

QUESTION-1

(a) FILL IN THE BLANKS:

[4]

- (i) The geometry of XeO_2F_4 molecule is _____ and the hybridization is _____.
- (ii) Phenol gives _____ coloured dye on reaction with benzene diazonium chloride at $0-5^\circ C$. This is known as _____.
- (iii) The appearance of colour in solid alkali metal halides is due to _____.
- (iv) The amount of coulombs required to deposit one mole of aluminum from a solution of $AlCl_3$ will be _____.

(b) COMPLETE THE FOLLOWING STATEMENTS BY CHOOSING THE CORRECT ALTERNATIVE:

[4]

- (i) Which among the following reacts fastest by S_N1 reaction?
(a) $(CH_3)_3C-Br$ (b) $(CH_3)_2CHBr$ (c) CH_3CH_2Br (d) CH_3Br
- (ii) When acetone is treated with Grignard's reagent followed by hydrolysis, the product formed is
(a) Primary alcohol (b) Secondary alcohol (c) Tertiary alcohol (d) Ether
- (iii) A solution of urea, molecular mass 60g/mol boils at $100.18^\circ C$ at the atmospheric pressure. If k_f and k_b are 1.86 and 0.512 kkg/mol, the above solution will boil at
(a) $-6.54^\circ C$ (b) $-0.654^\circ C$ (c) $6.54^\circ C$ (d) $0.654^\circ C$.
- (iv) One mole of complex compound $Co(NH_3)_5Cl_3$ gives 3 moles of ions on dissolution in water. One mole of the same complex reacts with 2 moles of $AgNO_3$ solution to yield two moles of $AgCl$. The structure of the complex is
(a) $[Co(NH_3)_3Cl_3] \cdot 2NH_3$ (b) $[Co(NH_3)_4Cl_2]Cl \cdot NH_3$ (c) $[Co(NH_3)_4Cl]Cl_2 \cdot NH_3$ (d) $[Co(NH_3)_5Cl]Cl_2$

(c) MATCH THE FOLLOWING:

[4]

Dissacharide

Arrhenius Equation

Rate constant

Addition polymer

Tyndall effect

Sucrose

Teflon

Ultra microscope

[8]

ANSWER THE FOLLOWING QUESTIONS:

Why do transition elements exhibit colour? Cu^{2+} is coloured but Cu^+ is colourless.

Write balanced chemical equation for Hoffmann's bromamide and Balz-Schiemann reaction.

Write the formulae for the following:

- (a) Penta-aquachloridochromium(III)chloride (b) amminebromidochloridonitrito-N-platinate(II)

- (iv) At 298K, 100cm^3 of a solution containing 3.002 g of an unidentified solute exhibits osmotic pressure of 2.55 atmospheres. What is the molar mass of the solute? [$R = 8.314\text{J/K/mol}$, 0.0821L atm/k/mol , 0.083L bar/k/mol]

QUESTION - 2

Briefly explain adsorption theory of catalysis.

[2]

QUESTION- 3

- (a) Differentiate between an antipyretic and an analgesic.
 (b) Name a biodegradable detergent.

[2]

QUESTION - 4

How will you bring about the following conversions?

[2]

- (a) Chloro benzene to diphenyl (ii) Propene to nitro propane

QUESTION - 5

Write the names and structures of the monomer of the following polymers:

[2]

- (i) Nylon-66 (ii) Buna-S

QUESTION - 6

What are essential and non-essential amino acids? Give examples.

[2]

QUESTION - 7

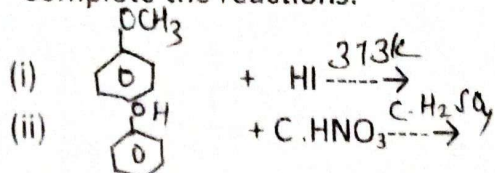
Give one chemical test to distinguish between:

[2]

- (i) Phenol and benzoic acid (ii) propan-1-ol and propan-2-ol

[OR]

Complete the reactions:



QUESTION - 8

If the rate constant for a reaction is 1.6×10^5 and $6.36 \times 10^3 \text{ Sec}^{-1}$ at 600 K and 700 K respectively. Calculate the activation energy for the reaction, and Arrhenius factor [2]

QUESTION - 9

- (a) What is a zero order reaction? Give a suitable example.
(b) What type of plots will you get for a zero order reaction for half life period versus initial concentration. [3]

[OR]

The following rate data were obtained at 303 K for the following reaction:



Experiment	[A] mol/L	[B] mol/L	Initial rate of formation of D mol/L
1	0.1	0.1	6×10^{-3}
2	0.3	0.2	7.2×10^{-2}
3	0.3	0.4	2.88×10^{-1}
4	0.4	0.1	2.4×10^{-2}

What is the rate law? What is the order with respect to each reactant and overall order? Also calculate the rate constant

and write its units.

QUESTION - 10

Chromium metal crystallizes with a body centred cubic lattice. The length of the unit cell edge is found to be 287 pm. $M = 51.99 \text{ g/mol}$ [3]

Calculate the atomic radius and the density of chromium in g/cm^3

QUESTION - 11

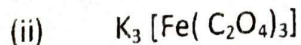
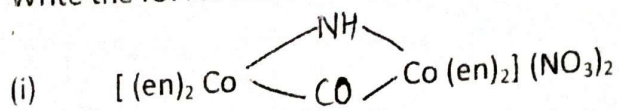
Give reasons for the following: [3]

- (a) Gelatin is added to ice cream.
(b) Alums are added to purify water.
(c) Lyophilic colloids are more stable than lyophobic colloids.

QUESTION - 12

[3]

(a) Write the IUPAC names of the following:



(b) Predict the hybridization of $[Cr(NH_3)_6]^{3+}$ and $[Ni(CO)_4]$

QUESTION - 13

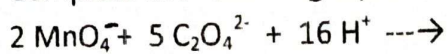
[3]

(a) Explain why:

(i) Transition metals form complex compounds.

(ii) Zr (Z = 40) and Hf (Z = 72) have almost identical radii.

(b) Complete the following equation:



[OR]

(a) Describe the preparation of potassium di chromate from chromite ore with chemical equations involved

What is the effect of increasing pH on a solution of potassium di chromate

QUESTION - 14

How would you achieve the following conversions:

[3]

(a) Aniline to benzonitrile

(b) Nitrobenzene to phenol

(c) Ethyl amine to ethyl isonitrile

QUESTION - 15

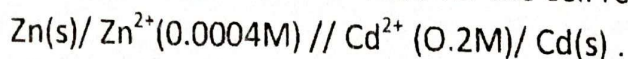
How is zinc extracted from its ore? Explain the process with relevant equations.

[3]

QUESTION - 16

(a) Calculate the equivalent conductivity of 1M H_2SO_4 solution, if its conductivity is $26 \times 10^{-2} \text{ ohm}^{-1} \text{ cm}^{-1}$ [5]
[atomic mass of sulphur = 32]

(b) Calculate the cell EMF and ΔG for the cell reaction



$$E_{Zn^{2+}/Zn}^0 = -0.763 \text{ V}, E_{Cd^{2+}/Cd}^0 = -0.403 \text{ V}$$

(c) Write the reaction at anode and cathode of a fuel cell.

[OR]

(a) Write the reaction at anode and cathode of mercury cell . Give two uses of mercury cell.

(b) Give reasons:

- (i) Specific conductance decreases with dilution whereas equivalent conductance increases.
- (ii) Dry cell becomes dead after a long time even when not in use.

[5]

QUESTION -17

(a) Predict the hybridization and geometry of the following:

- (i) XeO_3
- (ii) ClF_3

(b) Draw the structures for the following:

- (i) Pyrosulphuric acid
- (ii) Nitrous oxide

(c) Explain why fluorine shows only -1 oxidation state whereas other halogens show positive oxidation states.

[OR]

(a) Give balanced equation for the following:

- (i) Chlorine with hot concentrated NaOH
- (ii) Sulphur with concentrated nitric acid.

(b) Give reasons for the following:

- (i) Out of all noble gases xenon forms the maximum number of compounds.
- (ii) Inter halogens are more reactive than halogens.
- (iii) PCl_5 is ionic in solid state.

QUESTION - 18

(a) Write chemical equations to illustrate the following name reactions:

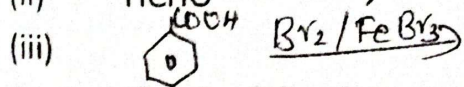
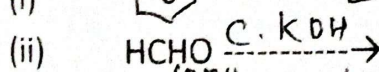
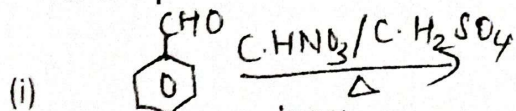
- (i) Aldol condensation
- (ii) H V Z reaction
- (iii) Clemmensen reduction

(b) Give one chemical test to distinguish between

- (i) Acetaldehyde and Benzaldehyde
- (ii) Acetone and Benzoic acid.

[OR]

(a) Write the products of the following reactions:



(b) Account for the following:

- (i) Aldehydes and ketones have lower boiling point than corresponding alcohols and acids.
- (ii) Carboxylic acids do not give the characteristic reactions of carbonyl group.