CHEMISTRY

JEE-MAIN EXAM APRIL, 2025

Date: - 03-04-2025 (SHIFT-2)

CHEMISTRY

SECTION-A

1. The standard cell potential (E_{cell}^{\odot}) of a fuel cell based on the oxidation of methanol in air that has been used to power television relay station is measured as 1.21 V. The standard half cell reduction potential for $O_2(E_{O_2/H_2O}^{\circ})$ is 1.229 V.

Choose the correct statement:

- (1) Oxygen is formed at the anode.
- (2) The standard half cell reduction potential for the reduction of $CO_2(E_{CO_2/CH,OH}^{\circ})$ is 19 mV
- (3) Reduction of methanol takes place at the cathode.
- (4) Reactants are fed at one go to each electrode.
- **2.** 40 mL of a mixture of CH₃COOH and HCI (aqueous solution) is titrated against 0.1 M NaOH solution conductometrically. Which of the following statement is correct?



- (1) CH₃COOH is neutralised first followed by neutralisation of HCI
- (2) The concentration of CH_3COOH in the original mixture is 0.005 M
- (3) Point 'C' indicates the complete neutralization of HCI
- (4) The concentration of HCl in the original mixture is 0.005 M
- 3. Identify the diamagnetic octahedral complex ions from below ;

A.
$$\left[Mn(CN)_{6}\right]^{3-}$$
 B. $\left[Co\left(NH_{3}\right)_{6}\right]^{3+}$ C. $\left[Fe(CN)_{6}\right]^{4-}$

$$\mathsf{D}.\left[\mathsf{Co}(\mathsf{H}_2\mathsf{O})_3\mathsf{F}_3\right]$$

(4) B and D Only

Choose the correct answer from the options given below:

- (1) A and D Only (2) A and C Only (3) B and C Only
- 4. Given below are two statements:

Statement I : CrO_3 is a stronger oxidizing agent than MoO_3

Statement II : Cr(VI) is more stable than Mo(VI)

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



CHEMISTRY

7.

5. For electrons in '2s' and '2p' orbitals, the orbital angular momentum values, respectively are :

(1)
$$\frac{h}{2\pi}$$
 and $\sqrt{2}\frac{h}{2\pi}$ (2) $\sqrt{2}\frac{h}{2\pi}$ and 0 (3) 0 and $\sqrt{2}\frac{h}{2\pi}$ (4) 0 and $\sqrt{6}\frac{h}{2\pi}$

- 6. 10 mL of 2 M NaOH solution is added to 20 mL of 1 M HCl solution kept in a beaker. Now, 10 mL of this mixture is poured into a volumetric flask of 100 mL containing 2 moles of HCl and made the volume upto the mark with distilled water. The solution in this flask is :
 - (1) Neutral solution (2) 10 M HCl solution (3) 20 M HCl solution (4) 0.2 M NaCl solution In the following series of reactions identify the major products A & B respectively



8. The sequence from the following that would result in giving predominantly 3,4,5 Tribromoaniline is :



 Mass of magnesium required to produce 220 mL of hydrogen gas at STP on reaction with excess of dil. HCl is

Given: Molar mass of Mg is 24 g mol^{-1} .

(1) 2.444 g (2) 0.24 mg (3) 236 mg (4) 235.7 g

10. Given below are two statements:

Statement I: When a system containing ice in equilibrium with water (liquid) is heated, heat is absorbed by the system and there is no change in the temperature of the system until whole ice gets melted.

Statement II: At melting point of ice, there is absorption of heat in order to overcome intermolecular forces of attraction within the molecules of water in ice and kinetic energy of molecules is not increased at melting point.

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



CHEMI	STRY			03-04-2025 (EVENING SESSION)						
11.	Fat soluble vitamins are	:								
	A. Vitamin B_1	B. Vitamin C	C. Vitamin E	D. Vitamin B_{12}						
	E. Vitamin K									
	Choose the correct answer from the options given below:									
	(1) A & B Only	(2) B & C Only	(3) C & D Only	(4) C & E Only						
12.	The correct orders among the following are									
	Atomic radius : $B < Al < Ga < In < Tl$									
	Electronegativity: $Al <$	Ga < In < Tl < B								
	Density: $Tl < In < Ga$	< Al < B								
	1st Ionisation Energy :	In < Al < Ga < Tl < B								
	Choose the correct ans	wer from the options giv	en below:							
	(1) A and C Only	(2) C and D Only	(3) A and B Only	(4) B and D Only						
13.	Given below are two sta	atements:								
	Statement I : Wet cotto	n clothes made of cellul	ose based carbohydrate	takes comparatively longer						
	time to get dried than wet nylon polymer based clothes. Statement II : Intermolecular hydrogen bonding with water molecule is more in nylon-based clothes									
	than in the case of cotton clothes.									
	In the light of above stat	tements, choose the cor	rect answer from the opt	ions given below						
	(1) Both Statement I and Statement II are false (2) Statement I is true but Statement II is false									
	(3) Both Statement I and	d Statement II are true	(4) Statement I is false	but Statement II is true						
14.	Consider the following s	statements related to ten	nperature dependence o	rate constants.						
	A The Arrhopius equation	ements.		is reaction						
	B. The unit of A is same	as that of k in Arrheniu	s equation							
	C. At a given temperature, a low activation energy means a fast reaction.									
	E. When $Ea >> RT, A$ and Ea become interdependent.									
	Choose the correct ans	wer from the options giv	' en below:							
	(1) B and C Only (2) B, D and E Only (3) A and B Only (4) A. C and D Only									
15.	analysis are :									
	A. $Na_2Cr_2O_7$			·						
	B. Oxalic acid									
	C. NaOH									
	D. $FeSO_4 \cdot 6H_2O$									
	E. Sodium tetraborate									
	Choose the most appropriate answer from the options given below: (1) B and D Only (2) C, D and E Only (3) A, C and D Only (4) D and E Only									
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17.

16. Match the LIST-I with LIST-II

	List-I	List-II				
	(Family)		(Symbol of Element)			
Α.	Pnictogen (group 15)	Ι.	Ts			
В.	Chalcogen	II.	Og			
C.	Halogen	III.	Lv			
D.	Noble gas	IV.	Мс			

Choose the correct answer from the options given below:

(1) A-IV, B-III, C-I, D-II (2) A-II, B-III, C-IV, D-I (3) A-IV, B-I, C-II, D-III (4) A-III, B-I, C-IV, D-II What is the correct IUPAC name of



- (1) 3-Bromo-2-hydroxy-5-nitrobenzoic acid
- (3) 5-Nitro-3-bromo-2-hydroxybenzoic acid
- (2) 2-Hydroxy-3-bromo-5-nitrobenzoic acid
- (4) 3-Bromo-4-hydroxy-1-nitrobenzoic acid
- **18.** Given below are two statements:

Statement I : Hyperconjugation is not a permanent effect.

Statement II : In general, greater the number of alkyl groups attached to a positively charged Cation, greater is the hyperconjugation interaction and stabilization of the cation.

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 false but Statement II is true
- (3) Statement I is true but Statement II is false (4) Both Statement I and Statement II are true
- **19.** The major product (P) in the following reaction is :

$$Ph - C - C - H \xrightarrow{KOH} P$$

$$Major product$$

$$(1) Ph - CH - COO^{-}K^{+}$$

$$OH$$

$$OH$$

$$(2) Ph - C - CH_{2}OH$$

$$(3) Ph - CH - CH_{2}OH$$

$$(4) Ph - C - COO^{-}K^{+}$$

$$(4) Ph - C - COO^{-}K^{+}$$

20. In Dumas' method for estimation of nitrogen 0.4 g of an organic compound gave 60 mL of nitrogen collected at 300 K temperature and 715 mm Hg pressure. The percentage composition of nitrogen in the compound is

(Given : Aqueous tension at 300 K = 15 mmHg)

(1) 17.46%(2) 7.85%(3) 20.95%(4) 15.71%

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SECTION-B

21. The total number of structural isomers possible for the substituted benzene derivatives with the molecular formula C_9H_{12} is _____.



A perfect gas (0.1 mol) having $\overline{C}_{\nu} = 1.50R$ (independent of temperature) undergoes the above transformation from point 1 to point 4. If each step is reversible, the total work done (w) while going from point 1 to point 4 is (-) _____ J (nearest integer)

[Given: $R = 0.082 Latm K^{-1} mol^{-1}$]

- 23. Among, Sc, Mn, Co and Cu, identify the element with highest enthalpy of atomisation. The spin only magnetic moment value of that element in its +2 oxidation state is _____ BM (in nearest integer).
- 24. A sample of *n*-octane (1.14g) was completely burnt in excess of oxygen in a bomb calorimeter, whose heat capacity is $5kJK^{-1}$. As a result of combustion reaction, the temperature of the calorimeter is increased by 5 K. The magnitude of the heat of combustion of octane at constant volume is ______ $kJmol^{-1}$ (nearest integer).
- **25.** X g of nitrobenzene on nitration gave 4.2 g of m -dinitrobenzene. $X = ____g$. (nearest integer) [Given : molar mass (in gmol⁻¹) C:12, H:1, O:16, N:14]

NTA ANSWERS													
1.	(2)	2.	(4)	3.	(3)	4.	(2)	5.	(3)	6.	(3)	7.	(2)
8.	(4)	9.	(3)	10.	(4)	11.	(4)	12.	(4)	13.	(2)	14.	(1)
15.	(3)	16.	(1)	17.	(1)	18.	(2)	19.	(1)	20.	(4)	21.	(8)
22.	(304)	23.	(4)	24.	(2500)	25.	(3)						

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