

DAY — 08

SEAT NUMBER

2024 II 29

1100

J-852

(E)

CHEMISTRY (55)

Time : 3 Hrs.

(7 Pages)

Max. Marks : 70

General Instructions :

The question paper is divided into four sections.

- (1) **Section A:** Q. No. 1 contains Ten multiple choice type of questions carrying One mark each. Only the first attempt will be considered for evaluation.
Q. No. 2 contains Eight very short answer type of questions carrying One mark each.
- (2) **Section B:** Q. No. 3 to Q. No. 14 are Twelve short answer type of questions carrying Two marks each. (Attempt any Eight)
- (3) **Section C:** Q. No. 15 to Q. No. 26 are Twelve short answer type of questions carrying Three marks each. (Attempt any Eight)
- (4) **Section D:** Q. No. 27 to Q. No. 31 are Five long answer type of questions carrying Four marks each. (Attempt any Three)
- (5) Use of log table is allowed. Use of calculator is not allowed.
- (6) Figures to the right indicate full marks.
- (7) Given : $R = 8.314 \text{ J.K}^{-1}.\text{mol}^{-1}$
 $N_A = 6.022 \times 10^{23}$
 $F = 96500 \text{ C}$

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SECTION - A

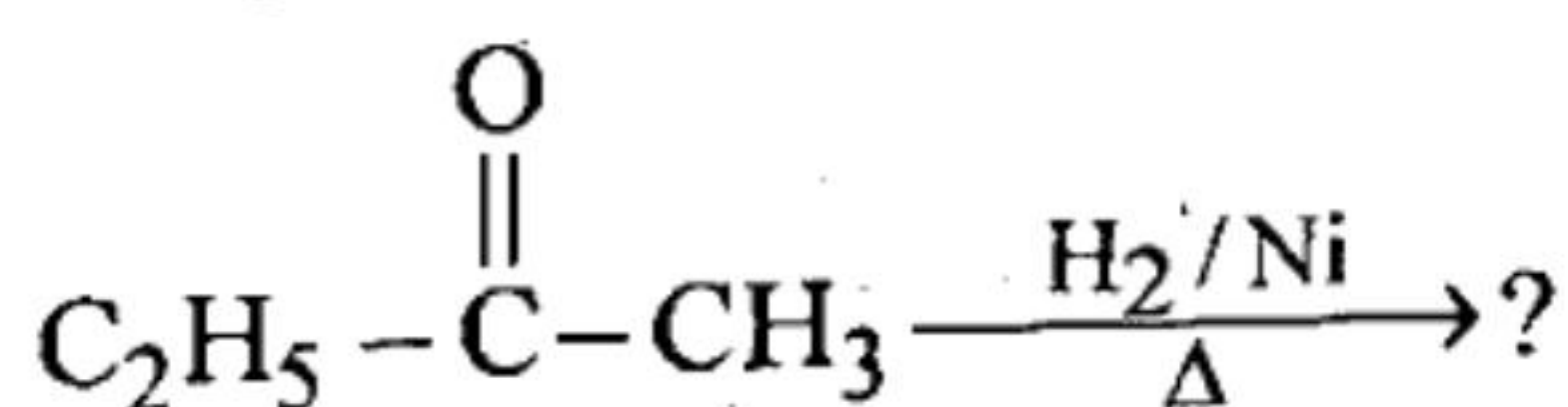
Q. 1. Select and write the correct answer for the following multiple choice type of questions :

[10]

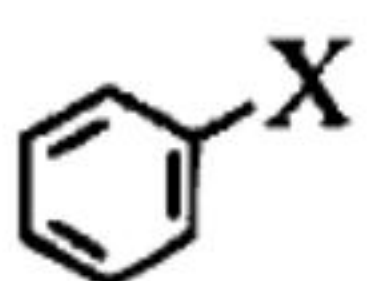
- (i) The spin only magnetic moment of Cr^{3+} cation is _____.
 (a) 3.742 BM (b) 3.755 BM
 (c) 3.873 BM (d) 3.633 BM

- (ii) The linkage present in Lactose is _____.
 (a) α , β -1, 2-glycosidic linkage
 (b) α -1, 4-glycosidic linkage
 (c) β -1, 4-glycosidic linkage
 (d) α -1, 4-glycosidic linkage

- (iii) The product of the following reaction is



- (a) $\text{CH}_3-\text{CH}_2-\text{CH}_2-\text{CH}_2-\text{OH}$
 (b) $\text{CH}_3-\underset{\text{OH}}{\text{CH}}-\text{CH}_2-\text{CH}_3$
 (c) $\text{CH}_3-\text{CH}_2-\text{CH}_2-\text{CH}_3$
 (d) $\text{CH}_3-\text{CH}_2-\text{CH}_2-\text{COOH}$
- (iv) The pH of 0.001M HCl solution is _____.
 (a) 10 (b) 3
 (c) 2 (d) 11
- (v) The correct structure of complex having IUPAC name sodium hexanitrocobaltate (III) is
 (a) $\text{Na}_3[\text{Co}(\text{NO}_2)_5]$
 (b) $\text{Na}_4[\text{Co}(\text{NO}_2)_6]$
 (c) $\text{Na}_3[\text{Co}(\text{NO}_2)_6]$
 (d) $\text{Na}_4[\text{Co}(\text{NO}_2)_5]$

- (vi) The number of particles present in Face Centred Cubic Unit Cell is/are ____.
- (a) 1 (b) 2
(c) 3 (d) 4
- (vii) The monomer used in preparation of teflon is ____.
- (a) E caprolactum (b) vinyl chloride
(c) styrene (d) tetrafluoroethene
- (viii) Among the following vinylic halide is ____.
- (a) $\text{R}-\underset{\text{X}}{\text{CH}}-\text{R}$ (b) $\text{CH}_2=\text{CH}-\text{X}$
(c)  (d) $\text{CH}_2=\text{CH}-\text{CH}_2-\text{X}$
- (ix) The product of hydrolysis of propyne in the presence of 1% HgSO_4 and 40% H_2SO_4 is ____.
- (a) methanal (b) ethanal
(c) propanal (d) propanone
- (x) If unit of rate constant is $\text{mol dm}^{-3}\text{s}^{-1}$, the order of reaction would be ____.
- (a) zero (b) 1
(c) 2 (d) 3

Q. 2. Answer the following questions :

[8]

- (i) Write the name of metal nanoparticle used to remove E.coli bacteria from water.
- (ii) Write the name of reduction product formed when ethyl cyanide is treated with sodium and alcohol.
- (iii) Complete the reaction: $\text{CH}_3\text{CH}_2\text{Cl} \xrightarrow[\text{alc.}\Delta]{\text{AgCN}} ?$
- (iv) Calculate effective atomic number of $[\text{Co}(\text{NH}_3)_6]^{3+}$ ion.

- (v) The compounds of Ti^{4+} ions are colourless due to
- (vi) Write SI unit of molar conductivity.
- (vii) Write the sign convention of work done during expansion of gas.
- (viii) Write the condition of reverse osmosis.

SECTION - B

[16]

Attempt any EIGHT of the following questions :

- Q. 3. Derive an expression for maximum work obtainable during isothermal reversible expansion of an ideal gas from initial volume (V_1) to final volume (V_2).
- Q. 4. What are interhalogen compounds? Write the chemical reaction, when chlorine reacts with dry slaked lime.
- Q. 5. What is nano material? Write the reaction involved in sol-gel process during hydrolysis. <https://www.maharashtrastudy.com>
- Q. 6. Write classification of proteins with an example.
- Q. 7. Calculate the time required to deposit 2.4 g of Cu, when 2.03 A of current passed through CuSO_4 solution.
(At. mass of Cu = 63.5 g.mol^{-1})
- Q. 8. Why amines are basic in nature? Among dimethylamine ($\text{pK}_b = 3.27$) and diethylamine ($\text{pK}_b = 3.0$), which one is more basic?
- Q. 9. Explain buffer action of sodium acetate-acetic acid buffer.
- Q. 10. Write preparation of (a) diethyl ether (b) ethyl cyanide from ethyl bromide.
- Q. 11. Henry's constant for $\text{CH}_3\text{Br}_{(g)}$ is $0.159 \text{ mol dm}^{-3}.\text{bar}^{-1}$ at 25°C . Calculate its solubility in water at 25°C , if its partial pressure is 0.164 bar.

Q. 12. Write the structure and name of monomer of

- (a) Nylon-6
- (b) Natural rubber

Q. 13. Define Lanthanide contraction. Write the balanced chemical equations when acidified $K_2Cr_2O_7$ reacts with H_2S .

Q. 14. Derive the relationship between molar mass, density of the substance and unit cell edge length.

SECTION - C

Attempt any EIGHT of the following questions :

[24]

Q. 15. What is osmotic pressure? How will you determine molar mass of solute from osmotic pressure?

Q. 16. Write chemical reactions involved in :

- (a) Rosenmund reduction.
- (b) Gatterman Koch formylation.
- (c) Cannizzaro reaction of methanal.

Q. 17. Calculate the standard enthalpy of combustion of methane, if the standard enthalpy of formation of methane, carbon dioxide and water are -74.8 , -393.5 and $-285.8 \text{ kJmol}^{-1}$ respectively.

Q. 18. What is the action of following on ethyl bromide ?

- (a) silver nitrite
- (b) Mg in dry ether
- (c) alcoholic sodium hydroxide

Q. 19. For the reaction $A + B \rightarrow P$.

If $[B]$ is doubled at constant $[A]$, the rate of reaction doubled. If $[A]$ is triple and $[B]$ is doubled, the rate of reaction increases by a factor of 6. Calculate the rate law equation.

- Q. 20.** Arrange the following in the increasing order of the property mentioned:
- HOCl , HClO_2 , HClO_3 , HClO_4 (acidic strength)
 - MF , MCl , MBr , MI (ionic character)
 - HF , HCl , HBr , HI (thermal stability)
- Q. 21.** Explain Wolf-Kishner reduction reaction. Write preparation of propanone by using ethanoyl chloride and dimethyl cadmium.
- Q. 22.** Write postulates of Werner theory of co-ordination complexes. Write the name of a hexadentate ligand.
- Q. 23.** Define electrochemical series and write its two applications.
- Q. 24.** Identify 'A', 'B' and 'C' in following chain reaction and rewrite the chemical reactions:
- $$\text{CH}_3\text{CH}_2\text{OH} \xrightarrow[\text{Br}_2]{\text{red 'P'}} \text{A} \xrightarrow[\text{alc}]{\text{KCN}} \text{B} \xrightarrow[\text{Ether}]{\text{LiAlH}_4} \text{C}$$
- Q. 25.** Define acids and bases according to Bronsted-Lowry theory. Derive relationship between pH and pOH.
- Q. 26.** Write the preparation of potassium dichromate from chromite ore.

SECTION - D

Attempt any **THREE** of the following questions :

[12]

Q. 27. Convert the following :

- acetaldehyde to isopropyl alcohol.
- cumene to phenol.
- anisole to phenol.

Write two uses of neon.

- Q. 28. Define : (i) Extensive and Intensive properties
(ii) Isobaric and Adiabatic processes

What are enzymes?

Write the atomic numbers of transuranium elements.

- Q. 29. Predict the type of cubic lattice of a solid element having edge length of 400 pm and density is 6.25 g/ml
(Atomic mass of element = 60)

Define : Nanoscience

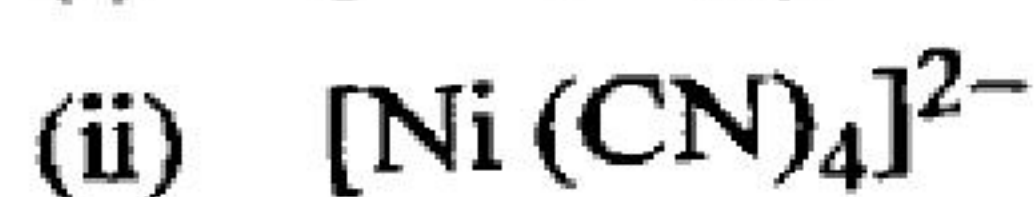
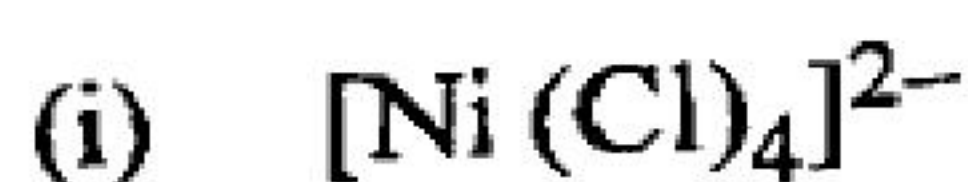
Write chemical reaction for the preparation of polyacrylonitrile.

- Q. 30. Derive the relation between half life period and rate constant for first order reaction.

Write the net cell reaction during discharging of lead accumulator.

Draw the structure of peroxymonosulphuric acid.

- Q. 31. Mention the number of unpaired electrons and geometry of following complexes :



Convert the following :

(a) Ethanenitrile into ethanal.

(b) Cyclohexane into adipic acid.

