

केंद्रीय विद्यालय संगठन, अहमदाबाद संभाग

KENDRIYA VIDYALAYA SANGATHAN, AHMEDABAD REGION

प्री-बोर्ड परीक्षा: 2024-25

PRE-BOARD EXAMINATION: 2024-25

SUBJECT : CHEMISTRY (043)

CLASS : XII

TIME : 3 HOURS

MM : 70

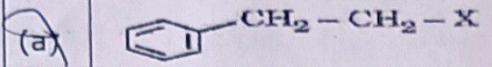
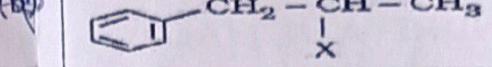
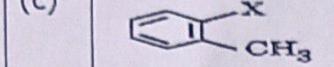
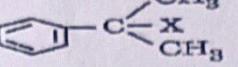
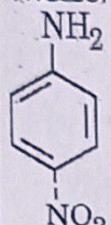
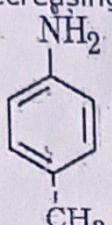
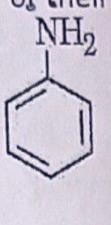
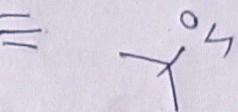
सामान्यनिर्देश/GENERAL INSTRUCTIONS:

- There are 33 questions in this question paper with internal choice.
- Section A consists of 16 multiple -choice questions carrying 1 mark each.
- Section B consists of 5 short answer questions carrying 2 marks each.
- Section C consists of 7 short answer questions carrying 3 marks each.
- Section D consists of 2 case - based questions carrying 4 marks each.
- Section E consists of 3 long answer questions carrying 5 marks each.
- All questions are compulsory.
- Use of log tables and calculators is not allowed.

SECTION A

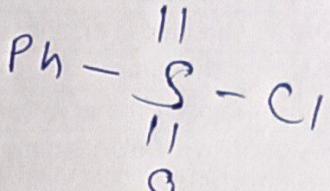
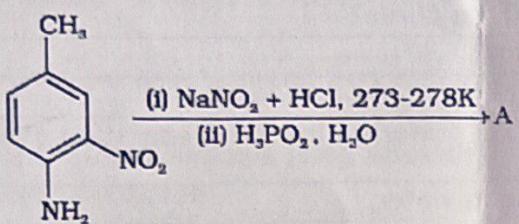
**The following questions are multiple -choice questions with one correct answer.
Each question carries 1 mark. There is no internal choice in this section.**

1	Which of the following carbohydrates is not a sugar?			
	(a) Glucose	(b) Fructose	(c) Lactose	(d) Cellulose
2	The most common oxidation state for all lanthanoids is:			
	(a) +5	(b) +5	(c) +3	(d) +4
3	Aspirin is formed by the acetylation of:			
	(a) Benzoic acid	(b) Salicylic acid		
	(c) Phthalic acid	(d) Phenol		
4	Solutions of two electrolytes X and Y are diluted. Molar conductivity of X increases 25 times whereas that of Y increases 1.5 times. Which one is a stronger electrolyte?			
	(a) X	(b) Y	(c) Both X and Y	(d) None of the above
5	Half-life period of a first order reaction is 1386 seconds. The rate constant (k) of the reaction is :			
	(a) $0.5 \times 10^{-3} \text{ s}^{-1}$	(b) $5.0 \times 10^{-3} \text{ s}^{-1}$		
	(c) $5 \times 10^{-2} \text{ s}^{-1}$	(d) $0.5 \times 10^{-2} \text{ s}^{-1}$		
6	Pantan-2-one and Pantan-3-one can be distinguished by:			
	(a) Sodium bicarbonate test	(b) Iodoform test		
	(c) Fehling's test	(d) Tollen's test		
7	What would be the major product of the given reaction?			
	$\begin{array}{c} \text{H} \\ \\ \text{H}-\text{C}=\text{O} \\ \\ \text{H} \end{array} + \text{CH}_3\text{MgI} \xrightarrow{\text{H}_2\text{O}}$			
	(a) Ethanal	(b) Propanol	(c) Ethanol	(d) Propanal
8	Oxidation state of central metal atom and coordination number of the given complex is: $[\text{Co}(\text{H}_2\text{O})_2(\text{en})_2]\text{Cl}_3$			

	(a) +3, 4	(b) +3, 6	(c) +2, 4	(d) +2, 6				
9	Identify benzylic halide among the following compounds-							
	(a) 	(b) 						
	(c) 	(d) 						
10	Which of the following methods cannot produce aldehydes?							
	(a) Oxidation of primary alcohols	(b) Dehydrogenation of secondary alcohols						
	(c) Ozonolysis of alkenes	(d) Hydration of ethyne with acid						
11	The correct decreasing order of their basic strength is:							
								
	I	II	III					
	(a) II > III > I	(b) III > II > I	(c) III > I > II	(d) I > III > II				
12	An azeotropic solution of two liquids has boiling point higher than either of them when it:							
	(a) is saturated							
	(b) Show positive deviation from Raoult's law							
	(c) Show negative deviation from Raoult's law							
	(d) Show no deviation from Raoult's law							
Question number 13-16 are of assertion-reason type questions. Select the most appropriate answer from the options given below:								
	(a) Both A and R are true and R is the correct explanation of A							
	(b) Both A and R are true but R is not the correct explanation of A.							
	(c) A is true but R is false.							
	(d) A is false but R is true.							
13	Assertion: molar mass of acetic acid in benzene calculates as colligative property is almost double the actual value							
	Reason: Acetic acid dimerizes in solution							
14	Assertion: Toxic metal ions are removed by the chelating ligands.							
	Reason: Chelate complexes tend to be more stable.							
15	Assertion: Benzene diazonium salt is stable and can be easily stored.							
	Reason: Benzene diazonium chloride decomposes easily.							
16	Assertion: D (+)-Glucose is dextrorotatory.							
	Reason: symbol D represents its dextrorotatory.							
SECTION B								
This section contains 5 questions with internal choice in one question. These questions are very short answer type and carry 2 marks each.								
17	(i)	The boiling point of solution increases when 1 mol of NaCl is added to 1 litre of water, while addition of 1 mol of methanol to one litre of water decreases its boiling point. Explain the above observations.						
18	(i) (ii)	Why do transition metals form large numbers of complex compounds? How does acidified potassium permanganate solution react with Fe^{2+} ions? Write ionic equation.						
19		Give reasons for the following:						

	(i)	Chlorine is ortho/para directing in electrophilic aromatic substitution reactions, though chlorine is an electron withdrawing group.
	(ii)	Racemic mixture is optically inactive.
20		Give the equations of reactions for the preparation of
	(i)	Phenol from chlorobenzene
	(ii)	Salicylaldehyde from phenol
		OR
		Write mechanism of acid catalyzed hydration of ethene to ethanol.

21 (i) Give the structure of 'A' in the following reaction.



(ii) What is Hinsberg reagent? Mention its use.

SECTION C

This section contains 7 questions with internal choice in one question. These questions are short answer type and carry 3 marks each.

22	(i)	Find the value of factor for acetic acid in benzene as per the given equation: $2\text{CH}_3\text{COOH} \rightarrow (\text{CH}_3\text{COOH})_2$, assuming its complete association
	(ii)	Osmotic pressure of a solution containing 3.5 g of dissolved protein in 0.05 L of a solution is 0.035 atm at 310 K. Calculate the molar mass of the protein. $(R = 0.0821 \text{ L atm K}^{-1} \text{ mol}^{-1})$
23	(i)	Why do tertiary alkyl halides undergo S_N1 reaction at a faster rate?
	(ii)	Define Enantiomers.
	(iii)	Why is chloroform stored in dark coloured air tight bottles?
		OR
	(i)	Write the major alkene that would be formed by dehydrohalogenation of 2-Bromopentane.
	(ii)	Which would undergo S_N2 reaction at a faster rate and why? $\text{CH}_3\text{CH}_2\text{CH}_2\text{Br}$ and $(\text{CH}_3)_3\text{C-Br}$
	(iii)	Why is chlorobenzene less reactive towards nucleophilic substitution reaction?
24	(i)	Name the reagents used in the following reactions: Oxidation of primary alcohol to aldehyde
	(ii)	Why is o-nitrophenol more acidic than o-methoxyphenol?
	(iii)	Convert Prop-1-ene to propan-1-ol.
25	(i)	How much electricity in terms of Faraday is required to produce 40 g of Al from molten Al_2O_3 ? (Given: atomic mass of Al = 27 u)
	(ii)	Calculate $\log K_c$ for the following reaction at 298 K: $\text{Zn (s)} + \text{Cu}^{2+} \text{ (aq)} \rightarrow \text{Zn}^{2+} \text{ (aq)} + \text{Cu (s)}$ Given: $\text{Zn}^{2+}/\text{Zn} E^0 = -0.76 \text{ V}$, $\text{Cu}^{+2}/\text{Cu} E^0 = +0.34 \text{ V}$
26		The rate of a gaseous reaction triples when temperature is increased from 17°C to 27°C. Calculate the energy of activation for this reaction. [Given: $2.303 R = 19.15 \text{ JK}^{-1} \text{ mol}^{-1}$, $\log 3 = 0.48$]
27		For a general reaction $A \rightarrow B$, plot of concentration of A vs time is given in Fig. Answer the following question on the basis of this graph.

~~Explain the following graph~~

- (i) What is the order of the reaction?
 (ii) What is the slope and intercept of the curve?
 (iii) What are the units of rate constant?

28 Give reasons for the following (any three)-

- (i) Reduction with iron scrap and HCl is preferred for the preparation of amines from nitro compounds.
 (ii) Lower aliphatic amines are soluble in water.
 (iii) Pyridine is used in the acylation reaction of amines.
 (iv) Although amino group is o- and p-directing in aromatic electrophilic substitution reactions, aniline on nitration gives a substantial amount of m-nitroaniline.

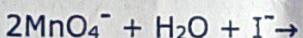
SECTION D

The following questions are case-based questions. Each question has an internal choice and carries 4 (1+1+2) marks each. Read the passage carefully and answer the questions that follow.

29 Transition metals have incomplete d-subshell either in neutral atom or in their ions. The presence of partly filled d-orbitals in their atoms makes transition elements different from that of the non-transition elements. With partly filled d-orbitals, these elements exhibit certain characteristic properties such as display of a variety of oxidation states, formation of coloured ions and entering into complex formation with a variety of ligands. The transition metals and their compounds also exhibit catalytic properties and paramagnetic behaviour. The transition metals are very hard and have low volatility. An examination of the $E^0_{M2+/M}$ shows the varying trends :

$E^0_{M2+/M}$ (V)	V	Cr	Mn	Fe	Co	Ni	Cu	Zn
-1.18	-0.91	-1.18	-0.44	-0.28	-0.25	+0.34	-0.76	

- (i) On what basis can we say that Cu is a transition element but Zn is not?
 (Atomic number: Cu = 29, Zn = 30)
 (ii) Why do transition elements show variety of oxidation states?
 (iii) (a) Of the d⁴ species, Cr²⁺ is strongly reducing while Mn³⁺ is strongly oxidizing.
 Why? (Atomic number: Cr = 24, Mn = 25)
 (b) Complete the following ionic equation:



OR

- (a) $E^0_{M2+/M}$ values show irregular trend from Vanadium to Zinc, why?
 (b) How is the variability in oxidation states of transition metals different from that of the non-transition elements ?

30 Proteins are the most abundant biomolecules of the living system. The chief sources of proteins are milk, cheese, pulses, fish, meat, peanuts, etc. They are found in every part of the body and form a fundamental basis of the structure and functions of life. These are also required for the growth and maintenance of the body. The word protein is derived from the Greek word, 'proteios' meaning 'primary' or of 'prime importance'. Chemically, proteins are the polymers in which the monomeric units are the α-amino acids. Amino acids contain an amino (-NH₂) and carboxylic (-COOH) functional groups.

Depending upon the relative position of the amino group with respect to the carboxylic group, the amino acids can be classified as α , β , and γ -amino acids. Amino acids which are synthesized by the body are called non-essential amino acids. On the other hand, those amino acids which cannot be synthesized in the human body and are supplied in the form of diet (because they are required for proper health and growth) are called essential amino acids.

- | | |
|-------|--|
| (i) | Amino acids show amphoteric behavior. Why? |
| (ii) | The name of linkage joining two amino acids to form polypeptide chain. |
| (iii) | (a) What type of bonding helps in stabilizing the α -helix structure of proteins?
(b) What happens to structure of protein if it undergoes denaturation? |
| | OR |
| | What are essential and non-essential amino acids? Give one example of each. |

SECTION E

The following questions are long answer type and carry 5 marks each. All questions have an internal choice

31	(i)	State Faraday's first law of Electrolysis.
	(ii)	Consider the reaction: $\text{Cr}_2\text{O}_7^{2-} + 14\text{H}^+ + 6\text{e}^- \rightarrow 2\text{Cr}^{3+} + 7\text{H}_2\text{O}$ What is the quantity of electricity in coulombs needed to reduce 2 mol of $\text{Cr}_2\text{O}_7^{2-}$?
	(iii)	The cell in which the following reaction occurs- $2\text{Fe}^{3+}(0.01\text{M}) + 2\text{I}^-(0.01\text{M}) \rightarrow 2\text{Fe}^{2+}(0.1\text{M}) + \text{I}_2$; $E^\circ_{\text{cell}} = 0.236\text{ V}$ at 298 K. Calculate emf of the cell.
		OR
	(i)	Define molar conductivity.
	(ii)	Write the complete chemical equation of lead storage battery during charging.
	(iii)	Conductivity of 0.00241 M acetic acid is $7.896 \times 10^{-5}\text{ S cm}^{-1}$. Calculate its molar conductivity. If Λ^0 m for acetic acid is $390.5\text{ S cm}^2\text{ mol}^{-1}$, what is its dissociation constant?
32	(i)	Write the formulas for the following coordination compounds: (a) Tetraamminediaquacobalt(III) chloride (b) Tris(ethane-1,2-diamine) chromium (III) chloride
	(ii)	$[\text{Fe}(\text{H}_2\text{O})_6]^{3+}$ is strongly paramagnetic whereas $[\text{Fe}(\text{CN})_6]^{3-}$ is weak paramagnetic. Explain using VBT.
	(iii)	Give evidence that $[\text{Co}(\text{NH}_3)_5\text{Cl}]\text{SO}_4$ and $[\text{Co}(\text{NH}_3)_5(\text{SO}_4)]\text{Cl}$ are ionization isomers.
		OR
	(i)	Write the IUPAC names of the following coordination compounds: (a) $[\text{Co}(\text{NH}_3)_5\text{Cl}]\text{Cl}_2$ (b) $\text{K}_3[\text{Fe}(\text{C}_2\text{O}_4)_3]$
	(ii)	Find out the hybridization and magnetic behavior of $[\text{Cr}(\text{NH}_3)_6]^{3+}$ and $[\text{Ni}(\text{CN})_4]^{2-}$ using VBT.
	(iii)	Why is geometrical isomerism not possible in tetrahedral complexes having two different types of unidentate ligands coordinated with the central metal ion?
33	(i)	Arrange the following compounds in increasing order of their reactivity in nucleophilic addition reactions. (a) Ethanal, Propanal, Propanone, Butanone.

(b) Benzaldehyde, p-Tolualdehyde, p-Nitrobenzaldehyde, Acetophenone.

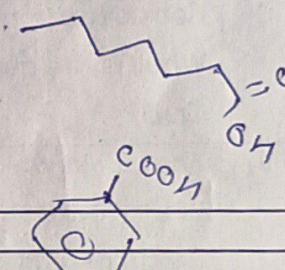
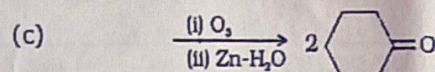
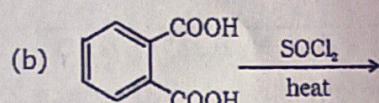
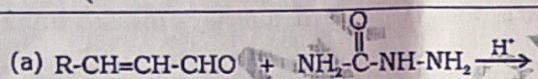
(ii) An organic compound (A) with molecular formula C_8H_8O forms an orange-red precipitate with 2,4-DNP reagent and gives yellow precipitate on heating with iodine in the presence of sodium hydroxide. It neither reduces Tollens' or Fehlings' reagent, nor does it decolourise bromine water or Baeyer's reagent. On drastic oxidation with chromic acid, it gives a carboxylic acid (B) having molecular formula $C_7H_6O_2$. Identify the compounds (A) and (B) and explain the reactions involved.

OR

(i) Write the following reactions:-

(a) Aldol condensation (b) HVZ Reaction

(ii) Complete the following reactions: -



$CN_3-C(=O)-ON$ {Aldol reactant}

