JEE-MAIN EXAM JANUARY, 2025

Date: - 22-01-2025 (SHIFT-2)

CHEMISTRY

SECTION-A

1. Given below are two statements :

Statement (I) : Nitrogen, sulphur, halogen and phosphorus present in an organic compound are detected by Lassaigne's Test.

Statement (II): The elements present in the compound are converted from covalent form into ionic form by fusing the compound with Magnesium in Lassaigne's test.

- In the light of the above statements, choose the correct answer from the options given below :
- (1) Both Statement I and Statement II are true (2) Both Statement I and Statement II are false
- (3) Statement I is true but Statement II is false (4) Statement I is false but Statement II is true
- 2. Identify the number of structure/s from the following which can be correlated to D-glyceraldehyde.



3. Arrange the following compounds in increasing order of their dipole moment : HBr, H₂ S, NF₃ and CHCl₃

(1)
$$CHCl_3 < NF_3 < HBr < H_2 S$$

(1) Three

(2) $NF_3 < HBr < H_2 S < CHCl_3$

- (3) $H_2 S < HBr < NF_3 < CHCl_3$
- $(4) \operatorname{HBr} < \operatorname{H}_2 \mathbf{S} < \operatorname{NF}_3 < \operatorname{CHCl}_3$
- 4. Consider the given figure and choose the correct option :



(1) Activation energy of forward reaction is $E_1 + E_2$ and product is less stable than reactant.

(2) Activation energy of both forward and backward reaction is $E_1 + E_2$ and reactant is more stable than product.

- (3) Activation energy of forward reaction is $E_1 + E_2$ and product is more stable than reactant.
- (4) Activation energy of backward reaction is E_1 and product is more stable than reactant.



- 5. Identify the homoleptic complex(es) that is/are low spin.
 - (A) $\left[\text{Fe}(\text{CN})_5 \text{NO} \right]^{2-}$
 - (B) $[CoF_6]^{3-}$
 - (C) $\left[\text{Fe}(\text{CN})_6 \right]^{4-}$
 - (D) $\left[\text{Co} \left(\text{NH}_3 \right)_6 \right]^{3+}$
 - (E) $\left[Cr(H_2O)_6 \right]^{2+}$

Choose the correct answer from the options given below :

- (1) (A) and (C) only (2) (C) only (3) (B) and (E) only (4) (C) and (D) only
- 6. The molar solubility(s) of zirconium phosphate with molecular formula $(Zr^{4+})_3(PO_4^{3-})_4$ is given by relation :

$$(1)\left(\frac{K_{sp}}{8435}\right)^{\frac{1}{7}} \qquad (2)\left(\frac{K_{sp}}{5348}\right)^{\frac{1}{6}} \qquad (3)\left(\frac{K_{sp}}{9612}\right)^{\frac{1}{3}} \qquad (4)\left(\frac{K_{sp}}{6912}\right)^{\frac{1}{7}}$$

7. Given below are two statements :

Statement (I) : A spectral line will be observed for a $2p_x \rightarrow 2p_y$ transition.

Statement (II) : $2p_x$ and $2p_y$ are degenerate orbitals.

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) Both Statement I and Statement II are true
- (3) Both Statement I and Statement II are false
- (4) Statement I is false but Statement II is true
- 8. Density of 3 M NaCl solution is 1.25 g/mL. The molality of the solution is :

(1) 1.79 m	(2) 3 m	(3) 2.79 m	(4) 2 m
			• •

- **9.** The maximum covalency of a non-metallic group 15 element 'E' with weakest E E bond is :
 - (1) 3 (2) 6 (3) 5 (4) 4
- **10.** Given below are two statements :

Statement (I): Corrosion is an electrochemical phenomenon in which pure metal acts as an anode and impure metal as a cathode.

Statement (II) : The rate of corrosion is more in alkaline medium than in acidic medium.

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

- (1) Both Statement I and Statement II are 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 are true



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11. Match List - I with List - II.

L	ist -	II	(Thermodynamic	Quantity)
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$(A) \left(\frac{\partial G}{\partial T} \right)_{P}$	(I) Cp
$(B)\left(\frac{\partial \mathrm{H}}{\partial \mathrm{T}}\right)_{\mathrm{P}}$	(II) -S
$(\mathbf{C}) \left(\frac{\partial G}{\partial P}\right)_T$	(III) Cv
$(D)\left(\frac{\partial U}{\partial T}\right)_{V}$	(IV) V

Choose the correct answer from the options given below :

(1) (A)-(II), (B)-(III), (C)-(I),	(D)-(IV)	(2) (A)-(II), (B)-(I), (C)-(III), (D)-(IV)
(3) (A)-(II), (B)-(I), (C)-(IV),	(D)-(III)	(4) (A)-(I), (B)-(II), (C)-(IV), (D)-(III)

12. Match the Compounds (List - I) with the appropriate Catalyst/Reagents (List - II) for their reduction into

corresponding amines.

List – I (Compounds)	List – II (Catalyst/Re <mark>agents)</mark>		
$(A) R - C - NH_2$	(I) NaOH (aqueous)		
(B) O NO ₂	(II) H ₂ / Ni		
(C) $R - C \equiv N$	(III) LiAlH ₄ ,H ₂ O		
$(D) \underbrace{\bigcap_{O}}_{O}^{O} N-R$	(IV) Sn,HCl		
Choose the correct answer from the options giv	en below :		

(1) (A)-(III), (B)-(IV), (C)-(II), (D)-(I)	(2) (A)-(II), (B)-(IV), (C)-(III), (D)-(I)
(3) (A)-(III), (B)-(II), (C)-(IV), (D)-(I)	(4) (A)-(II), (B)-(I), (C)-(III), (D)-(IV)

13. The alkane from below having two secondary hydrogens is :

(1) 2,2,4,5-Tetramethylheptane	(2) 4-Ethyl-3,4-dimethyloctane
(3) 2,2,3,3-Tetramethylpentane	(4) 2,2,4,4-Tetramethylhexane

- (3) 2,2,3,3-Tetramethylpentane
- OFFICE ADDRESS : Plot number 35, Gopalpura Bypass Rd, near Riddhi Siddhi Circle, 10 B Competishun Scheme, Triveni Nagar, Gopal Pura Mode, Jaipur, Rajasthan 302020 Мов. 7410900901, 7410900906, 7410900907, 7410900908 The Power of Real Gurus 3 www.competishun.com

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16. The correct order of the following complexes in terms of their crystal field stabilization energies is :

$$(1) \left[\operatorname{Co}(\mathrm{NH}_{3})_{4} \right]^{2+} < \left[\operatorname{Co}(\mathrm{NH}_{3})_{6} \right]^{2+} < \left[\operatorname{Co}(\mathrm{en})_{3} \right]^{3+} < \left[\operatorname{Co}(\mathrm{NH}_{3})_{6} \right]^{3+} \\ (2) \left[\operatorname{Co}(\mathrm{NH}_{3})_{6} \right]^{2+} < \left[\operatorname{Co}(\mathrm{NH}_{3})_{6} \right]^{3+} < \left[\operatorname{Co}(\mathrm{NH}_{3})_{4} \right]^{2+} < \left[\operatorname{Co}(\mathrm{en})_{3} \right]^{3+} \\ (3) \left[\operatorname{Co}(\mathrm{en})_{3} \right]^{3+} < \left[\operatorname{Co}(\mathrm{NH}_{3})_{6} \right]^{3+} < \left[\operatorname{Co}(\mathrm{NH}_{3})_{6} \right]^{2+} < \left[\operatorname{Co}(\mathrm{NH}_{3})_{4} \right]^{2+} \\ (4) \left[\operatorname{Co}(\mathrm{NH}_{3})_{4} \right]^{2+} < \left[\operatorname{Co}(\mathrm{NH}_{3})_{6} \right]^{2+} < \left[\operatorname{Co}(\mathrm{NH}_{3})_{6} \right]^{3+} < \left[\operatorname{Co}(\mathrm{en})_{3} \right]^{3+} \\ \end{array}$$

17. Given below are two statements :

Statement (I) : An element in the extreme left of the periodic table forms acidic oxides.

Statement (II): Acid is formed during the reaction between water and oxide of a reactive element present in the extreme right of the periodic table.

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



18. When sec-butyl cyclohexane reacts with bromine in the presence of sunlight, the major product is :



 The maximum number of RBr producing 2-methylbutane by above sequence of reactions is _________

 (Consider the structural isomers only)
 (1) 5
 (2) 3
 (3) 1
 (4) 4

- **20.** The species which does not undergo disproportionation reaction is :
 - (1) ClO_3^- (2) ClO_4^- (3) ClO^- (4) ClO_2^-

SECTION-B

21. Consider the following cases of standard enthalpy of reaction $(\Delta H_r^{\circ} \text{ in } kJmol^{-1})$

$$C_2H_6(g) + \frac{7}{2}O_2(g) \rightarrow 2CO_2(g) + 3H_2O(l)\Delta H_1^\circ = -1550$$

C(graphite) + $O_2(g) \rightarrow CO_2(g) \quad \Delta H_2^\circ = -393.5$

$$H_2(g) + \frac{1}{2}O_2(g) \to H_2O(l) \quad \Delta H_3^\circ = -286$$

The magnitude of $\Delta H^{\circ}_{\mathcal{J}_{C_2}H_6(g)}$ is ______ kJmol⁻¹ (Nearest integer).

- 22. The compound with molecular formula C_6H_6 , which gives only one monobromo derivative and takes up four moles of hydrogen per mole for complete hydrogenation has _____ π electrons.
- **23.** Niobium (Nb) and ruthenium (Ru) have "x" and "y" number of electrons in their respective 4 d orbitals. The value of x + y is _____ -
- 24. The complex of Ni^{2+} ion and dimethyl glyoxime contains _____ number of Hydrogen (H) atoms.
- 25. 20 mL of 2 M NaOH solution is added to 400 mL of 0.5 M NaOH solution. The final concentration of the solution is $___ \times 10^{-2}$ M . (Nearest integer)

NTA ANSWERS													
1.	(3)	2.	(1)	3.	(2)	4.	(1)	5.	(4)	6.	(4)	7.	(4)
8.	(3)	9.	(4)	10.	(2)	11.	(3)	12.	(1)	13.	(3)	14.	(3)
15.	(1)	16.	(4)	17.	(4)	18.	(4)	19.	(4)	20.	(2)	21.	95
22.	8	23.	11	24.	14	25.	57						

