केंद्रीय विद्यालय संगठन, अहमदाबाद संभाग

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प्री-बोर्ड परीक्षा 2022-23

PRE-BOARD EXAMINATION 2022-23

SUBJECT: CHEMISTRY **M.M.: 70**

CLASS: XII **TIME: 3 Hours**

General Instructions: Read the following instructions carefully.

a) There are 35 questions in this question paper with internal choice.
b) Internal choices are given in two questions of 2 marks, one question of 3 marks and two questions of 5 marks.
b) SECTION A consists of 18 multiple-choice questions carrying 1 mark each.
c) SECTION B consists of 7 very short answer questions carrying 2 marks each.
d) SECTION C consists of 5 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 Which has highest freezing point:
(a) 1 M Glucose
(b) 1 M NaCl
(c) 1 M $CaCl_2$
(d) 1 M AlF_3

2 A 5% solution of cane-sugar (molecular weight = 342) is isotonic with 1% solution of substance A. The molecular weight of X is
(a) 342 g
(b) 171.2 g
(c) 68.4 g
(d) 136.8 g

3 If limiting molar conductivity of Ca^{2+} and Cl^- are 119.0 and 76.3 S cm^2 mol^{-1}, then the value of limiting molar conductivity of $CaCl_2$ will be:
(a) 195.3 S cm^2 mol^{-1}
(b) 271.6 S cm^2 mol^{-1}
(c) 43.3 S cm^2 mol^{-1}
(d) 314.3 S cm^2 mol^{-1}

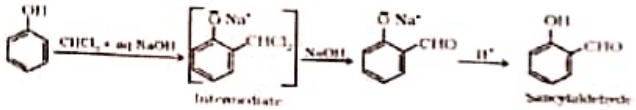
4 The unit of the rate of reaction is the same as that of the rate constant for a –
(a) Zero order reaction
(b) Second order reaction
(c) first order reaction
(d) half order reaction

7 The activation energy of a reaction may be lowered by
(a) Decreasing the temperature
(b) Increasing the temperature
(c) Adding a catalyst
(d) Reducing the potential energy

8 Interstitial compounds are formed when small atoms are trapped inside the crystal lattice of metals. Which of the following is not the characteristic property of interstitial compounds?
(a) They have high melting points in comparison to pure metals.
(b) They are very hard
(c) They retain metallic conductivity.
(d) They are chemically very reactive

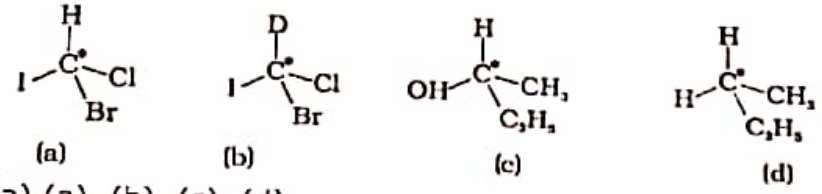
9 $[Pt(NH_3)_4]$ $[CuCl_4]$ and $[Cu(NH_3)_4]$ $[PtCl_4]$ are known as
(a) hydrated isomers.
(b) coordination isomers
(c) linkage isomers
(d) polymerization isomers

10 Identify following reaction:



(a) Wurtz Reaction
(b) Etard Reaction
(c) Reimer Tiemann Reaction
(d) Kolbe Reaction

11 In which of the following molecules carbon atom marked with asterisk (*) is asymmetric?



(a) (a), (b), (c), (d)
(b) (a), (b), (c)
(c) (b), (c), (d)
(d) (a), (c), (d)

12 Which of the following compounds will undergo Cannizzaro reaction?
(a) CH_3CHO
(b) CH_3COCH_3
(c) C_6H_5CHO
(d) $C_6H_5CH_2CHO$

13 Which of the reactions below can result in ketones?
(a) Oxidation of primary alcohols
(b) Oxidation of secondary alcohols
(c) Dehydrogenation of tertiary alcohols
(d) Dehydrogenation of primary alcohols

14 The correct order of the basic strength of methyl substituted amines in aqueous solution is
(a) $CH_3NH_2 > (CH_3)_2NH > (CH_3)_3N$

(b) $(CH_3)_2NH > CH_3NH_2 > (CH_3)_3N$
(c) $(CH_3)_3N > CH_3NH_2 > (CH_3)_2NH$
(d) $(CH_3)_3N > (CH_3)_2NH > CH_3NH_2$

13 Which of the following is incorrect regarding maltose?
(a) It consists of two glucopyranose units
(b) It is a non-reducing sugar
(c) Glycosidic bond between C_1 of one unit and C_4 of the other unit
(d) It is a disaccharide

14 Nucleotides are joined together by
a) peptide linkage b) disulphide linkage c) glycosidic linkage d) phosphodiester linkage

15 Given below are two statements labelled as Assertion (A) and Reason (R)
Assertion: Conductivity of an electrolyte increases with decrease in concentration.
Reason: Number of ions per unit volume decreases on dilution.
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

16 Given below are two statements labelled as Assertion (A) and Reason (R)
Assertion: $[Fe(CN)_6]^{3-}$ is weakly paramagnetic while $[Fe(CN)_6]^{4-}$ is diamagnetic.
Reason : In $[Fe(CN)_6]^{3-}$,Fe^{+3} has one unpaired electron while in $[Fe(CN)_6]^{4-}$, Fe^{+2} has all electrons paired.
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

17 Given below are two statements labelled as Assertion (A) and Reason (R)
Assertion(A): The α-hydrogen atom in carbonyl compounds is more acidic than phenol.
Reason (R): The anion formed after the loss of α-hydrogen atom is resonance stabilized.
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.

18 Given below are two statements labelled as Assertion (A) and Reason (R)
Assertion: - D (+) – Glucose is dextrorotatory in nature.
Reason:- 'D' represents its dextrorotatory nature.
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.

SECTION B

This section contains 7 questions with internal choice in two questions. The following questions are very short answer type and carry 2 marks each.

19 The vapour pressure of water is 12.3 kPa at 300K; calculate the vapour pressure of 1 molar solution of a solute in it.

20 Discuss the variation molar conductivity of weak and strong electrolytes with dilution along with graphical representation.

OR

What is corrosion? Give the mechanism of rusting based on electrochemical theory.

21 For a first order reaction plot a graph between
i) ln[R] and time
ii) log([R_0/R]) and time.

22 Account for the following:
(a) The enthalpies of atomization of transition metals are quite high.
(b) Most of the transition metal ions exhibit characteristic colours in aqueous solutions.

OR

(a) Explain why Cu^+ ion is not stable in aqueous solutions?
(b) How would you account for the increasing oxidising power in the series

$$VO_2^+ < Cr_2O_7^{2-} < MnO_4^-$$

23 Complete the following reactions :

i) $CH_3CH{=}C(CH_3)_2 + HBr \dashrightarrow$

ii) $CH_3CH_2CH_2OH + SOCl_2 \dashrightarrow$

24 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.

25 (i) Write the reactions involved in Hoffmann's Bromamide degradation reaction.
(ii) Give reasons: Aniline does not undergo friedal Craft reaction.

SECTION C

This section contains 5 questions with internal choice in two questions. The following questions are short answer type and carry 3 marks each.

26 (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 -2^0C, 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?

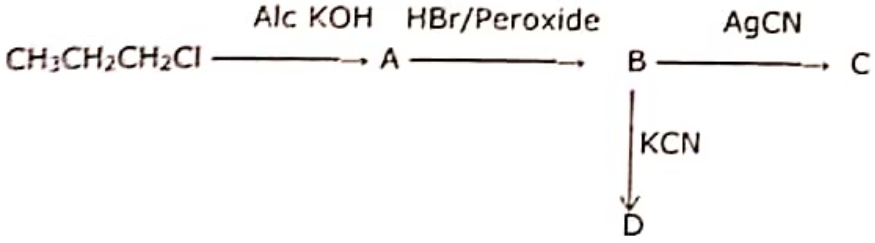
(ii) What is meant by abnormal molar mass of solute? Discuss the factors which bring abnormality in the experimentally determined molecular masses of solutes using colligative properties.

27 (i) State a condition under which a bimolecular reaction is kinetically first order reaction.

(ii) Show that in a first order reaction, time required for completion of 99.9% is 10 times of half-life ($t_{1/2}$) of the reaction.

28 (i) Give a suitable reason that alkyl halides are though polar but immiscible with water.

(ii) Identify A, B , C and D in the following:-



29 (i) You are given benzene, conc. H_2SO_4 and NaOH. Write the equations for the preparation of phenol using these reagents.

(ii) Write the mechanism of hydration of ethene to yield ethanol.

OR

(i) Arrange the following sets of compounds in order of their increasing boiling points:

Pentan-1-ol, n-butane, pentanal, ethoxyethane.

(ii) Give mechanism for the acidic dehydration of alcohols to give ethers.

$C_2H_5\text{-}OH + HO\text{-}C_2H_5 \xrightarrow{conc\ H_2SO_4,\ 413\ K} C_2H_5\text{-}O\text{-}C_2H_5 + H_2O$

30 (i) Although $-NH_2$ group is o/p directing in electrophilic substitution reactions, yet aniline, on nitration gives good yield of m-nitroaniline.

(ii) How will you distinguish between the following pairs of compounds:

(a) Aniline and ethanamine.

(b) Aniline and N-methylaniline

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.

31 The d-block consisting of Groups 3-12 occupies the large middle section of the periodic table. In these elements the inner d orbitals are progressively filled. 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 reacted 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.
There are many useful applications of the d- and f-block elements and their compounds, notable among them being in varieties of steels, catalysts, complexes, organic syntheses, etc.

(i) Name a member of the lanthanoid series which is well known to exhibit +4 oxidation state and why?

(ii) Actinoid contraction is greater from element to element than lanthanoid contraction. Why?

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

OR

What is Mischmetal and write its composition. Also write its uses.

32 **Read the passage given below and answer the following questions:**

Proteins are high molecular mass complex biomolecules of alpha amino acids. The important proteins required for our body are enzymes, hormones, antibodies, transport proteins, structural proteins, contractile proteins etc. Except for glycine, all alpha -amino acids have chiral carbon atom and most of them have L-configuration. The amino acids exist as dipolar ion called zwitter ion, in which a proton goes from the carboxyl group to the amino group. A large number of alpha -amino acids are joined by peptide bonds forming polypeptides. The peptides having very large molecular mass (more than 10,000) are called proteins. The structure of proteins is described as primary structure giving sequence of linking of amino acids; secondary structure giving way in which polypeptide chains are arranged and folded; tertiary structure giving folding, coiling, or bonding polypeptide chains producing three dimensional structures and quaternary structure giving arrangement of sub-units in an aggregate protein molecule.

(i) Name an amino acid which is optically inactive. Also give its structural formula.

(ii) Name any two forces which stabilize the 2° and 3° structures of proteins.

(iii) What is called a dipeptide. Taking any two suitable alpha amino acids show the formation of a dipeptide.

OR

Give the condition for the Polypeptides with fewer amino acids are likely to be called proteins. Give an example any such amino acid.

SECTION E

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

3 **(i)** What is the emf of the cell when the cell reaction attains equilibrium?

(ii) What is a fuel cell? Give two advantages of H_2-O_2 fuel cell over ordinary cell.

(iii) Calculate the potential of hydrogen electrode in contact with a solution whose pH is 10.

OR

(i) What is the quantity of electricity in coulombs needed to reduce 1 mol of $Cr_2O_7^{2-}$?

Consider the $Cr_2O_7^{2-} + 14H^+ + 6e^- \rightarrow 2Cr^{3+} + 8H_2O$ reaction:

(ii) Write the chemistry (separate reaction at the cathode and the anode and the complete cell reaction) of the lead storage battery when in use, highlighting all the materials that are involved during the battery in use.

(iii) What is the cell potential for the cell at $25^{\circ}C$

Cr/Cr^{+3} (0.1 M) // Fe^{+2} (0.01M)/Fe

$E^{\circ}_{Cr^{+3}/Cr} = -0.74V$; $E^{\circ}Fe^{2+}/Fe = -0.44V$.

34 (i) Write down the IUPAC name of the complex: $[Cr(NH_3)_2Cl_2(en)]Cl$ (en = ethylenediamine)

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

(iii) Discuss the nature of bonding in the coordination entity $[Co(NH_3)_6]^{3+}$ based on valence bond theory.

35 (i) Give a simple chemical test to distinguish between propanal and propanone.

(ii) Illustrate HVZ reaction.

(iii) How would you convert Benzene to benzaldehyde.

(iv) An organic compound (A) (molecular formula $C_8H_{16}O_2$) 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 the structural formula and name of the main product formed when propanal reacts with $H_2N - NH_2$ followed by heating with KOH in ethylene glycol.

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

F – CH_2COOH, O_2N – CH_2COOH, CH_3COOH, HCOOH — acid character

(iii) How would you convert Ethanal to 2- Butenal

(iv) An organic compound with the molecular formula $C_9H_{10}O$ forms 2,4-DNP derivative, reduces Tollens' reagent, and undergoes Cannizzaro reaction. On vigorous oxidation, it gives 1,2-benzenedicarboxylic acid. Identify the compound.