

KVS LUCKNOW REGION
PRE-BOARD EXAMINATION 2024-2025
Class-XII
SUBJECT -CHEMISTRY THEORY (043)

M.M 70

TIME:3HRS

GENERAL INSTRUCTION

Read the following instructions carefully

- (a) There are 33 questions in this question paper with internal choice
- (b) SECTION A consist 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 question 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 table and calculator is not allowed

SECTION A

Question no.1 to 16 are multiple choice question carrying 1 marks each

- Q.1 In the ring structure of glucose the anomeric carbon is
a. C-2 b. C-3 c. C-4 d. C-1
- Q.2 The quantity of charge required to obtain one mole of aluminum from Al_2O_3 is
a. 1F b. 6F c. 3F d. 2F
- Q.3 Which of the following is affected by catalyst
a. ΔH b. ΔG c. E_a d. ΔS
- Q.4 The half-life period of a first order reaction is 400 S. its rate constant will be
a. $1.73 \times 10^{-3} s^{-1}$ b. $1.44 \times 10^{-3} S^{-1}$ c. $2.72 \times 10^{-3} S^{-1}$ d. $2.88 \times 10^{-3} S^{-1}$
- Q.5 $KMnO_4$ is colored due to
a. d-d transitions c. Unpaired electrons in d orbital in Mn
b. Charge transfer from Ligand to metal d. charge transfer from metal to ligand
- Q.6 Among the following maximum magnetic moment can be shown by
a. Sc (Z=21) b. V (Z=23) C. Cr (Z=24) d. Fe (Z=26)
- Q.7 The reaction between $RNH_2 + CHCl_3 + KOH$ (alco.) is known as
a. Coupling reaction c. Carbylamine reaction
b. Hoffman bromamide reaction d. Diazotization
- Q.8 The reagent that can be used to distinguish acetophenone & benzophenone is
a. 2,4 DNP c. Fehling solution
b. Aqueous $NaHSO_3$ d. I_2 in NaOH
- Q.9 Inversion of configuration occurs in;
a. SN^2 reaction b. SN^1 reaction
c. Neither SN^1 or SN^2 reaction d. SN^1 as well as SN^2 reactions

Q.10 Monochlorination of toluene in sunlight followed by hydrolysis with aq. NaOH yields:

- | | |
|---------------|--------------------------|
| a. O – cresol | c. benzyl alcohol |
| b. m- cresol | d. 2,4 dihydroxy toluene |

Q.11 Arrange the following compounds in increasing order of boiling point:

Propan- 1 – ol, butan-1-ol, butan-2-ol, pentan-1-ol

- Propan-1-ol, Butan-2-ol, Butan -1-ol, pentan-1-ol
- Propan-1-ol, Butan-1-ol, Butan-2-ol, pentan-1-ol
- Pentan-1-ol. Butan-2-ol, Butan-1-ol, Propan-1-ol
- Pentan -1-ol, Butan-1-ol, Butan -2-ol, Propan -1-ol

Q.12 What is IUPAC name of the ketone A, which undergoes iodoform reaction to give $\text{CH}_3\text{CH}=\text{C}(\text{CH}_3)\text{COONa}$ and yellow precipitate of CHI_3 ?

- | | |
|-----------------------------|---------------------------|
| (a) 3-Methylpent-3-en-2-one | (c) 3-Methylbut-2-en- one |
| (b) 2, 3-Dimethylethanone | (d) 3-Methylpent-4-one |

Q.13 The following two statement are labelled as Assertion and reason

Assertion – Electrolysis of NaCl solution gives chlorine at Anode instead of oxygen

Reason- Formation of oxygen at anode require over voltage

Select the most appropriate answer from the options given below:

- Both A and R are true and R is the correct explanation of A
- Both A and R are true but R is not the correct explanation of A.
- A is true but R is false.
- A is false but R is true.

Q.14 The following two statement are labelled as Assertion and reason

Assertion – Alcohols reacts as both electrophiles and nucleophiles

Reason - When the bond between C-O in alcohol is broken, it acts as nucleophiles

Select the most appropriate answer from the options given below

- Both A and R are true and R is the correct explanation of A
- Both A and R are true but R is not the correct explanation of A.
- A is true but R is false.
- A is false but R is true.

Q.15 The following two statement are labelled as Assertion and reason

Assertion- Vitamin C cannot be stored in our body

Reason - Vitamin C is water soluble and readily excreted in urine

Select the most appropriate answer from the options given below

- Both A and R are true and R is the correct explanation of A
- Both A and R are true but R is not the correct explanation of A.
- A is true but R is false.
- A is false but R is true.

Q.16 The following two statement are labelled as Assertion and reason

Assertion-Benzoic acid does not undergo Friedel craft reaction

Reason- The -COOH is deactivating and the catalyst AlCl_3 get bonded to carboxyl group

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

Question no. 17 to 21 are short answer questions carrying 2 marks each

Q.17 The vapour pressure of pure liquid A and pure liquid B at 25°C are 120 mm Hg and 160

mm Hg respectively. If equal moles of A & B are mixed to form an ideal solution, calculate the vapour pressure of the solution .

Q.18 Differentiate between

- a. Keratin and insulin
- b. Nucleotide and Nucleoside

OR

What happens when Glucose reacts with

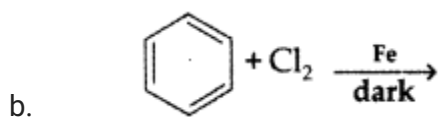
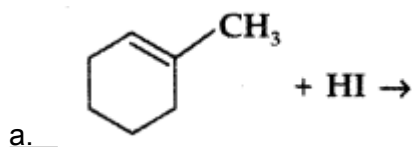
- a. Br_2 water
- b. HI

Q.19 A reaction is of first order in reactant A and of second order in reactant B. How is the rate of this reaction affected when (i) the concentration of B alone is increased to three times (ii) the concentrations of A as well as B are doubled?

Q.20 Bring out the following conversion

- a. Benzoyl chloride to Benzaldehyde
- b. Ethanoic acid to 2-chloro Ethanoic acid

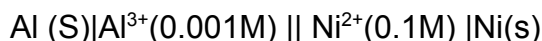
Q. 21 Identify and draw the structure of product



SECTION C

Question no. 22 to 28 are short answered question and carrying 3 marks each

Q.22 Calculate the emf of the following cell at 25 °C



Given $E^\circ \text{Ni}^{2+}/\text{Ni} = -0.25\text{V}$ & $E^\circ \text{Al}^{3+}/\text{Al} = -1.66\text{V}$

$\log 2 = 0.3010$, $\log 3 = 0.477$

Q. 23 a. What is meant by ambidentate ligand ? Give example

b. Write the electronic configuration for d^4 ion, If $\Delta_o < P$ on the basis of crystal field theory.

c. Does ionisation isomer for the following compound exist? Justify your answer.



Q. 24 List the point of differences between order and molecularity of a reaction.

For which type of reactions order and molecularity are same?

Q. 25 Give reasons for the following:

- During the electrophilic substitution reaction of haloarenes, para substituted derivative is the major product
- Haloalkanes are immiscible with water though C-cl bond is polar
- Grignard reagent should be prepared under anhydrous condition.

OR

- Name the suitable alcohol and reagent, from which 2-Chloro-2-methyl propane can be prepared.
- Out of the Chloromethane and Fluoromethane, which one is has higher dipole moment and why?
- \pm Butan-2-ol is optically inactive.

Q. 26 Arrange the following compounds in increasing order of their property as indicated

- CH_3COCH_3 , $\text{C}_6\text{H}_5\text{COCH}_3$, CH_3CHO
(reactivity towards nucleophilic addition reaction)
- $\text{Cl}-\text{CH}_2-\text{COOH}$, $\text{F}-\text{CH}_2-\text{COOH}$, CH_3-COOH (acidic character)
- Benzoic acid, 4-Nitrobenzoic acid, 3,4-Dinitrobenzoic acid, 4-Methoxybenzoic acid (Acidic character)

Q.27 (i)(a) What are essential and non-essential amino acids in human food? Give one example of each type

(b) mention one function each for DNA & RNA

Q. 28 Explain the following reactions with an example for each

- Reimer Tiemann reaction
- Williamsons ether synthesis
- Friedel craft acylation of Anisol

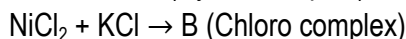
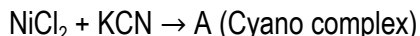
Section D

Question no. 29 &30 are case based questions and carrying 4 marks each Read the following passages carefully and give the answers for the questions given with the passages

Q.29 Coordination compounds are the compounds in which the central metal atom is linked to a number of ions or neutral molecules by coordinate bonds and the donor atoms, molecules or anions which donate a pair of electrons to the metal atom or ion and form a coordinate bond

with it are called ligands. Coordination number of atoms or ions immediately surrounding a central atom in a complex or a crystal.

Coordination number of Ni^{2+} is 4 and it forms two complexes A and B as given below:



(i) Which of the following is the correct IUPAC name of complex A?

- a. Potassium tetracyano nickelate (I)
- b. Potassium tetra nitrile nickelate (II)
- c. Potassium tetracyano nickelate (III)
- d. Potassium tetracyano nickelate (II)

(ii) The correct formula of complex B will be

- a. $\text{K}_2[\text{NiCl}_4]$
- b. $\text{K}_2[\text{Ni}(\text{CN})_4]$
- c. $\text{K}_3[\text{NiCl}_4]$
- d. $\text{K}_4[\text{NiCl}_4]$

(iii) The magnetic nature of A is

- a. Paramagnetic
- b. Diamagnetic
- c. Ferrimagnetic
- d. Ferromagnetic

(iv) The State of hybridization of the complex B is

- a. sp
- b. sp^2
- c. sp^3
- d. sp^3d^2

Q.30 The conductance of material is the properties of material which allows the flow of ions through its self and thus conducts electricity. Conductance G is opposite of resistance. Conductivity is represented by (κ) and it depends upon nature of concentration of electrolyte. A more common term molar conductivity (λ_m) of a solution at a given concentration is conductance of the volume of the solution containing one mole of electrolyte kept between two electrodes with unit area of cross section and a distance of unit length. Both conductivity and molar conductivity varies with dilution, at infinite dilution molar conductivity is termed as limiting molar conductivity λ_m^0 and limiting molar conductivity for weak electrolyte cannot be found graphically.

(Answer any four)

- (a) Why does conductivity of solution decreases with dilution?
- (b) What is the effect of temperature on metallic and electrolytic conductor?
- (c) State Kohlrausch's Law.
- (d) What is the unit of Molar Conductivity?
- (e) Cell constant G^* is given as
(a) $G^* = A/l$ (b) $G^* = A \times l$ (c) $G^* = l/A$ (d) none of these

SECTION E

Question no. 31 to 33 are long answer questions and carrying 5 marks each

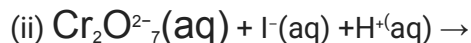
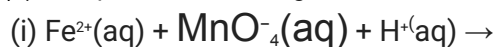
Q.31 (a) Define the term (i) Mole fraction (ii) Ideal solution

- (b) 15.0 g of an unknown molecular material is dissolved in 450 g of water. The resulting solution freezes at -0.34°C . What is the molar mass of the material?
(K_f for water = $1.86 \text{ K kg mol}^{-1}$)

Or

- (a) Determine the osmotic pressure of a solution prepared by dissolving 2.5×10^{-2} g of K_2SO_4 in 2L of water at $25^\circ C$, assuming that it is completely dissociated.
($R = 0.0821 \text{ L atm K}^{-1} \text{ mol}^{-1}$, Molar mass of $K_2SO_4 = 174 \text{ g mol}^{-1}$).
- (b) What is meant by +ve and -ve deviations from Raoult's law and how is the sign of ΔH solution related to +ve and -ve deviations from Raoult's law?

Q.32 (a) Complete the following chemical reaction equations:



(a) Explain why

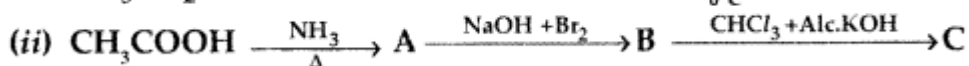
- Transition metals exhibit variable oxidation state
- Transition metals generally form coloured compounds
- The enthalpies of atomization of the transition elements are quite high

OR

Give reasons:

- Zirconium ($Z = 40$) and Hafnium ($Z = 72$) have almost similar atomic radii.
- Salts of La^{3+} ($Z=57$) and Lu^{3+} ($Z=71$) are white.
- Cu^+ ion is not known in aqueous solutions
- With the same d-orbital configuration d^4 , Cr^{2+} ion is a reducing agent but Mn^{3+} ion is an oxidising agent.
- Orange solution of potassium dichromate turns yellow on adding sodium hydroxide to it.

Q.33 (a) Identify and draw the structure of A, B & C



(b) Give a chemical test to distinguish between the following pair of compounds

- Aniline and methyl amine
- N-methyl methanamine and N, N- dimethylmethanamine

OR

(a) Account for the following:

- Primary amines ($R-NH_2$) have higher boiling point than tertiary amines (R_3N).
 - Aniline does not undergo Friedel – Crafts reaction.
 - $(CH_3)_2NH$ is more basic than $(CH_3)_3N$ in an aqueous solution
- (b) Bring out the following conversions
(i) Nitrobenzene to aniline (ii) Aniline to Iodobenzene

