

केंद्रीय विद्यालय संगठन, अहमदाबाद संभाग

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प्री-बोर्ड परीक्षा: 2024-25

PRE-BOARD EXAMINATION: 2024-25

SUBJECT : CHEMISTRY (043)
CLASS : XII

TIME : 3 HOURS
MM : 70

सामान्य निर्देश/GENERAL INSTRUCTIONS:

Read the following instructions carefully.

- (a) There are 33 questions in this question paper with internal choice.
- (b) SECTION A consists of 16 multiple -choice questions carrying 1 mark each.
- (c) SECTION B consists of 5 short answer questions carrying 2 marks each.
- (d) SECTION C consists of 7 short answer questions carrying 3 marks each.
- (e) SECTION D consists of 2 case - based questions carrying 4 marks each.
- (f) SECTION E consists of 3 long answer questions carrying 5 marks each.
- (g) All questions are compulsory.
- (h) 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	Standard solution of KNO₃ is used to make a salt bridge because
	(a) Velocity of K ⁺ is greater than that of NO ₃ ⁻ .
	(b) Velocity of NO ₃ ⁻ is greater than that of K ⁺ .
	(c) Velocity of both K ⁺ and NO ₃ ⁻ are nearly same
	(d) KNO ₃ is highly soluble in water.
2	VANT HOFF factor for K ₂ SO ₄ solution is, assuming complete ionization is
	(a) 3
	(b) 2
	(c) 13
	(d) 1
3	Which of the following statements is not correct about order of a reaction.
	(a) The order of a reaction can be a fractional number.
	(b) Order of a reaction is experimentally determined quantity.
	(c) The order of a reaction is always equal to the sum of the stoichiometric coefficients of reactants in the balanced chemical equation for a reaction
	(d) The order of a reaction is the sum of the powers of molar concentration of the reactants in the rate law expression
4	Aldehydes other than formaldehyde react with Grignard's reagent to give addition products which on hydrolysis give
	(a) tertiary alcohols
	(b) secondary alcohols

	(c)	primary alcohols
	(d)	carboxylic acids
5		Which type of isomerism is shown by the complex compounds $[Co(NH_3)_5Br]SCN$ and $[Co(NH_3)_5SO_4]Br$
	(a)	Linkage
	(b)	Optical
	(c)	Ionisation
	(d)	Coordination
6		Toluene reacts with a halogen in the presence of iron (III) chloride giving ortho and para halo compounds. The reaction is
	(a)	Electrophilic elimination reaction
	(b)	Electrophilic substitution reaction
	(c)	Free radical addition reaction
	(d)	Nucleophilic substitution reaction
7		Which of the following are d-block elements but not regarded as transition elements?
	(a)	Cu, Ag, Au
	(b)	Ru, Rh, Pd
	(c)	Fe, Co, Ni
	(d)	Zn, Cd, Hg
8		The correct order of increasing acidic strength is _____.
	(a)	Phenol < Ethanol < Chloroacetic acid < Acetic acid
	(b)	Ethanol < Phenol < Chloroacetic acid < Acetic acid
	(c)	Ethanol < Phenol < Acetic acid < Chloroacetic acid
	(d)	Chloroacetic acid < Acetic acid < Phenol < Ethanol
9		The symbols D and L in the name of Carbohydrate represents
	(a)	Dextro-rotatory nature
	(b)	Laevo-rotatory nature
	(c)	The relative configuration of a particular isomer
	(d)	The optical activity of compounds
10		Methyl ketones are usually characterised through
	(a)	Tollen's reagent
	(b)	Iodoform test
	(c)	Schiff's test
	(d)	Benedict solution test
11		Which of the following does not react with Hinsberg reagent?
	(a)	$C_2H_5NH_2$
	(b)	$(CH_3)_2NH$
	(c)	$(CH_3)_3N$
	(d)	$CH_3CH(NH_2)CH_3$
12		Which of the following acids is a vitamin?
	(a)	Aspartic acid
	(b)	Ascorbic acid
	(c)	Adipic acid
	(d)	Saccharic acid

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:** When NaCl is added to water a depression in freezing point is observed.

Reason: The lowering of vapour pressure of a solution causes depression in the freezing point. ✓

14 **Assertion:** Linkage isomerism arises in coordination compounds containing ambidentate ligand.

Reason: Ambidentate ligand has two different donor atoms.

15 **Assertion:** Propanal gives Aldol condensation.

Reason: beta-Hydroxy aldehydes or ketones readily undergo acid catalyzed dehydration

16 **Assertion:** Glycine must be taken through diet.

Reason: It is a non- essential amino acid.

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) A 2.00 molal aqueous solution of trichloroacetic acid (CCl₃COOH) is heated to its boiling point. Determine the boiling point of trichloroacetic acid solution. (K_b for water = 0.512 K kg mol⁻¹, i = 0.35)

18 (i) Write down IUPAC name of the following complex [Co(NH₃)₆]Cl₃

(ii) Arrange the following complexes in the increasing order of conductivity of their aqueous solution:
[Co(NH₃)₃Cl₃], [Co(NH₃)₄Cl₂]Cl, [Co(NH₃)₆]Cl₃, [Cr(NH₃)₅Cl]Cl₂

19 (i) Arrange the following compounds in increasing order of their acid strength:
Propan-1-ol, 2, 4, 6-trinitrophenol, 3-nitrophenol, 3, 5-dinitrophenol, phenol, 4-methylphenol.

(ii) Ortho nitrophenol has lower boiling point than p-nitrophenol. Why?

20 (i) Cl-CH₂COOH is a stronger acid than CH₃COOH, explain?

(ii) Give the product when CH₃CH=CHCH₂CN reduced by DiBAL-H.

OR

(i) Give name of one suitable test to distinguish Propanal and acetone.
(ii) Write Hell Volhard Zelinsky reaction.

21 (i) How can the following conversions be carried out-?
But-1-ene to 1-Iodobutane

Chloroethane to propanoic acid

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) The following data were obtained during the first order thermal decomposition of SO_2Cl_2 at a constant volume: $\text{SO}_2\text{Cl}_2(\text{g}) \rightarrow \text{SO}_2(\text{g}) + \text{Cl}_2(\text{g})$ (2)

Experiment	Time (Second)	Pressure (atm)
1	0	0.4
2	100	0.7

(ii) Calculate rate constant. ($\log_{10} 4 = 0.6021$ and $\log_{10} 2 = 0.3010$)
Define molecularity of a reaction.

23 Attend any two questions.

(i) Haloalkanes react with KCN to form alkyl cyanides as main product while AgCN forms isocyanides as the chief product. Explain.

(ii) Give chemical tests to distinguish between Benzyl chloride & chloro benzene.

(iii) Sulphuric acid not used during the reaction of alcohols with KI.

24 (i) How does sprinkling of salt help in clearing the snow-covered roads in hilly areas?
Explain the phenomenon involved in the process. (1)

(ii) A solution is prepared by dissolving 10 g of non-volatile solute in 200 g of water. It has a vapour pressure of 31.84 mm Hg at 308 K. Calculate the molar mass of the solute. (Vapour pressure of pure water at 308 K = 32 mm Hg) (2)

25 (i) A zinc rod is dipped in 0.1 M solution of ZnSO_4 . The salt is 95% dissociated at this dilution at 298 K. Calculate the electrode potential. [$E^\circ_{\text{Zn}^{2+}/\text{Zn}} = -0.76 \text{ V}$]

(ii) Calculate the degree of dissociation of acetic acid if its molar conductivity (λ_m) is $39.05 \text{ S cm}^2 \text{ mol}^{-1}$. Given: $\lambda^\circ(\text{H}^+) = 349.6 \text{ S cm}^2 \text{ mol}^{-1}$ and $\lambda^\circ(\text{CH}_3\text{COO}^-) = 40.9 \text{ S cm}^2 \text{ mol}^{-1}$.

26 (i) Convert the followings

Phenol to acetophenone

Propanone to 2-methylpropan-2-ol

Methyl chloride to methoxy ethane

27 (i) What is half life of a reaction? If a reactant [A] takes 20 minutes for 50% consumption. Calculate time in which its concentration becomes 60% of initial concentration. [$\log 2 = 0.3010$, $\log 3 = 0.4771$, $\log 5 = 0.6911$]

(ii) How do you convert the following:

(a) $\text{C}_6\text{H}_5\text{CONH}_2$ to $\text{C}_6\text{H}_5\text{NH}_2$

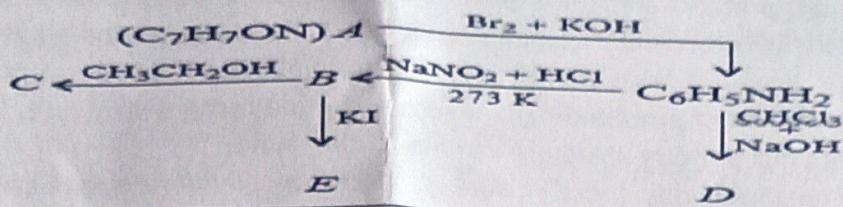
(b) Aniline to phenol

(ii) Give one chemical test each to distinguish between Ethylamine and aniline

OR

(i) Arrange the following in increasing order of their basic strength:
 $\text{C}_6\text{H}_5\text{NH}_2$, $\text{C}_6\text{H}_5\text{NHCH}_3$, $\text{C}_6\text{H}_5\text{CH}_2\text{NH}_2$

(ii)

**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 The transition elements have incompletely filled d-subshells in their ground state or in any of their oxidation states. The transition elements occupy position in between s- and p-blocks in groups 3-12 of the Periodic table. Starting from fourth period, transition elements consist of four complete series: Sc to Zn, Y to Cd and La, Hf to Hg and Ac, Rf to Cn.

In general, the electronic configuration of outer orbitals of these elements is $(n-1)d^{1-10} ns^{1-2}$. The electronic configurations of outer orbitals of Zn, Cd, Hg and Cn are represented by the general formula $(n-1) d^{10} ns^2$. All the transition elements have typical metallic properties such as high tensile strength, ductility, malleability. Except mercury, which is liquid at room temperature, other transition elements have typical metallic structures. The transition metals and their compounds also exhibit catalytic property and paramagnetic behaviour. Transition metal also forms alloys.

The f-block elements are those in which the differentiating electrons enter the $(n-2)f$ orbitals. There are two series of f-Block elements corresponding to filling of 4f and 5f-orbitals. The series of 4f-orbitals is called Lanthanides. Lanthanides show different oxidation states depending upon stability of f^0 , f^7 and f^{14} configurations, though the most common oxidation state is +3. There is a regular decrease in the size of lanthanide ions with increase in atomic number which is known as lanthanide contraction.

- i Among Cerium (X=58) Europium (Z=63) & Lanthanum (Z=57) which is well known to exhibit +4 oxidation.

OR

Europium and Ytterbium both show highly stable +2 oxidation state, why?

- ii Among 3d series elements, which element show maximum paramagnetic behavior in atomic ground state?

- iii Why do transition elements show catalytic activity?

- 30 Biomolecules are complex molecules which build up living organisms and required for their growth, maintenance and ability to reproduce. Carbohydrates are polyhydroxy aldehydes and ketones which are major sources of energy. Monosaccharides are simple sugars which cannot be hydrolyzed. Oligosaccharide, on hydrolysis give 2 to 10 molecules of monosaccharides. Polysaccharides like starch and cellulose on hydrolysis give large number of molecules of glucose \alpha-glucose and \beta-glucose (Anomers). Proteins are complex nitrogenous polymers of amino acids connected

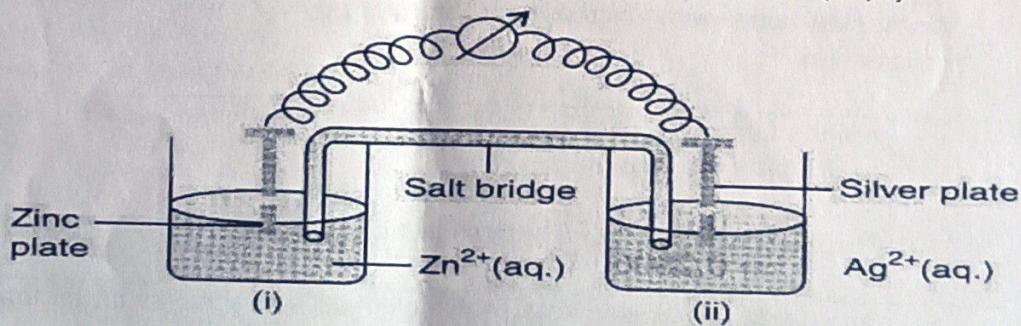
through peptide bonds. The sequence in which amino acids are linked is called Primary structure. Secondary structures are of 2 types \alpha-helix in globular proteins and \beta-pleated structure in fibrous proteins involving H-bonds. Tertiary structure has H-bonds, disulphide linkage, ionic bonding and van der Waals' forces. Insulin is hormone for metabolism of glucose, has quaternary structure. Denaturation of protein destroys secondary and tertiary structure, loss of biological activity but primary structure remaining the same. Enzymes are highly specific, work at specific pH, moderate temperature and catalyse biochemical reactions. Hormones perform specific functions and secreted by endocrine glands. Vitamins are essential for healthy body. A, D, E, K are fat soluble vitamins. Vitamin C and B₁, B₂, B₆ are water soluble. B₁₂ is neither water, nor fat soluble. Nucleic acids are polymer of nucleotides. RNA consists of m-RNA, t-RNA, r-RNA. RNA has Adenine, Cytosine, Uracil and Guanine. It helps in protein synthesis. It cannot replicate. DNA contains deoxyribose, A, C, G and Thymine. It transfers genetic characteristics. DNA has double helix structure and undergoes replication.

- | | |
|-------|--|
| (i) | Name a disaccharide which on hydrolysis gives glucose and galactose |
| (ii) | What type of protein is albumin? |
| (iii) | (a) Which linkage by which nucleotide are joined together between 5' and 3' atoms of pentose sugar?
(b) Name one non-reducing sugar.
OR
(a) Which vitamin helps in coagulation of blood?
(b) Which one is complementary base of cytosine in one strand of DNA to that in other strand of DNA? |

SECTION E

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

- 31 Consider Fig. and answer the questions (i) to (vi) given below. (any 5)



- | | |
|-------|---|
| (i) | Redraw the diagram to show the direction of electron flow |
| (ii) | Is silver plate the anode or cathode |
| (iii) | What will happen if salt bridge is removed? |
| (iv) | When will the cell stop functioning? |
| (v) | How will concentration of Zn ²⁺ ions and Ag ⁺ ions be affected when the cell functions? |
| (vi) | How will the concentration of Zn ²⁺ ions and Ag ⁺ ions be affected after the cell becomes 'dead'? |

OR

- | | |
|-----|--|
| (i) | Define molar conductivity of a substance |
|-----|--|

	(ii)	Describe how for weak and strong electrolytes, molar conductivity changes with concentration of solute. How is such change explained?
	(iii)	A voltaic cell is set up at 25 °C with the following half-cells Ag^+ (0.001 M) Ag and Cu^{+2} (0.10 M) Cu. What would be the voltage of this cell? ($E^\circ_{\text{cell}} = 0.4\text{V}$)
32	(i)	What is the oxidation state of Ni in $[\text{Ni}(\text{CO})_4]$?
	(ii)	(ii) Arrange the following complex ions in increasing order of crystal field splitting energy (Δ): $[\text{Cu}(\text{NH}_3)_4]^{2+}$, $[\text{Co}(\text{CN})_6]^{3-}$, $[\text{Co}(\text{NH}_3)_6]^{3+}$, $[\text{Ni}(\text{Cl})_4]^2-$
	(iii)	$[\text{Ni}(\text{CN})_4]^{2-}$ is colourless whereas $[\text{Ni}(\text{H}_2\text{O})_6]^{2+}$ is green. Why?
		OR
	(i)	Out Cis – $[\text{Pt}(\text{en})_2 \text{Cl}_2]^{2+}$ and trans $[\text{Pt}(\text{en})_2\text{Cl}_2]^{2+}$ which one shows optical isomerism
	(ii)	Explain why $[\text{Fe}(\text{H}_2\text{O})_6]^{3+}$ has a magnetic moment value of 5.92 BM whereas $[\text{Fe}(\text{CN})_6]^{3-}$ has a value of only 1.74 BM.
	(iii)	Give IUPAC name of the ionization isomer of $[\text{Ni}(\text{NH}_3)_3\text{NO}_3]\text{Cl}$
33	(i)	a) Aldehydes and Ketones have lower boiling points than corresponding alcohols. Why ? b) Write the structure of the product formed in the following reaction
		<p>The reaction shows benzene reacting with propionyl chloride ($\text{C}_2\text{H}_5\text{C}(=\text{O})\text{Cl}$) in the presence of anhydrous AlCl_3. The product is likely to be a substituted benzene derivative where the chlorine atom from the propionyl chloride has replaced one of the hydrogen atoms on the benzene ring.</p>
	(ii)	a) Give a chemical test to distinguish between benzoic acid and phenol b) Write the reagents required in the following reactions (i) $\text{CH}_2 = \text{CH}-\text{CH}_2\text{OH} \xrightarrow{?} \text{CH}_2 = \text{CH}-\text{CHO}$ (ii) $\text{CH}_3-\text{COOH} \xrightarrow{?} \text{CH}_3-\text{CONH}_2$
		OR
	(i)	a) Rearrange the following compounds in the increasing order of their boiling points: CH_3-CHO , $\text{CH}_3-\text{CH}_2-\text{OH}$, $\text{CH}_3-\text{CH}_2-\text{CH}_3$
		b) Draw the structure of the compound named 4-methylpent-3-en-2-one
	(ii)	a) Write the equations involved in the following reactions Wolff-Kishner reduction (ii) Etard reaction
		b) Formaldehyde does not take part in Aldol condensation, Why ?
