GRADE-XII,

TIME: 3:00 HRS **M.M: 70**

General Instruction:

Read the following instructions carefully.

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

Section – A

Question Nos. 1 to 16 are Multiple Choice Questions, carrying 1 mark each.

(Q1). The sugar (disaccharide) present in milk is:

(a). glucose (b). sucrose (c). lactose (d). maltose

Q2. The reagent used to prepare amine from amide is:

(a). Br_2/KOH (b). NaOH/CaO

(c). HCl/$ZnCl_2$ (d). $K_2Cr_2O_7$/ H_2SO_4

Q3. The catalyst used for the preparation of methyl alcohol from water gas is:

(a). CuO+ZnO+NiO (b). CuO + ZnO + Cr_2O_3

(c). Al_2O_3 (d). CuO + Fe_2O_3

Q4. A primary alkyl halide would prefer to undergo:

(a). S_N1 reaction (b). S_N2 reaction

(c). α-elimination (d). racemisation

Q5. Which one among the following metals of 3d-series has the lowest melting point?

(a). Fe (b). Mn (c). Zn (d). Cu

(Q6). Mole fraction of glycerine $C_3H_5(OH)_3$ in solution containing 36 g of water and 46 g of glycerine is:

(a). 0.46 (b). 0.20 (c). 0.40 (d). 0.36

(Q7). The standard oxidation electrode potential of four metals A, B, C and D are + 1.5 V, -2.0 V, + 0.84 V and -0.36 V respectively. The order of increasing reactivity of these metals is:

(a). A < B < C < D (b). D < C < B < A

(c). A < C < D < B (d). B < C < D < A

(Q8). For a zero order reaction of the type A-----> products, the rate equation may be expressed as:

(a). $k=\frac{[A]0-[A]}{T}$ (b). $k=\frac{[A]-[A]0}{T}$

(c). $k=\frac{[A]0-[A]}{2T}$ (d) $k=\frac{[A]0-[A]\,t}{2}$

(Q9). Which of the following is not correct?

(a). In haloarenes, the electron pairs on halogen atom are in conjugation with π-electrons of the ring.

(b). The carbon-magnesium bond is covalent and non- polar in nature.

(c). During S_N1 reaction, the carbocation formed in the slow step being sp^2 hybridised is planar.

(d). Out of $CH_2 = CH - Cl$ and $C_6H_5CH_2Cl$, $C_6H_5CH_2Cl$ is more reactive towards S_N1 reaction.

(Q10). Lucas reagent is used to differentiate which monohydric alcohol?

(a). Primary (b). Secondary (c). Tertiary (d). All of these

(Q11). The unit of cell constant is:

(a). ohm cm^{-1} (b) ohm^{-1} (c). cm^{-1} (d) $ohm^{-1}\,cm^2\,mol^{-1}$

(Q 12). Value of Henry's constant K_H:

(a). increases with decrease in temperature

(b). decreases with increase in temperature

(c). increases with increase in temperature

(d). remains constant

Directions (Q.Nos. 13-16): Given below are two statements labelled as Assertion (A) and Reason (R). Select the most appropriate answer from the options:

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.

(Q 13). **Assertion (A):** Zr and Hf have almost identical radii.

Reason (R): Both Zr and Hf exhibit similar properties.

(Q14). **Assertion (A):** Order and molecularity are same.

Reason (R): Order is determined experimentally and molecularity is the sum of the stoichiometric coefficient of rate determining elementary step.

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Q 15. **Assertion (A):** tert-Butyl bromide undergoes Wurtz reaction to give 2, 2, 3, 3-tetramethylbutane.

Reason (R): In Wurtz reaction, alkyl halides react with sodium in dry ether to give hydrocarbon containing double the number of carbon atoms present in the halide.

Q 16. **Assertion (A):** Alcohols have higher boiling points than ethers of comparable molecular masses.

Reason (R): Alcohols and ethers are isomeric in nature.

Section – B

(Q17). For a decomposition reaction, the values of k at two different temperatures are given below.

$k_1 = 2.15 \times 10^{-8}$ L/(mol.s) at 650 K

$k_2 = 2.39 \times 10^{-7}$ L/(mol.s) at 700 K

Calculate the value of E_a for the reaction.

(Given, log11.11 = 1.046 , R = 8.314 $JK^{-1}mol^{-1}$).

(Q18). Using IUPAC names, write the formulae for the following

(i) Hexaamminecobalt (III) sulphate

(ii) Potassium trioxalatochromate (III)

(Q 19). Write IUPAC name of the following compound:

(a).$CH_3NHCH(CH_3)_2$ (b).CH_3-CH(OH)-CH_2-COOH

(Q 20). For which type of reactions, order and molecularity have the same value?

(Q 21). Explain the following terms.

(i) Rate determining step of a reaction.

(ii) Molecularity of a reaction.

Section – C

(Q-22). Define the following:

(i) Ambidentate Ligand. (ii) Coordination number.

(Q-23). Note the structures of the products when butan-2-ol reacts with the following:

(i) CrO_3 (ii) $SOCl_2$

(Q-24). What happens when:

(i) Butanone is treated with methyl magnesium bromide and then hydrolysed

(ii) Sodium benzoate is heated with soda lime.

(iii) Phenol is treated with conc.HNO_3.

(Q-25). From the given cells:

Lead storage cell, Mercury cell, Fuel cell and Dry cell

Answer the following:

(i) Which cell is used in hearing aids?

(ii) Which cell was used in Apollo Space Programme?

(iii) Which cell is used in automobiles and inverters?

(Q-26). Arrange each set of compounds in order of increasing boiling points:

(i) Bromomethane, bromoform, chloromethane, dibromomethane

(ii) 1-chloropropane, isopropylchloride, 1-chlorobutane.

(iii) CH_3-CHO , CH_3-CH_2-OH , CH_3-CH_2-CH_3

(Q-27). Write the IUPAC names and hybridisation of the following complexes:

(i) $[Ni(CN)_4]^{2-}$

(ii) $[Fe(H_2O)_6]^{2+}$

(Given: Atomic number, Ni = 28 Fe = 26)

(Q-28). Account for the following:

(i) Primary amines (R-NH_2) have higher boiling point than tertiary amines (R_3N).

(ii) Aniline does not undergo Friedel - Crafts reaction.

(iii) $(CH_3)_2NH$ is more basic than $(CH_3)_3N$ in an aqueous solution

Section – D

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

(Q-29). Monosaccharides containing an aldehyde group are called aldoses while those containing a keto group are called ketoses. All monosaccharides containing five and six carbon atoms have cyclic structures, furanose (five membered) and pyranose (six membered).During ring formation, C_1 in aldoses and C_2 in ketoses becomes chiral and hence all these monosaccharides exist in two forms called the α-anomer and β-anomer while C_1 and C_2 are called glycosidic or anomeric carbon atoms. In contrast, stereoisomers, which differ in configuration at any other chiral other carbon other than the glycosidic carbon are called epimers.

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Two molecules of the same or different monosaccharides combine together through glycosidic linkage to form disaccharides.

Based on the above information, answer the following questions.

(a) Explain essentially the difference between α-form of glucose and β-form of glucose.

(b) Name the two monosaccharides obtained on hydrolysis of lactose sugar.

Or

What type of linkage is present in disaccharides?

(c) Write one difference between peptide linkage and glycosidic linkage

(Q-30). Solutions are homogeneous mixture of two or more substances. Ideal solution follow Raoult's law. The vapour pressure of each component is directly proportional to their mole fraction if both solute and solvent are volatile. Non-ideal solution do not obey Raoult's law and forms azeotropes which cannot be separated by fractional distillation. Henry's law is a special case of Raoult's law and is applicable to gases dissolved in liquids. Relative lowering of vapour pressure, elevation in boiling point, depression in freezing point and osmotic pressure are colligative properties which depend upon mole fraction of solute, molality and molarity of solutions.

Based on the above information, answer the following question.

(a) What will be the vapour pressure (mm of Hg) of water at 293 K when 25 g of glucose is dissolved in 450 g of water? Vapour pressuse of water at 293 k is 17.5 mmHg.

(b) Define Azeotrope. What type of azeotrope is formed by the solutions showing positive deviation. from Raoult's law? Give an example.

Or

(c) The vapour pressure of C_2H_5OH at 298 K is 50 mm of Hg. Its mole fraction in a solution with CH_3OH is 0.20. What is its vapour pressure in solution if the mixture obeys Raoult's law.

Section – E

(Q-31). (i) When 2.56 g of sulphur was dissolved in 100 g of CS_2, the freezing point gets lowered by 0.383 K. Calculate the formula of sulphur (S). (K_f for CS_2 = 3.83 K kg mol^{-1}, Atomic mass of sulphur = 32 g mol^{-1})

(ii) Blood cells are isotonic with 0.9% sodium chloride solution. What happens if we place blood cells in a solution containing

(a) 1.2% sodium chloride solution?

(b) 0.4% sodium chloride solution?

Or

(i) Define the term molar conductance.

(ii) How Nernst equation can be applied in the calculation of equilibrium constant of any cell reaction?

(iii) Calculate the emf of the cell.

$Cr|Cr^{3+}(0.1M)||Fe^{2+}(0.01\ M)|Fe$

Given: $E^0_{Cr^{3+}/Cr} = -0.75$ V,

$E^0_{Fe^{2+}/Fe} = -0.45$ V

32.(a) Write the equations involved in the following reactions:

(i) Stephen reaction.

(ii) Wolff-Kishner reaction.

(iii) Etard reaction.

(b) A first order reaction takes 40 min for 30% decomposition. Calculate $t_{1/2}$ for this reaction. (Given, log 1.428 = 0.1548)

Or

(a) An aromatic compound A (molecular formula C_8H_8O) gives 2, 4-DNP test. It gives a yellow precipitate of compound B on treatment with iodine and NaOH.

A does not gives Tollen's test. On drastic oxidation with chromic acid, it gives a carboxylic acid (C) having molecular formula $C_7H_6O_2$

(i) Identify A, B and C.

(ii) Write equation involved in 2, 4-DNP test of A.

(iii) Write equation of iodoform test of A.

(b) Give the chemical tests to distinguish between

(i) propanol and propanone.

(ii) benzaldehyde and acetophenone.

33. Answer the following

(a) Most of the transition metal ions exhibit characteristic colours in aqueous solutions. Why?

(b) Many of the transition elements are known to form interstitial compounds. Explain.

(c) Copper (I) ion is not known in aqueous solution. Why?

(d) Transition metals and their compounds generally exhibits a paramagnetic

behaviour. Give reason.

(e) Cr^{2+} is a strong reducing agent, whereas Mn^{3+} with the same configuration is an oxidising agent. Why?

Or

Answer the following

(a) The enthalpies of atomisation of transition metals are quite high.

(b) Write two characteristics of the transition elements.

(c) $E^{0}_{(Mn^{2+}/Mn)}$ is -1.18 V. Why is this value highly negative in comparison to neighbouring d-block elements?

(d) Which element of 3d-series has lowest enthalpy of atomisation and why?

(e) What happens when sodium chromate is acidified?

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