O_2, Be_2, Li_2, Ne_2,\ N_2, He_2$

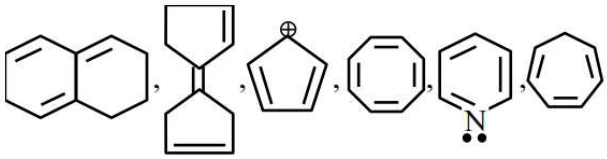
23. Total number of optically active compounds from the following is_____



24. The total number of carbon atoms present in tyrosine, an amino acid, is_____

25. Two moles of benzaldehyde and one mole of acetone under alkaline conditions using aqueous $NaOH$ after heating gives x as the major product. The number of π bonds in the product x is

26. Total number of aromatic compounds among the following compounds is_____.



27. Molality of an aqueous solution of urea is $4.44\ m$. Mole fraction of urea in solution is $x \times 10^{-3}$. Value of x is _____(integer answer)

28. Total number of unpaired electrons in the complex ion $[Co(NH_3)_6]^{3+}$ and $[NiCl_4]^{2-}$ is

29. Wavenumber for a radiation having 5800Å wavelength is $x \times 10\ \text{cm}^{-1}$. The value of x is _____.

30. A solution is prepared by adding 1 mole ethyl alcohol in 9 mole water. The mass percent of solute in the solution is _____ (Integer Answer) (Given : Molar mass in gmol^{-1} Ethyl alcohol : 46, water : 18)

NTA ANSWERS

1.	**(3)**	**2.**	**(4)**	**3.**	**(2)**	**4.**	**(4)**	**5.**	**(1)**	**6.**	**(3)**	**7.**	**(4)**
8.	**(4)**	**9.**	**(4)**	**10.**	**(3)**	**11.**	**(2)**	**12.**	**(1)**	**13.**	**(1)**	**14.**	**(1)**
15.	**(4)**	**16.**	**(2)**	**17.**	**(1)**	**18.**	**(3)**	**19.**	**(1)**	**20.**	**(3)**	**21.**	**(38)**
22.	**(2)**	**23.**	**(1)**	**24.**	**(9)**	**25.**	**(9)**	**26.**	**(1)**	**27.**	**(74)**	**28.**	**(2)**
29.	**(1724)**	**30.**	**(22)**										