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कक्षा बारहवीं प्रथम प्री-बोर्ड - I परीक्षा 2025-26
PRE-BOARD I EXAMINATION 2025-26 for Class XII

SUBJECT: CHEMISTRY (043)

M.M.: 70

TIME: 3 Hours

GENERAL INSTRUCTIONS:

- (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. Required log values are given below:
(log 2 = 0.3010, log 3 = 0.4771, log 4 = 0.6021, log 0.095 = - 1.0223)

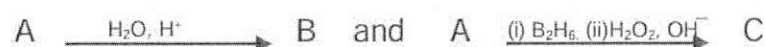
SECTION A

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

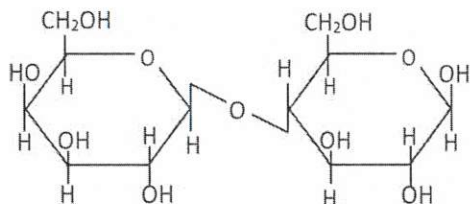
1. Increasing the temperature of an aqueous solution will cause:
 - (a) decrease in molarity
 - (b) decrease in molality
 - (c) decrease in mole fraction
 - (d) decrease in % (w/w)
2. Which has lowest boiling point:
 - (a) 1 M Glucose
 - (b) 1 M NaCl
 - (c) 1 M CaCl₂
 - (d) 1 M AlF₃
3. Λ_m^o CH₃COOH can be calculated if the values of the following are given:
 - 1. Λ_m^o HCl, Λ_m^o KCl and Λ_m^o CH₃COOK
 - 2. Λ_m^o NaCl, Λ_m^o KCl and Λ_m^o CH₃COONa
 - 3. Λ_m^o H₂SO₄, Λ_m^o Na₂SO₄ and Λ_m^o CH₃COONa
 - A. Only 1
 - B. Either 1 or 2
 - C. Either 1 or 3
 - D. Either 2 or 3
4. In pseudo unimolecular reactions
 - (a) both the reactants are present in low concentration
 - (b) both the reactants are present in same concentration
 - (c) one of the reactants is non-reactive
 - (d) one of the reactants is present in excess

5. Which of the following complex species is not expected to exhibit optical isomerism?
- $[\text{Co}(\text{en})(\text{NH}_3)_2\text{Cl}_2]^+$
 - $[\text{Co}(\text{en})_3]^{3+}$
 - $[\text{Co}(\text{en})_2\text{Cl}_2]$
 - $[\text{Co}(\text{NH}_3)_3\text{Cl}_3]$
6. Alkyl halides are not prepared from alcohols by treating with_____
- $\text{HCl} + \text{ZnCl}_2$
 - Red P + Br_2
 - $\text{KMnO}_4 + \text{HCl}$
 - PCl_5
7. Formic acid and acetic acid are distinguished by
- Tollen's reagent
 - FeCl_3
 - Victor Mayer test
 - NaHCO_3
8. Heating of ethyl methyl ether with HI produces
- Iodomethane
 - phenol
 - benzene
 - ethyl iodide

9. Consider the reaction and identify B and C



- B=C= Butanol
 - B= Butanol, C=Butene
 - B= Butan-2-ol, C= Butanol
 - B= Butene, C=Butan-2-ol
10. The correct order of the basic strength of methyl substituted amines in gaseous phase is
- $(\text{CH}_3)_3\text{N} > \text{CH}_3\text{NH}_2 > (\text{CH}_3)_2\text{NH}$
 - $\text{CH}_3\text{NH}_2 > (\text{CH}_3)_2\text{NH} > (\text{CH}_3)_3\text{N}$
 - $(\text{CH}_3)_2\text{NH} > \text{CH}_3\text{NH}_2 > (\text{CH}_3)_3\text{N}$
 - $(\text{CH}_3)_3\text{N} > (\text{CH}_3)_2\text{NH} > \text{CH}_3\text{NH}_2$
11. Which of the following amino acids is optically inactive?
- Lysine
 - Glycine
 - Alanine
 - Valine
12. Identify the glycosidic linkage in the following disaccharide.



- C1-C2 glycosidic linkage
- C1-C4 glycosidic linkage
- C1-C5 glycosidic linkage
- C1-C6 glycosidic linkage

Q. No. 13 to 16 are of Assertion- Reason type.

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:** Uracil is present in DNA

Reason: DNA undergoes replication

14 **Assertion:** Compounds containing $-\text{CHO}$ group are easily oxidized to corresponding carboxylic acids.

Reason: Carboxylic acids can be reduced to alcohols by treatment with LiAlH_4

15 **Assertion:** Chelates are less stable than ordinary coordination compounds.

Reason: Chelates can be formed by bidentate ligands.

16 **Assertion:** Rate constant of a zero-order reaction has the same unit as the rate of a reaction.

Reason: Rate constant of a zero-order reaction does not depend upon the concentration of the reactant.

SECTION B

This section contains 5 questions with internal choice in one question. The following questions are very short answer type and carry 2 marks each.

17 Define Raoult's law for solution containing two volatile liquids. Explain how it is special condition of Henry's law?

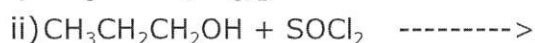
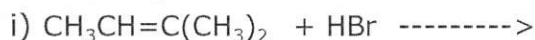
18 For a first order reaction plot a graph between

- i) $\ln[R]$ and time
- ii) $\log([R_0/R])$ and time.

OR

Derive an integrated equation of rate constant for 1st order reaction. Also show that half-life of a first order reaction is independent of its initial concentration.

19 Complete the following reactions:



20 Give equations of the following reactions:

(i) Bromine in CS_2 at 273 K with phenol.

(ii) Treating phenol with NaOH in presence of CO_2 at a temperature of 400K and 4 to 7 atm pressure.

21 Give reasons:

(a) Aromatic amine cannot be prepared by Gabriel phthalimide synthesis.

(b) Although $-\text{NH}_2$ group is o- and p- directing in electrophilic substitution reactions, yet aniline, on nitration gives good yield of m-nitroaniline.

SECTION C

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

22 (i) Which colligative property is most suitable to measure molecular mass of proteins and why?

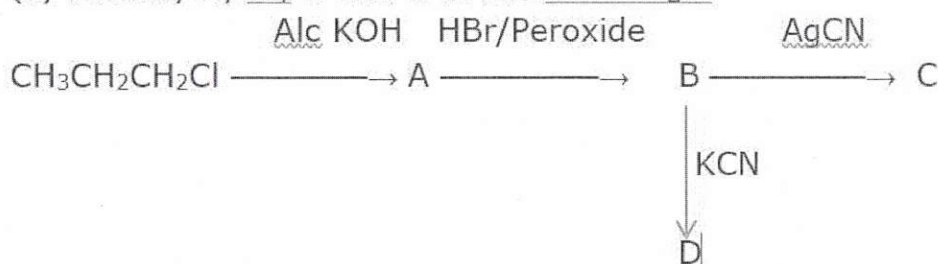
(ii) Equimolal solutions of NaCl and BaCl_2 are prepared in water. Freezing point of NaCl is found to be -2°C , What freezing point do you expect for BaCl_2 solution?

OR

(i) What will happen when Red Blood Cell are placed in 0.5% NaCl Solution?

(ii) What is meant by abnormal molar mass of solute? Discuss the factors which bring abnormality in the experimentally determined molecular masses of solutes using colligative properties.

- 23 (i) Why does the conductivity of a solution decrease with dilution?
(ii) Discuss the variation molar conductivity of weak and strong electrolytes with dilution along with graphical representation.
- 24 (i) The decomposition of NH_3 on platinum surface is zero order reaction. What are the rates of production of N_2 and H_2 if $k = 2.5 \times 10^{-4} \text{ mol}^{-1} \text{ L s}^{-1}$?
(ii) For a first order reaction, show that time required for 99% completion is twice the time required for the completion of 90% of reaction.
- 25 Account for the following
(i) Transition elements exhibit variable oxidation states.
(ii) Actinoid contraction is greater from element to element than lanthanoid contraction.
(iii) Transition elements form colored ions.
- 26 (i) Haloarenes are extremely less reactive towards nucleophilic substitution reaction than haloalkanes. Give reason.
(ii) Identify A, B, C and D in the following:-



- 27 (i) Write the mechanism of acid catalyzed hydration of ethene to ethanol.
(ii) Write Reimer Tiemann Reaction
- 28 (i) Give one chemical test to distinguish between ethylamine and aniline.
(ii) Aniline does not undergo Friedel-Crafts reaction. Give reason.
(iii) Write Carbylamine reaction.

SECTION D

The following 2 questions of this section 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 In the periodic table the f-block is placed outside at the bottom of the periodic table and in the elements of this block, 4f and 5f orbitals are progressively filled. The two series of inner transition elements, lanthanoids and actinoids constitute the f-block of the periodic table. With the successive filling of the inner orbitals, 4f, there is a gradual decrease in the atomic and ionic sizes of these metals along the series (lanthanoid contraction). This has far reaching consequences in the chemistry of the elements succeeding them. Lanthanum and all the lanthanoids are rather soft white metals. They react easily with water to give solutions giving +3 ions. The principal oxidation state is +3, although +4 and +2 oxidation states are also exhibited by some occasionally. The chemistry of the actinoids is more complex in view of their ability to exist in different oxidation states. Furthermore, many of the actinoid elements are radioactive which make the study of these elements rather difficult.
- (i) Name a member of the lanthanoid series which is well known to exhibit +4 oxidation state and why?
(ii) What is the cause and the consequences (any one) of lanthanoid contraction?
(iii) What is Mischmetal and write its composition. Also write its uses.

OR

Write one similarity and one difference between the chemistry of lanthanoids and that of actinoids.

- 30 In combined form, glucose occurs in cane sugar and polysaccharides such as starch and cellulose. Glucose has an aldehyde group ($-\text{CHO}$), one primary alcoholic group ($-\text{CH}_2\text{OH}$) and four secondary alcoholic groups ($-\text{CHOH}$) in their structure. Due to the presence five hydroxyl groups ($-\text{OH}$), glucose acetylation. Glucose also undergoes oxidation with mild oxidising agents like bromine water as well as with strong oxidising agents like nitric acid. Since glucose is readily oxidised, it acts as a strong reducing agent and reduces Tollen's reagent and Fehling solution. Glucose exists in two crystalline forms: α -D-glucose and β -D-glucose. If either of the two forms is dissolved in water and allowed to stand, the specific rotation of the solution changes gradually, until a constant value is obtained. This change is called mutarotation. The two cyclic hemiacetal forms of glucose differ only in the configuration of the hydroxyl group at C1, called anomeric carbon (the aldehyde carbon before cyclisation). Such isomers, i.e., α -form and β -form, are called anomers.

- (a) How can you prove that all the six carbon atoms are linked in a straight chain?
(b) Write two observations which cannot be proved by the open chain structure of glucose.
(c) Draw the Haworth structure of α - D- (+)-Glucopyranose and β - D- (+)-Glucopyranose.

OR

What information do we get when D-glucose reacts with following reagent, write the reaction also: (i) HCN and (ii) Br_2 water

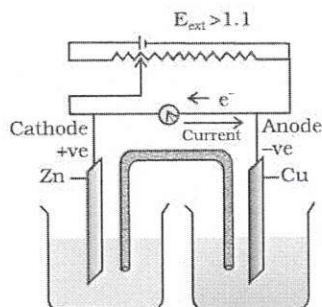
SECTION E

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

- 31 (i) Consider the reaction: $\text{Cr}_2\text{O}_7^{2-} + 14\text{H}^+ + 6\text{e}^- \rightarrow 2\text{Cr}^{3+} + 8\text{H}_2\text{O}$
What is the quantity of electricity in coulombs needed to reduce 1 mol of $\text{Cr}_2\text{O}_7^{2-}$?
(ii) Calculate the emf for the cell at 25°C :
 $\text{Cr}/\text{Cr}^{3+}(0.1 \text{ M}) // \text{Fe}^{+2}(0.01\text{M})/\text{Fe}$
 $E^\circ \text{Cr}^{3+}/\text{Cr} = -0.74 \text{ V}$ and $E^\circ \text{Fe}^{+2}/\text{Fe} = -0.44 \text{ V}$
(iii) Write the chemistry of discharging the lead storage battery, highlighting all the materials that are involved during discharging.

OR

- (i) Daniell cell converts the chemical energy liberated during the redox reaction $\text{Zn(s)} + \text{Cu}^{2+}(\text{aq}) \rightarrow \text{Zn}^{2+}(\text{aq}) + \text{Cu(s)}$ to electrical energy and has an electrical potential equal to 1.1 V when concentration of Zn^{2+} and Cu^{2+} ions is unity (1 mol dm^{-3}). If an external opposite potential greater than 1.1 V is applied in what manner the cell now functions?



(ii) 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. $[E^\circ \text{Zn}^{2+}/\text{Zn} = -0.76 \text{ V}]$

(iii) Calculate the degree of dissociation of acetic acid. The conductivity of 0.001 M acetic acid is $4 \times 10^{-5} \text{ S/cm}$ and the molar conductivity of acetic acid at infinite dilution is $390.5 \text{ S cm}^2 \text{ mol}^{-1}$.

32 (i) Write down the IUPAC name of the complex: $[\text{Pt}(\text{NH}_3)_2\text{Cl}(\text{NO}_2)]$

(ii) Draw figure to show the splitting of d orbitals in a tetrahedral crystal field.

(iii) Discuss the nature of bonding in the coordination entity $[\text{Co}(\text{NH}_3)_6]^{3+}$ based on valence bond theory.

OR

A metal ion M^{n+} having d^4 valence electronic configuration combines with three bidentate strong field ligands to form an **octahedral complex**. Assuming Δ_0 is greater than P.

(i) Draw diagram showing **d-orbital splitting**.

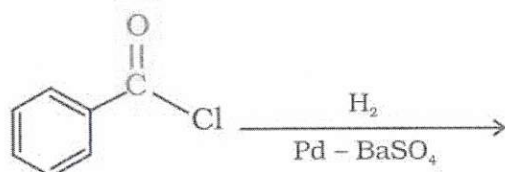
(ii) Write the electronic configuration of M^{n+} in terms of t_{2g} and e_g .

(iii) What type of hybridization will M^{n+} have.

(iv) Name the type of isomerism it shows.

33 (i) Give simple chemical tests to distinguish between Propanal and Propanone

(ii) Complete and identify the reaction:



Benzoyl chloride

(iii) Write Cannizzaro reaction

(iv) An organic compound (A) (molecular formula $\text{C}_8\text{H}_{16}\text{O}_2$) was hydrolysed with dilute sulphuric acid to give a carboxylic acid (B) and an alcohol (C). Oxidation of (C) with chromic acid produced (B). (C) on dehydration gives but-1-ene. Write equations for the reactions involved.

OR

(i) Write Wolff-Kishner reduction reaction.

(ii) Arrange the following compounds in increasing order of their property as indicated:

$\text{F}-\text{CH}_2\text{COOH}$, $\text{O}_2\text{N}-\text{CH}_2\text{COOH}$, CH_3COOH , HCOOH — acid character

(iii) Convert ethanal to 2-butanal and identify the reaction.

(iv) An organic compound with the molecular formula $\text{C}_9\text{H}_{10}\text{O}$ forms 2,4-DNP derivative, reduces Tollens' reagent, and undergoes Cannizzaro reaction. On vigorous oxidation, it gives 1,2-benzenedicarboxylic acid.