केंद्रीय विद्यालय संगठन
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शिक्षा एवं प्रशिक्षण का आंचलिक संस्थान, चंडीगढ़

ZONAL INSTITUTE OF EDUCATION AND TRAINING, CHANDIGARH

SAMPLE PAPERS

SESSION– 2021-22

CLASS – XII

CHEMISTRY

TERM - II

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DIRECTOR'S MESSAGE

Our aim is to provide such brief study materials and sample papers to the student that not only guides students to the path of success, but also inspires them to recognize and explore their own inner potential. The Board exam preparation is based on three pillars – **Concept Clarity, Contextual familiarity and Application Expertise**. Our innovative and dedicated teaching materials ensure that every student gets a firm grip of each of these pillars so very essential for these arduous preparations.

We also understand the importance of CBSE board exam as students' future goal depends upon the performance in board exams. We know that in pandemic situation the students feel a lot of pressure of performance in board exam. It is very important to develop the right exam temperament in students so they can tackle the pressure & surprises easily. In this direction, to release such brief study materials and sample papers will help to the students a lot.

SAMPLE PAPER QUESTION (2021-22)

TERM – II

CHEMISTRY THEORY (043)

MM:35 Time: 2 Hours

GENERAL INSTRUCTIONS:

Read the following instructions carefully.

1. There are **12** questions in this question paper with internal choice.
2. **SECTION A - Q. No. 1 to 3** are very short answer questions carrying 2 marks each.
3. **SECTION B - Q. No. 4 to 11** are short answer questions carrying 3 marks each.
4. **SECTION C- Q. No. 12** is case based question carrying 5 marks.
5. **All questions are compulsory.**
6. **Use of log tables and calculators is not allowed**

SECTION A

1. Arrange the following in the increasing order of their property indicated (any 2):
   a. Benzoic acid, Phenol, Picric acid, Salicylic acid (pka values).
   b. Acetaldehyde, Acetone, Methyl tert butyl ketone (reactivity towards NH_2OH).
   c. ethanol, ethanoic acid, benzoic acid (boiling point) (1x2=2)

2. Solutions of two electrolytes 'A' and 'B' are diluted. The Λm of 'B' increases 1.5 times while that of A increases 25 times. Which of the two is a strong electrolyte? Justify your answer. Graphically show the behavior of 'A' and 'B'. (2)

3. Give reasons to support the answer:
   a. Presence of Alpha hydrogen in aldehydes and ketones is essential for aldol condensation.
   b. 3 –Hydroxy pentan-2-one shows positive Tollen's test. (1x2=2)

SECTION B

4. Account for the following:
   a. Aniline cannot be prepared by the ammonolysis of chlorobenzene under normal conditions.
   b. N-ethylethanamine boils at 329.3K and butanamine boils at 350.8K, although both are isomeric in nature.
   c. Acylation of aniline is carried out in the presence of pyridine. (1x3=3)

OR

4. Convert the following:
   a. Phenol to N-phenylethanamide.
   b. Chloroethane to methanamine.
   c. Propanenitrile to ethanol. (1x3=3)

5. Answer the following questions:
   a. $[Ni(H_2O)_6]^{2+}$ (aq) is green in colour whereas $[Ni(H_2O)_4(en)]^{2+}$(aq)is blue in colour , give reason in support of your answer .
   b. Write the formula and hybridization of the following compound:
      tris(ethane-1,2–diamine) cobalt(III) sulphate (1+2)

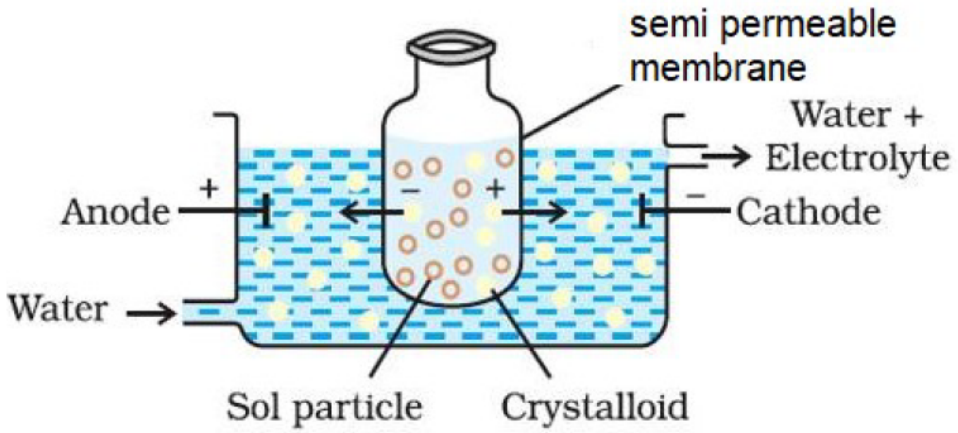
OR

5. In a coordination entity, the electronic configuration of the central metal ion is $t_{2g}^3 e_g^1$
   a. Is the coordination compound a high spin or low spin complex?
   b. Draw the crystal field splitting diagram for the above complex. (1+2)

6. Account for the following:
   a. Ti(IV) is more stable than the Ti (II) or Ti(III).
   b. In case of transition elements, ions of the same charge in a given series show progressive decrease in radius with increasing atomic number.
   c. Zinc is a comparatively a soft metal, iron and chromium are typically hard. (1x3=3)

7. An alkene 'A' (Mol. formula C_5H_{10}) on ozonolysis gives a mixture of two compounds 'B' and 'C'. Compound 'B' gives positive Fehling's test and also forms iodoform on treatment with I_2 and NaOH. Compound 'C' does not give Fehling's test but forms iodoform. Identify the compounds A, B and C. Write the reaction for ozonolysis and formation of iodoform from B and C. (3)

8. Observe the figure given below and answer the questions that follow:



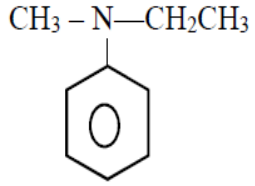
   a. Which process is represented in the figure?

b. What is the application of this process?
c. Can the same process occur without applying electric field? Why is the electric field applied?

9. What happens when reactions:
a. N-ethylethanamine reacts with benzenesulphonyl chloride.
b. Benzylchloride is treated with ammonia followed by the reaction with Chloromethane.
c. Aniline reacts with chloroform in the presence of alcoholic potassium hydroxide. (1x3=3)

OR

9. a. Write the IUPAC name for the following organic compound:



b.Complete the following:

$$C_6H_5NO_2 \xrightarrow{Sn/HCl} A \xrightarrow{Br_2/H_2O} B \xrightarrow[273\text{-}278K]{NaNO_2/HCl} C \xrightarrow[\Delta]{HBF_4} D$$

(1x3=3)

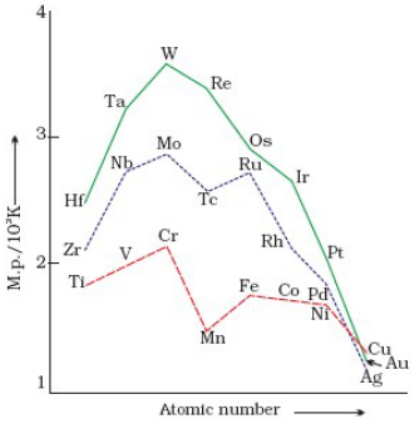
10. Represent the cell in which the following reaction takes place.The value of E° for the cell is 1.260 V. What is the value of E_{cell} ?

$$2Al(s) + 3Cd^{2+}\ (0.1M) \rightarrow 3Cd\ (s) + 2Al^{3+}\ (0.01M) \qquad (3)$$

11. a. Why are fluorides of transition metals more stable in their higher oxidation state as compared to the lower oxidation state?
b. Which one of the following would feel attraction when placed in magnetic field: Co^{2+} , Ag^{+} ,Ti^{4+} , Zn^{2+}
c. It has been observed that first ionization energy of 5 d series of transition elements are higher than that of 3d and 4d series, explain why? (1x3=3)

OR

11. On the basis of the figure given below, answer the following questions:



(source: NCERT)

a. Why Manganese has lower melting point than Chromium?

b. Why do transition metals of 3d series have lower melting points as compared to 4d series?

c. In the third transition series, identify and name the metal with the highest melting point. (1x3=3)

SECTION C

12. Read the passage given below and answer the questions that follow.

Are there nuclear reactions going on in our bodies?

There are nuclear reactions constantly occurring in our bodies, but there are very few of them compared to the chemical reactions, and they do not affect our bodies much. All of the physical processes that take place to keep a human body running are chemical processes. Nuclear reactions can lead to chemical damage, which the body may notice and try to fix.

The nuclear reaction occurring in our bodies is radioactive decay. This is the change of a less stable nucleus to a more stable nucleus. Every atom has either a stable nucleus or an unstable nucleus, depending on how big it is and on the ratio of protons to neutrons. The ratio of neutrons to protons in a stable nucleus is thus **around 1:1** for small nuclei ($Z < 20$). Nuclei with too many neutrons, too few neutrons, or that are simply too big are unstable. They eventually transform to a stable form through radioactive decay. Wherever there are atoms with unstable nuclei (radioactive atoms), there are nuclear reactions occurring naturally. The interesting thing is that there are small amounts of radioactive atoms everywhere: in your chair, in the ground, in the food you eat, and yes, in your body.

The most common natural radioactive isotopes in humans are carbon-14 and potassium-40. Chemically, these isotopes behave exactly like stable carbon and potassium. For this reason, the body uses carbon-14 and potassium-40 just like it does normal carbon and potassium; building them into the different parts of the cells, without knowing that they are radioactive. In time,

carbon-14 atoms decay to stable nitrogen atoms and potassium-40 atoms decay to stable calcium atoms. Chemicals in the body that relied on having a carbon-14 atom or potassium-40 atom in a certain spot will suddenly have a nitrogen or calcium atom. Such a change damages the chemical. Normally, such changes are so rare, that the body can repair the damage or filter away the damaged chemicals.

The natural occurrence of carbon-14 decay in the body is the core principle behind carbon dating. As long as a person is alive and still eating, every carbon-14 atom that decays into a nitrogen atom is replaced on average with a new carbon-14 atom. But once a person dies, he stops replacing the decaying carbon-14 atoms. Slowly the carbon-14 atoms decay to nitrogen without being replaced, so that there is less and less carbon-14 in a dead body. The rate at which carbon-14 decays is constant and follows first order kinetics. It has a half - life of nearly 6000 years, so by measuring the relative amount of carbon-14 in a bone, archeologists can calculate when the person died. All living organisms consume carbon, so carbon dating can be used to date any living organism, and any object made from a living organism. Bones, wood, leather, and even paper can be accurately dated, as long as they first existed within the last 60,000 years. This is all because of the fact that nuclear reactions naturally occur in living organisms.

(source: The textbook Chemistry: The Practical Science by Paul B. Kelter, Michael D. Mosher and Andrew Scott states)

a. Why is Carbon -14 radioactive while Carbon -12 not? (Atomic number of Carbon: 6)
b. Researchers have uncovered the youngest known dinosaur bone, dating around 65 million years ago. How was the age of this fossil estimated?
c. Which are the two most common radioactive decays happening in human body?
d. Suppose an organism has 20 g of Carbon -14 at its time of death. Approximately how much Carbon -14 remains after 10,320 years? (Given antilog 0.517 = 3.289)

OR

d. Approximately how old is a fossil with 12 g of Carbon -14 if it initially possessed 32 g of Carbon -14? (Given log 2.667 = 0.4260)
(1+1+1+2)

MARKING SCHEME (2021-22)

TERM – II

CHEMISTRY THEORY (043)

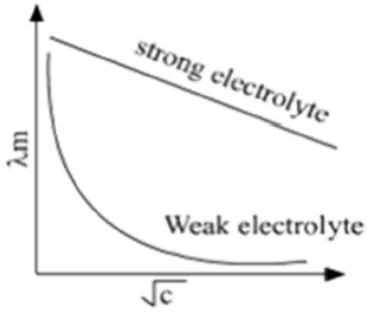
MM:35 Time: 2 Hours

1. (a)Picric acid < salicylic acid < benzoic acid <phenol 1

(b)Methyl tert – butyl ketone < acetone< Acetaldehyde 1

(c)ethanol <ethanoic acid < benzoic acid (boiling point of carboxylic acids is higher than alcohols due to extensive hydrogen bonding , boiling point increases with increase in molar mass) 1

2. B is a strong electrolyte. The molar conductivity increases slowly with dilution as there is no increase in number of ions on dilution as strong electrolytes are completely dissociated. ½+½



1

3. (a) The alpha hydrogen atoms are acidic in nature due to presence of electron withdrawing carbonyl group. These can be easily removed by a base and the carbanion formed is resonance stabilized. 1

(b) Tollen's reagent is a weak oxidizing agent not capable of breaking the C-C bond in ketones . Thus ketones cannot be oxidized using Tollen's reagent itself gets reduced to Ag. 1

4 a) In case of chlorobenzene, the C—Cl bond is quite difficult to break as it acquires a partial double bond character due to conjugation. 1

So Under the normal conditions, ammonolysis of chlorobenzene does not yield aniline.

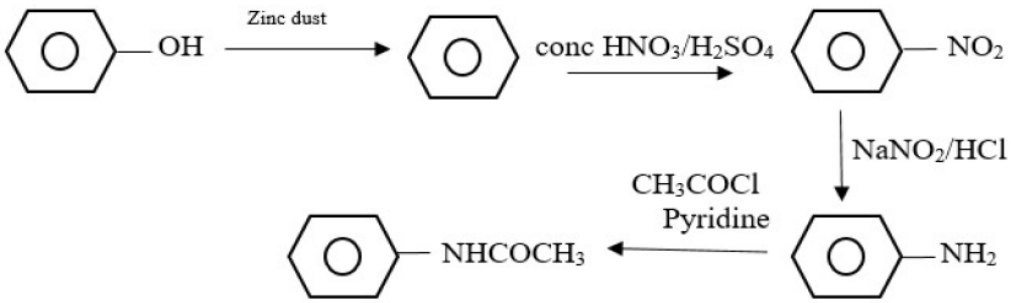
b) Primary and secondary amines are engaged in intermolecular association due to hydrogen bonding between nitrogen of one and hydrogen of another molecule. Due to the presence of three hydrogen atoms, the intermolecular association is more in 1

primary amines than in secondary amines as there are two hydrogen atoms available for hydrogen bond formation in it.

c) During the acylation of aniline, stronger base pyridine is added. This done in order to remove the HCl so formed during the reaction and to shift the equilibrium to the right hand side. 1

OR

a) Phenol into N-phenylethanamide



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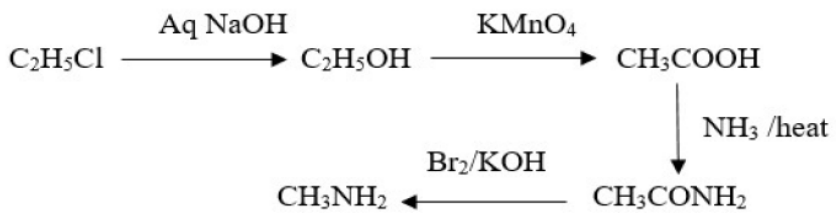
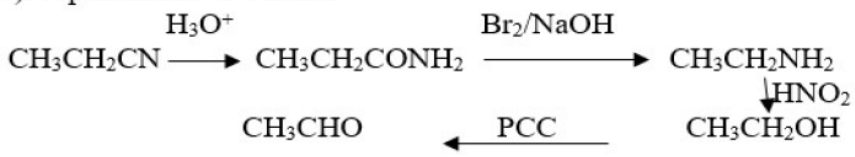
b) Chloroethane to methanamine



1

c)Propanenitrile to ethanal



1

5 (a) The colour of coordination compound depends upon the type of ligand and d-d transition taking place . 1

H_2O is weak field ligand , which causes small splitting , leading to the d-d transition corresponding green colour , however due to the presence of (en) which ia strong field ligand , the splitting is increased . Due to the change in t_{2g} -e_g splitting the colouration of the compound changes from green to blue.

(b)Formula of the compound is $[Co(H_2NCH_2CH_2NH_2)_3]_2(SO_4)_3$

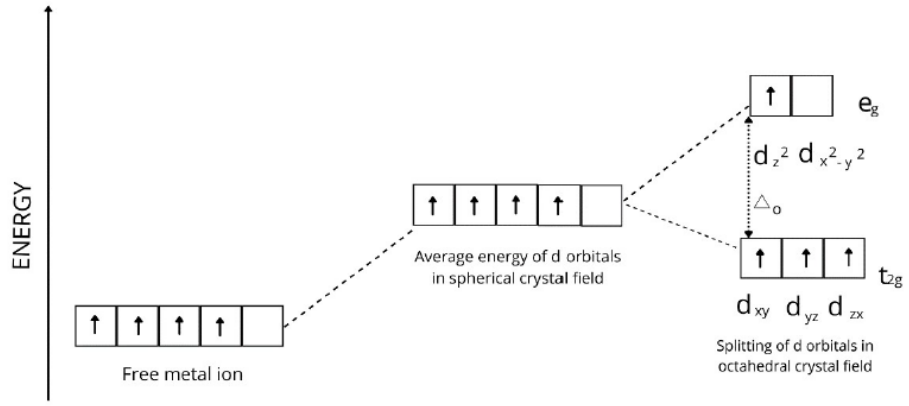
The hybridisation of the compound is: d^2sp^3 1

OR 1

a)As the fourth electron enters one of the e_g orbitals giving the configuration $t_{2g}^3\ e_g^1$,which indicates $\Delta o < P$ hence forms high spin complex.

1

b) 2



6 (a) Ti is having electronic configuration [Ar] $3d^2\ 4s^2$. Ti (IV) is more stable as Ti^{4+} acquires nearest noble gas configuration on loss of 4 e-. 1

(b)In case of transition elements, ions of the same charge in a given series show progressive decrease in radius with increasing atomic number. 1

As the new electron enters a d orbital each time the nuclear charge increases by unity. The shielding effect of a d electron is not that effective, hence the net electrostatic attraction between the nuclear charge and the outermost electron increases and the ionic radius decreases.

(c)Iron and Chromium are having high enthalpy of atomization due to the presence of unpaired electrons, which accounts for their hardness. However, Zinc has low enthalpy of atomization as it has no unpaired electron. Hence zinc is comparatively a soft metal. 1

7 Compound A is an alkene, on ozonolysis it will give carbonyl compounds. As both B and C have >C=O group,

B gives positive Fehling's test so it is an aldehyde and it gives iodoform test so it is so it has $CH_3C{=}O$ group. This means the aldehyde is acetaldehyde

C does not give Fehling's test, so it is a ketone. It gives positive iodoform test so it is a methyl ketone means it has $CH_3C{=}O$ group

Compound A (C_5H_{10}) on ozonlysis gives B (CH_3CHO) + C (CH_3COR)

So "C" is CH_3COCH_3 ½

$$CH_3CH{=}C(CH_3)_2 \xrightarrow{(i)O_3\ (ii)\ Zn/H_3O^+} CH_3CHO + CH_3COCH_3$$

$CH_3CHO + 2Cu^{2+} + 5OH^- \longrightarrow CH_3COO^- + Cu_2O$ (red ppt) $+ 3H_2O$

$CH_3COCH_3 + 2Cu^{2+} + 5OH^- \longrightarrow$ No reaction ½

$CH_3CHO + 3I_2 + 3\ NaOH \longrightarrow CHI_3$ (yellow ppt) $+ 3HI + HCOONa$

$CH_3COCH_3 + 3I_2 + 3\ NaOH \longrightarrow CHI_3$ (yellow ppt) $+ 3HI + CH_3COONa$ ½

A = $CH_3CH{=}C(CH_3)_2$ ½

B = CH_3CHO ½

C = CH_3COCH_3 ½

8 (a)electrodialysis 1

(b)purification of colloidal solution 1

(c)Yes. Dialysis is a very slow process to increase its speed electric field is applied ½+½

9 (a)When N-ethylethanamine reacts with benzenesulphonyl chloride , N,N-diethylbenzenesulphonamide is formed. 1

b)When benzylchloride is treated with ammonia , Benzylamine is formed which on reation with Chloromethane yields a secondary amine , N-methylbenzylamine . ½+½

c)When aniline reacts with chloroform in the presence of alcoholic potassium hydroxide , 1

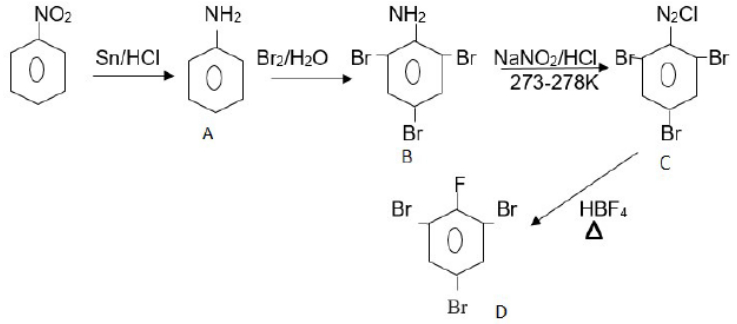
phenyl isocyanides or phenyl isonitrile is formed .

OR

(i)

N-Ethyl-N-methylbenzenamine or N-Ethyl-N-ethylaniline 1

(ii) ½ each



10 $Al(s)\ /Cd^{2+}\ (0.1M)\ //\ Al^{3+}\ (0.01M)\ /Cd(s)$ ½

$2Al(s) + 3Cd^{2+}\ (0.1M) \rightarrow 3Cd\ (s) + 2Al^{3+}\ (0.01M)$

$E_{cell} = E^\circ_{cell} - \frac{0.059}{n} \log \frac{[Al^{3+}]^2}{[Cd^{2+}]^3}$ ½

$E_{cell} = 1.26 - \frac{0.059}{6} \log \frac{(0.01)^2}{(0.1)^3}$ ½

$= 1.26 - \frac{0.059}{6}(-1)$ 1

$= 1.26+0.009$ ½

$= 1.269$ V ans unit

11

(a) The ability of fluorine to stabilize the highest oxidation state is attributed to the higher lattice energy or high bond enthalpy. 1

1

(b) Co^{2+} has three unpaired electrons so it would be paramagnetic in nature, hence Co^{2+} ion would be attracted to magnetic field.

(c) The transition elements of 5d series have intervening 4f orbitals. There is greater effective nuclear charge acting on outer valence electrons due to the weak shielding by 4f electrons. Hence first ionisation energy of 5 d series of transition elements are higher than that of 3d and 4d series. 1

OR 1

a)Manganese is having lower melting point as compared to chromium , as it has highest number of unpaired electrons , strong interatomic metal bonding , hence no delocalisation of electrons .

b) There is much more frequent metal – metal bonding in compounds of the heavy transition metals i.e 4d and 5d series , whixh accounts for lower melting point of 3d series. 1

1

c) Tungsten

12 (a) Ratio of neutrons to protons is 2.3: 1 which is not the stable ratio of 1:1 1

(b)Age of fossils can be estimated by C-14 decay. All living organisms have C-14 which decays without being replaced back once the organism dies. 1

(c) carbon-14 atoms decay to stable nitrogen atoms and potassium-40 atoms decay to stable calcium 1

(d)$t = 2.303/ k \log (Co/Ct)$ ½

Co = 20 g Ct = ?

t = 10320 years k = 0.693/6000 (half-life given in passage)

substituting in equation:

$10320 = 2.303 / (0.693/6000) \log 20/ Ct$ ½

$0.517 = \log 20 / Ct$ anlilog (0.517) = 20/Ct

$3.289 = 20/Ct$ ½

Ct = 6.17 g ½

OR

$t = 2.303/ k \log (Co/Ct)$ ½

Co = 32 g Ct = 12

t = ? k = 0.693/6000 (half life given in passage)

substituting in equation:

$t = 2.303 / (0.693/6000) \log 32/ 12$ ½

$t = 2.303 \times 60000 /0.693 \log 2.667$ ½

$t = 2.303 \times 6000 \times 0.4260 /0.693$

= 8494 years ½

PATTERN FOR CHEMISTRY SAMPLE PAPER TERM II

SECTION A 2 MARKS	SECTION B 3 MARKS	SECTION C CASE BASED 5 MARKS	TOTAL
3 QUESTIONS	8 QUESTIONS WITH 3 INTERNAL CHOICES	1 QUESTION	12 QUESTIONS
3 X 2 = 6	8 X 3 = 24	1 X 5 = 5	
6 MARKS	24 MARKS	5 MARKS	35 MARKS

BLUE PRINT CHEMISTRY SAMPLE PAPER -1 TERM II

S. NO.	UNITS	SECTION A 2 MARKS	SECTION B 3 MARKS	SECTION C CASE BASED 5 MARKS	TOTAL
1.	ELECTROCHEMISTRY			1 (5)	1 (5)
2.	CHEMICAL KINETICS	1 (2)	1 (3)		2 (5)
3.	SURFACE CHEMISTRY		2 (6)		2 (6)
4.	D- & F- BLOCK ELEMENTS		1 (3)		1 (3)
5.	COORDINATION COMPOUNDS		1 (3)		1 (3)
6.	ALDEHYDES, KETONES & CARBOXYLIC ACIDS	2 (4)	1 (3)		3 (7)
7.	AMINES		2 (6)		2 (6)
	TOTAL NO. OF QUESTIONS	3 (6)	8 (24)	1 (5)	12 (35)

SAMPLE PAPER -1 TERM II 2021-22
CHEMISTRY THEORY (043)

MM: 35 **TIME: 2 HOURS**

GENERAL INSTRUCTIONS:

Read the following instructions carefully.

1. There are 12 questions in this question paper with internal choice.
2. SECTION – A, Q. No. 1 – 3 are very short answer questions carrying 2 Marks each.
3. SECTION – B, Q. No. 4 – 11 are short answer questions carrying 3 Marks each.
4. SECTION – C, Q. No. 12 is case based question carrying 5 Marks.
5. All questions are compulsory.
6. Use of log tables and Calculator is not allowed.

SECTION – A

Q1. For the reaction: $2NH_3\,(g) \xrightarrow{Pt} N_2\,(g) + 3H_2\,(g)$

Rate = k

(i) What is the order and molecularity of the reaction?

(ii) Write unit of k.

Q2. Give reasons:

(i) The α-hydrogen atoms of aldehydes and ketones are acidic in nature.

(ii) Propanone is less reactive than Ethanal towards Nucleophilic addition reactions.

Q3. Draw structures of the following derivatives:

(i) Cyanohydrin of cyclobutanone

(ii) Hemiacetal of ethanal

SECTION – B

Q4. A first order reaction takes 20 minutes for 25% decomposition. Calculate the time when 75% of the reaction will be completed. [Given log2 = 0.3010, log3 = 0.4771, log4 = 0.6021]

OR

The decomposition of N_2O_5 (g) is a first order reaction with rate constant of $5 \times 10^{-4}\ s^{-1}$ at 45^0C i.e.

$$2N_2O_5\,(g) \rightarrow 4NO_2\,(g) + O_2\,(g)$$

If the initial concentration of N_2O_5 is 0.25 M. calculate its initial concentration after 2 minutes. Also calculate the half-life for decomposition of N_2O_5 (g).

Q5. (a) Adsorption of gas on the surface of solid is generally accompanied by decrease in entropy. Still it is a spontaneous process. Explain.

(b) How does an increase in temperature affect both physical as well as chemical adsorption?

(c) Identify the functional groups in the molecular of non-ionic detergent.

Q6. Write the difference in each of the following:

(i) Multimolecular colloids and Associated colloids

(ii) Coagulation and Peptisation
(iii) Lyophilic sol and lyophobic sol.

Q7. The magnetic moments of few transition metal ions are given below:

METAL ION	MAGNETIC MOMENT (BM)
Sc^{3+}	0.00
Ti^{3+}	1.73
Cr^{2+}	4.90
Ni^{2+}	2.84

[Atomic no. of Sc = 21, Ti = 22, Cr = 24, Ni = 28]
Which of the given metal ions?
(i) Has maximum number of unpaired electrons?
(ii) Forms colourless aqueous solution?
(iii) Exhibits the most stable +3 oxidation state?
OR
Account for the following:
(i) $CuCl_2$ is more stable than Cu_2Cl_2.
(ii) Transition metals form complex compounds.
(iii) Atomic radii of 4d and 5d series elements are nearly same.

Q8. (a) What type of isomerism is shown by the complex $[Co(NH_3)_5(SCN)]^{2+}$?
(b) Why is $[NiCl_4]^{2-}$ paramagnetic while $[Ni(CN)_4]^{2-}$ is diamagnetic?
(c) Why are low spin tetrahedral complexes rarely observed?
OR
(a) What type of isomerism is shown by the complex $[Cr(H_2O)_6]Cl_3$?
(b) On the basis of crystal field theory, write the electronic configuration for d^4 ion if $\Delta_0 > P$.
(c) Write the hybridization and shape of $[CoF_6]^{3-}$. (Atomic number of Co = 27)

Q9. Give reasons:
(i) Benzoic acid does not give Friedel-Craft reaction.
(ii) $O_2N\text{-}CH_2\text{-}COOH$ has lower pKa value than CH_3COOH.
(iii) $(CH_3)_2CH\text{-}CHO$ undergoes Aldol condensation whereas $(CH_3)_3C\text{-}CHO$ does not.

Q10. (a) Write the structure of main products when aniline reacts with the following reagents:
(i) HCl
(ii) Bromine water
(iii) $(CH_3CO)_2O$/pyridine

Q11. (a) Arrange the following in the increasing order of their basic character in an aqueous solution:
$C_2H_5NH_2$, $(C_2H_5)_2NH$, $(C_2H_5)_3N$
(b) Arrange the following in the increasing order of their boiling points:
$C_2H_5NH_2$, C_2H_5OH, $(CH_3)_3N$
(c) Give a simple chemical test to distinguish between the following pair of compounds:
$(CH_3)_2NH$, and $(CH_3)_3N$

SECTION – C

Q12. Case Based Question: Read the passage given below and answer the following questions:

Weak electrolyte like acetic acid has lower degree of dissociation at higher concentration and hence for such electrolytes, the change in Λm with dilution is due to increase the degree of dissociation and consequently the number of ions in total volume of solution that contains one mol of electrolyte. In such cases Λm increases steeply on dilution, especially near lower concentrations. Therefore, $\Lambda^0 m$ cannot be obtained by extrapolation of Λm to zero concentration. At infinite dilution (i.e. concentration c --> zero) electrolyte dissociates completely ($\alpha = 1$), but at such low concentration the conductivity of the solution is so low that it cannot be measures accurately. Therefore, $\Lambda^0 m$ for weak electrolytes is obtained by using Kohlrausch's law of independent migration of ions.

The following questions ate multiple choice questions. Choose the most appropriate answer.

(i) Which of the following is not a weak electrolyte?
- (a) Ammonium acetate
- (b) Acetic acid
- (c) Ammonium chloride
- (d) Ammonium hydroxide

(ii) The value of Λm in case of a weak electrolyte on dilution.
- (a) Increases steeply
- (b) Decreases steeply
- (c) Increases gradually
- (d) Decreases gradually

(iii) $\Lambda^0 m$ for weak electrolytes is obtained by using
- (a) Kohlrausch's law
- (b) Arrhenius law
- (c) Avogadro's law
- (d) Maxwell's law

(iv) For strong electrolytes, Λm increases slowly with dilution and can be represented by the equation:
- (a) $\Lambda^0 m = \Lambda m - AC^{1/2}$
- (b) $\Lambda m = \Lambda^0 m - AC^{1/2}$
- (c) $\Lambda^0 m = \Lambda m - AC$
- (d) $\Lambda m = \Lambda^0 m - AC$

(v) Limiting molar conductivity (S cm mol^{-1}) of K^+ and SO_4^{2-} are respectively 73.5 and 160.0. The Limiting molar conductivity of K_2SO_4 will be
- (a) 393.5
- (b) 233.5
- (c) 467
- (d) 307

MARKING SCHEME CHEMISTRY SAMPLE PAPER -1 TERM II

Q. No.	ANSWERS
1.	(i) Zero order, Bimolecular (ii) mol L^{-1} s^{-1}
2.	(i) Oxygen being more electronegative than carbon draws the electrons towards it making carbon positive. Carbon, in turns, draws the electrons. (ii) Because the nucleophile CN^- faces steric hindrance while attaching to Propanone.
3.	Draw their structures of the following derivatives.
4.	t = 2.303/k log $[R]_0$ /[R], t = 96.3 minutes. OR t = 2.303/k log $[R]_0$/[R], [R] = 0.23 M, $t_{1/2}$ = 0.693/5 x 10^{-4} s^{-1}, 1386 s.
5.	(a) In adsorption, ΔS is –ve, ΔH is –ve (Exothermic), ΔG is –ve (Spontaneous) (b) Physical adsorption decreases with increase of temperature while Physical adsorption increases with increase of temperature. (c) (i) ether, (ii) primary alcoholic group.
6.	(i) On dissolution, a large number of atoms or smaller molecules of a substance aggregate to form species having size in colloidal range. These species are called multimolecular colloids. There are some substances which at lower concentration behave as normal electrolytes but at higher concentration exhibit colloidal behaviour. Such substances are called associated colloids (ii) The process of settling of colloidal particles is called coagulation. Peptisation is the process of conversion of precipitate into colloidal solution. (iii) Lyophilic sols are reversible and lyophobic sols are irreversible.
7.	(i) Cr^{2+} (ii) Sc^{3+} (iii) Sc^{3+} OR (i) $CuCl_2$ is more stable than Cu_2Cl_2. Because in $CuCl_2$, Cu is in +2 oxidation states is more stable due to high hydration enthalpy compared to Cu_2Cl_2. (ii) Transition metals form complex compounds due to comparatively smaller sizes of the metal ions, high ionic charges and the availability of d-orbitals for bond formation. (iii) Because of lanthanoids contraction.
8.	(a) Linkage isomer (b) $[NiCl_4]^{2-}$ paramagnetic (sp^3), 2 unpaired electrons while $[Ni(CN)_4]^{2-}$ is diamagnetic (dsp^2), 2 no unpaired electrons. (c) For tetrahedral complexes, $\Delta t = (4/9)\ \Delta_0$. Crystal field splitting energies are not large; pairing of electrons does not take place. OR (a) $[Cr(H_2O)_6]Cl_3$ shows hydrate isomerism. (b) $t_{2g}^4\ e_g^0$ (c) sp^3d^2, octahedral
9.	(i) Benzoic acid does not give Friedel-Craft reaction because –COOH group is deactivating and the aluminium chloride (Lewis acid) gets bonded to the carbonyl group.

	(ii) $-NO_2$ Exerts electron withdrawing effect which increases the acidic strength or decreases the pKa value. (iii) $(CH_3)_3C$-CHO does not have α-hydrogen atom.
10.	(i) Aniline hydrochloride (Anilinium chloride) (ii) 2, 4, 6-tribromoaniline (white ppt.) (iii) Acetanilide
11.	(a) $C_2H_5NH_2 < (C_2H_5)_3NH < (C_2H_5)_2N$ (b) $(CH_3)_3N < C_2H_5NH_2 < C_2H_5OH$ (c) $(CH_3)_2NH$ reacts with Hinsberg's reagent but $(CH_3)_3N$ does not react with Hinsberg's reagent.
12.	(i) (c) Ammonium chloride (ii) (a) increased steeply (iii) (a) Kohlrausch's law (iv) (b) $\Lambda m = \Lambda^0 m - AC^{1/2}$ (v) (d) 307

BLUE PRINT CHEMISTRY SAMPLE PAPER -2 TERM II

S. NO.	UNITS	SECTION A 2 MARKS	SECTION B 3 MARKS	SECTION C CASE BASED 5 MARKS	TOTAL
1.	ELECTROCHEMISTRY	1 (2)	1 (3)		2 (5)
2.	CHEMICAL KINETICS		2 (6)		2 (6)
3.	SURFACE CHEMISTRY		2 (6)		2 (6)
4.	D- & F- BLOCK ELEMENTS			1 (5)	1 (5)
5.	COORDINATION COMPOUNDS		1 (3)		1 (3)
6.	ALDEHYDES, KETONES & CARBOXYLIC ACIDS		2 (6)		2 (6)
7.	AMINES	2 (4)			2 (4)
	TOTAL NO. OF QUESTIONS	3 (6)	8 (24)	1 (5)	12 (35)

SAMPLE PAPER -2 TERM II 2021-22
CHEMISTRY THEORY (043)

MM: 35 **TIME: 2 HOURS**

GENERAL INSTRUCTIONS:

Read the following instructions carefully.

1. There are 12 questions in this question paper with internal choice.
2. SECTION – A, Q. No. 1 – 3 are very short answer questions carrying 2 Marks each.
3. SECTION – B, Q. No. 4 – 11 are short answer questions carrying 3 Marks each.
4. SECTION – C. Q. No. 12 is case based question carrying 5 Marks.
5. All questions are compulsory.
6. Use of log tables and Calculator is not allowed.

SECTION – A

Q1. Calculate the degree of dissociation (α) of acetic acid if its molar conductivity (Λm) is 39.05 S cm^2 mol^{-1} given: $\lambda^0 (H^+)$ = 349.6 S cm^2 mol^{-1} and $\lambda^0 (CH_3COO^-)$ = 40.9 S cm^2 mol^{-1}

Q2. Write a chemical equation each to represent

(a) Gatterman reaction
(b) Carbylamine reaction

Q3. Show the mechanism of acylation of Ethanamine and write IUPAC name of the product formed.

SECTION – B

Q4. Calculate the standard cell potential of the galvanic cell in which the following reaction takes place:

$$2Cr\ (s) + 3Cd^{2+}\ (aq) \text{--->} 2Cr^{3+}\ (aq) + 3Cd\ (s)$$

Also calculate the $\Delta_r G^0$ value of the reaction.

[Given: $E^0Cr^{3+}/Cr) = -0.74$ V, $E^0Cd^{2+}/Cd) = -0.40$ V and F = 96500 C mol^{-1}]

OR

The following chemical reaction is occurring in an electrochemical cell:

$Mg\ (s) + 2Ag^+\ (0.0001M) \rightarrow Mg^{2+}\ (0.10M) + 2Ag\ (s)$

The E^0 electrode values are $Mg^{2+}/Mg = -2.36$ V, $Ag^+/Ag = 0.81$ V

For this cell calculate:

(a) Standard cell potential (E^0_{cell})
(b) Cell potential (E_{cell})
(c) (i) Symbolic representation of the above cell
(ii)Will the above cell reaction be spontaneous?

Q5. (a) For the following reaction: $2NO\ (g) + O_2\ (g) \rightarrow 2NO_2\ (g)$,

Write the rate law and order of reaction.

(b)After 24 hours, only 0.125 g out of the initial quantity of 1 g of a radioactive isotope remains behind. What is the half-life period?

OR

Following data are obtained for the reaction: $N_2O_5 \rightarrow 2NO_2 + 1/2O_2$

t/s	0	300	600
$[N_2O_5]$/mol L^{-1}	1.6×10^{-2}	0.8×10^{-2}	0.4×10^{-2}

(a) Show that it follows first order reaction.
(b) Calculate half-life period.

Q6. For the reaction: $C_{12}H_{22}O_{11} + H_2O \xrightarrow{H+} C_6H_{12}O_6 + C_6H_{12}O_6$

Write:

(i) Rate reaction expression
(ii) Rate law equation

(iii) Order and molecularity of the reaction.

Q7. Explain the following terms:

(i) Electrophoresis
(ii) Tyndall effect
(iii) Zeta potential

Q8. Explain the following observations:

(a) Ferric hydroxide sol gets coagulated on addition of sodium chloride solution.
(b) Cottrell's smoke precipitator is fitted at the mouth of the chimney used in factories.
(c) Physical adsorption is multilayered, while chemisorption is monolayer.

Q9.

(a) For the complex $[Fe(CN)_6]^{3-}$, write the hybridization type, magnetic character and spin nature of the complex.
(b) Draw one of the geometrical isomers of the complex $[Pt(en)_2Cl_2]^{2+}$ which is optically active.

OR

(a) Name the following compound according to IUPAC system of nomenclature:

$$[Pt(NH_3)_4Cl(NO_2)]SO_4$$

(b) On the basis of crystal field theory, write the electronic configuration for d^4 ion if $\Delta_0 < P$.
(c) Write the hybridization and magnetic behaviour of the complex $[Ni(CN)_4]^{2-}$

Q10. Write the products in the following reactions:

(i) Cyclohexanone + HCN ----->
(ii) $C_6H_5COONa + NaOH \xrightarrow{CaO/\Delta}$
(iii) $CH_3\text{-}CH{=}CH\text{-}CN \xrightarrow{DIBAL\text{-}H/H_2O}$

Q11. Complete the following sequence of reactions:

$$CH_3COCH_3 \xrightarrow{Ba(OH)_2} (A) \xrightarrow{\Delta} (B) \xrightarrow{NaOH/I_2} (C) + (D)$$

(i) Identify (A) to (D)
(ii) Give the IUPAC name of (A)

SECTION – C

Q12. Case based question: Read the passage given below and answer the following questions:

The d-block of the periodic table contains the elements of the groups 3–12 and is known as transition elements. In general, the electronic configuration of the elements is $(n-1)\,d^{1-10}ns^{1-2}$. The d-orbitals of the penultimate energy level in their atoms receive electrons

giving rise to the three rows of the transition metals i.e. 3d, 4d and 5d series. However, Zn, Cd and Hg are not regarded as transition elements. Transition elements exhibit certain characteristic properties like variable oxidation states, complex formation, formation of coloured ions and alloys, catalytic activity, etc. Transition metals are hard (except Zn, Cd and Hg) and have a high melting point.

The following questions ate multiple choice questions. Choose the most appropriate answer.

(i) The electronic configuration of d-block elements is
- (a) (n-2) d^{1-10} $(n-1)s^{1-2}$
- (b) (n-1) $d^{10}ns^{1-2}$
- (c) (n-2) $d^{1-10}ns^{1-2}$
- (d) (n-1) $d^{1-10}ns^{1-2}$

(ii) Which transition element of 3d series does not show variable oxidation state?
- (a) Chromium
- (b) Titanium
- (c) Scandium
- (d) Mercury

(iii) Why are melting points of transition metals high?
- (a) It is because of vacant d-orbitals.
- (b) It is because of high ionization enthalpy.
- (c) It is due to metallic bonding.
- (d) It is because they occupy positions between s- and p-block.

(iv) 4d series of elements consists of the elements
- (a) Sc - Zn
- (b) Rf – Cn
- (c) La – Hg
- (d) Y – Cd

(v) Why are Zn, Cd and Hg not regarded as transition elements?
- (a) They have low melting points.
- (b) They have low boiling points.
- (c) (n-1) d orbitals are completely filled.
- (d) They do not show variable oxidation state.

MARKING SCHEME CHEMISTRY SAMPLE PAPER -2 TERM II

Q. No.	ANSWERS
1.	$\alpha = 0.1$
2.	(a)Gatterman reaction: Benzene Diazonium halides on treatment with Cu/HX liberate N_2 and aryl halide is formed. (b)Carbylamine reaction: Aliphatic/aromatic primary amines on heating with chloroform and alkali produce alkyl/aryl isocyanide.
3.	Give mechanism, The product N-ethylethanamide is formed.
4.	E^0cell = -0.40 V – (-0.76 V) = 0.34 V, $\Delta_r G^0$ = - nF E^0cell = -196.86 kJ mol^{-1} OR (a) E^0cell = 0.81 V – (-2.36 V) = 3.17 V (b) Ecell = 2.9635 V (c) (i) Mg (s)|Mg^{2+} (0.10M) || Ag^+ (0.0001M)|Ag (s) (ii) Yes, E^0cell is +ve.
5.	(a) Rate = $k[NO]^2[O_2]^1$ and order of reaction 2 +1 = 3 (b) k = 2.303/t log (a/a-x) = (2.303/24) log (1/0.125) = 0.0866 h^{-1}. $t_{1/2}$ = 0.693/ 0.0866 =8 hours. OR k = 2.303/t log $[R]_0$ /[R] = 0.00231 s^{-1}, $t_{1/2}$ = 0.693/ 0.00231 = 300 s
6.	(i) Rate = $-d/dt[C_{12}H_{22}O_{11}] = -d/dt[H_2O] = d/dt[C_6H_{12}O_6] = d/dt[C_6H_{12}O_6]$ (ii) Rate = $k[C_{12}H_{22}O_{11}]$ (iii)Two and first order reaction.
7.	(i) The movement of colloidal particles under an applied electric potential is called electrophoresis. (ii) The path of light is clearly visible due to scattering of light by colloidal particles. (iii)The potential difference between the fixed layer and the diffused layer of opposite charges.
8.	(a) Fe $(OH)_3$ is positively charged sol. It gets coagulated by the Cl^- ions from NaCl. (b) The charged colloidal particles of carbon, after coming into contact with oppositely charged electrode in Cottrell precipitator lose their charge and settle down at the bottom. (c)In physical adsorption, there are weak Vander waals forces. Therefore, it forms multilayers. In chemisorption, adsorbate is attached by chemical bond. There is a strong force of attraction. Therefore only one layer is obtained.
9.	(a) Hybridization d^2sp^3, paramagnetic due to presence of one unpaired electron and low spin. (b) cis- form is optically active. OR (a) Tetraaminechloridonitrito-N-platinum (IV) sulphate (b) t_{2g}^3 e_g^1 (c) Hybridization dsp^2, Diamagnetic

10.	(i) Cyclohexane cyanohydrin (ii) Benzene (iii)But-2-en-1-al
11.	(i) A = 4-Hydroxy-4-methylpentan-2-one B = 4-methylpent-3-en-2-one C = Iodoform D = Sodium 3-methylbut-2-enoate (ii) 4-Hydroxy-4-methylpentan-2-one
12.	(i) (d) (n-1) $d^{1-10}ns^{1-2}$ (ii) (c) Scandium (iii) (c) It is due to metallic bonding. (iv) (d) Y-Cd (v)(c) (n-1) d orbitals are completely filled.

BLUE PRINT CHEMISTRY SAMPLE PAPER -3 TERM II

S. NO.	UNITS	SECTION A 2 MARKS	SECTION B 3 MARKS	SECTION C CASE BASED 5 MARKS	TOTAL
1.	ELECTROCHEMISTRY	1 (2)	1 (3)		2 (5)
2.	CHEMICAL KINETICS		2 (6)		2 (6)
3.	SURFACE CHEMISTRY		2 (6)		2 (6)
4.	D- & F- BLOCK ELEMENTS	2 (4)	1 (3)		3 (7)
5.	COORDINATION COMPOUNDS		1 (3)		1 (3)
6.	ALDEHYDES, KETONES & CARBOXYLIC ACIDS			1 (5)	1 (5)
7.	AMINES		1 (3)		1 (3)
	TOTAL NO. OF QUESTIONS	3 (6)	8 (24)	1 (5)	12 (35)

SAMPLE PAPER -3 TERM II 2021-22
CHEMISTRY THEORY (043)

MM: 35 **TIME: 2 HOURS**

GENERAL INSTRUCTIONS:

Read the following instructions carefully.

1. There are 12 questions in this question paper with internal choice.
2. SECTION – A, Q. No. 1 – 3 are very short answer questions carrying 2 Marks each.
3. SECTION – B, Q. No. 4 – 11 are short answer questions carrying 3 Marks each.
4. SECTION – C, Q. No. 12 is case based question carrying 5 Marks.
5. All questions are compulsory.
6. Use of log tables and Calculator is not allowed.

SECTION – A

Q1. A current of 1.50 A was passed through an electrolytic cell containing $AgNO_3$ solution with inert electrodes. The weight of silver deposited was 1.50 g. How long did the current flow?

Q2. Mention the types of compounds formed when small atoms like H, C and N get trapped inside the crystal lattice of transition metals. Also give physical and chemical characteristics of these compounds.

Q3. Account for the following:

(i) Transition metals show variable oxidation states.

(ii) Iron has higher enthalpy of atomization than that of copper.

SECTION – B

Q4.

(i) Solutions of two electrolytes 'A' and 'B' are diluted. The limiting molar conductivity of 'B' increases 1.5 times while that of 'A' increases 25 times. Which of the two is a strong electrolyte? Justify your answer.

(ii) The product of electrolysis of aqueous NaCl at the respective electrodes are:
Cathode: H_2
Anode: Cl_2 and not O_2. Explain

OR

(i) Calculate the charge in coulombs required for oxidation of 2 moles of water to oxygen?
(Given 1F = 96500C mol^{-1})

(ii) Zinc/Silver oxide cell is used in hearing aids and electric watches. The following reaction occur:
$Zn (s) \rightarrow Zn2^+ (aq) + 2e^-$, $E^0_{Zn2+/Zn} = -0.76$ V
$Ag_2O + H_2O + 2e- \rightarrow 2Ag + 2OH^-$, $E^0_{Ag+/Ag} = 0.344$ V
Calculate (i) standard potential of the cell, (ii) standard Gibb's free energy.

Q5. For a certain chemical reaction: A + 2B -----> 2C + D

The experimentally obtained information is tabulated below:

Experiment	[A]0	[B]0	Initial rate of reaction
1.	0.30	0.30	0.096
2.	0.60	0.30	0.384
3.	0.30	0.60	0.192
4.	0.60	0.60	0.768

For this reaction

(i) Derive the order of reaction w. r. t. both the reactants A and B.
(ii) Write rate law.
(iii) Calculate the value of rate constant.

Q6. The rate constant for the first order reaction is 60 s^{-1}. How much time will it take to reduce 1 g of the reactant to 0.0625 g?

OR

(i) A first order reaction takes 40 minutes for 30% decomposition. Calculate $t_{1/2}$.
(ii) Identify the order of a reaction if the units of rate constant are:
  (i) L^{-1} mol s^{-1}
  (ii) L mol^{-1} s^{-1}

Q7.

(i) Why does leather get hardened after tanning?
(ii) On the basis of Hardy-Schulze rule explain why the coagulating power of phosphate is higher than chloride?
(iii) Does the vital function of the body such as digestion get affected during fever? Explain your answer.

Q8. Give reasons for the following observations:

(i) A delta is formed at the meeting point of sea water and river water.
(ii) Ammonia gas adsorbs more readily than nitrogen gas on the surface of charcoal.
(iii) Powdered substances are more effective adsorbents.

Q9. Give reasons:

(i) E^0 value for Mn^{3+}/Mn^{2+} couple is much more positive than that for Fe^{3+}/Fe^{2+}.
(ii) Iron has higher enthalpy of atomization than that of copper.
(iii) Sc^{3+} is colourless in aqueous solution whereas Ti^{3+} is coloured.

OR

Following are the transition metal ions of 3d series:

Ti^{4+}, V^{2+}. Mn^{3+}, Cr^{3+}

[Atomic numbers: Ti =22, V = 23, Mn = 25, Cr = 24]

Answer the following:

(i) Which ion is more stable in an aqueous solution and why?
(ii) Which ion is a strong oxidizing agent and why?
(iii) Which ion is colourless and why?

Q10.

(i) What type of isomerism is shown by the complex $[Co(NH_3)_6][Cr(CN)_6]$?
(ii) Why a solution of $[Ni(H_2O)_6]^{2+}$ is green while a solution of $[Ni(CN)_4]^{2-}$ is colourless?

(iii) Write the IUPAC name of the following complex: $[Co(NH_3)_5(CO_3)]Cl$

Q11.

(a) Write the structures of A and B in the following reactions:

(i) $C_6H_5N_2^+Cl^- \xrightarrow{CuCN} A \xrightarrow{H2O/H+} B$

(ii) $CH_3COOH \xrightarrow{NH3/\Delta} A \xrightarrow{NaOBr} B$

(b) Write the chemical reaction of methyl amine with benzoyl chloride and write the IUPAC name of the product obtained.

SECTION – C

Q12. Case based question: Read the passage given below and answer the following questions:
The IUPAC names of open chain aliphatic aldehydes and ketones are derived from the names of the corresponding alkanes by replacing the ending -e with -al and -one respectively. In case of aldehydes the longest carbon chain is numbered starting from the carbon of the aldehyde group while in case of ketones the numbering begins from the end nearer to the carbonyl group. The substituents are prefixed in alphabetical order along with numerals indicating their positions in the carbon chain. The same applies to cyclic ketones, where the carbonyl carbon is numbered one. When the aldehydic group is attached to a ring, the suffix carbaldehyde is added after the full name of the cycloalkane. The numbering of the ring carbon atoms start from the carbon atom attached to the aldehyde group. The name of the simplest aromatic aldehyde carrying the aldehyde group on a benzene ring is benzene carbaldehyde. H, the common name benzaldehyde is also accepted by IUPAC. Other aromatic aldehydes are hence named as substituted benzaldehydes.

The following questions ate multiple choice questions. Choose the most appropriate answer.

(i) The compound with the structure $C_6H_5 – CH=CHCHO$
- (a) Cinnamaldehyde
- (b) Salicylaldehyde
- (c) Vanillin
- (d) Acrolein

(ii) Conversion of benzoyl chloride to benzaldehyde using $H_2/Pd\text{-}BaSO_4$ is an example of
- (a) Stephen's reaction
- (b) Kolbe's reaction
- (c) Rosenmund's reaction
- (d) Etard's reaction

(iii) Aldehydes and ketones give
- (a) Electrophilic substitution reaction
- (b) Electrophilic addition reaction
- (c) Nucleophilic substitution reaction
- (d) Nucleophilic addition reaction

(iv) Which of the following does not give Cannizaro's reaction?
- (a) HCHO
- (b) C_6H_5CHO
- (c) $CH_3C_6H_4CHO$

(d) CH_3CHO

(v) Acetone is soluble in water because of

(a) Covalent bonding

(b) Ionic bonding

(c) Hydrogen bonding

(d) Vander Waal's forces

MARKING SCHEME CHEMISTRY SAMPLE PAPER -3 TERM II

Q. No.	ANSWERS
1.	Quantity of charge required to deposit 108 g Ag = 96500 C Quantity of charge required to deposit 1.50 g Ag = (96500 x 1.50) / 108 = 1340.28 C Time taken = Q/t = 1340.28 / 1.50 = 893.5 s
2.	Interstitial compounds formed when small atoms like H, C and N get trapped inside the crystal lattice of transition metals. Properties of such compounds are: High melting points, hard, retain metallic conductivity and chemically inert.
3.	(i) Because the energies of (n-1)d and ns are similar. (ii) Because iron has greater number of unpaired electrons than copper. Greater the number of electrons, greater the strength of metallic bonding.
4.	(i) B is a strong electrolyte. Strong electrolyte is already dissociated into ions, but there are interionic forces of attraction. On dilution, these forces are overcome and the ions become free to move. So, there is greater increase in molar conductivity on dilution. (ii) Water should get oxidized in preference to Cl^-, but due to overvoltage or over potential, Cl^- is oxidized in preference to water. OR (i)$2H_2O\ (l) \rightarrow O_2\ (g) + 4H^+\ (aq) + 4e^-$ Charge in coulombs required for the process = 4 x 96500 = 386000 coulombs.

	(ii)E^0cell = 0.344 V – (-0.76V) = 1.104 V ΔG^0 = -n F E^0cell = -2 x 96500 x 1.104 = -213072 J mol^{-1} = -213.072 $kJmol^{-1}$.
5.	(i) Rate = $k[A]^x[B]^y$, x = 2, y = 1 (ii) Rate = $k[A]^2[B]^1$ (iii)From Experiment 1, 0.096 = k $[0.30]^2$ $[0.30]^1$ k = 3.55
6.	t = (2.303/k) log $[R]_0/[R]$ t = (2.030/60) log (1/0.0625) t = (2.303/60) x log 16 t = (2.303/60) x log (2^4) t = (2.303/60) x 4 log 2 t = (2.303/60) x 4 x 0.3010 = 0.0462 s OR (a) k = (2.303/t) log $[R]_0/[R]$ k = (2.303/40) log (100/70) k = 0.0089 min^{-1} $t_{1/2}$ = 0.693/0.0089 = 77.86 min. (b) (i) Zero order (ii) Second order
7.	(i) Animal hides are colloidal in nature and are soft. These hides carry a positive charge. On treatment with negatively charged tannin, coagulation takes place and the leather gets hardened. (ii)Hardy Schulze rule states that the coagulating power of an ion is directly proportional to the valency of the ion. As phosphate ion has a greater valency (-3) compared to chloride ion (-1), the former has a greater coagulating power. (iii)Vital functions of the body such as digestion are carried by the enzymes and the enzymatic activity takes place in the temperature range of 298 K -310 K. Under the conditions of fever, the body temperature is outside this range; therefore, the vital functions get affected.
8.	(i) River water is a colloidal solution of clay. Sea water contains a number of electrolytes. When river water meets sea water, the electrolytes in sea water coagulate the colloidal solution of clay resulting in the formation of delta. (ii)The amount of gas adsorbed by a solid depends upon the nature of the gas. Easily liquefiable gases are more easily adsorbed. As ammonia gas is more liquefiable as compare to nitrogen gas, it is more readily adsorbed. (iii)Adsorption increases with the increase in surface area of the adsorbent. On powdering, the surface area increases. Therefore, the extent of adsorption also increases.
9.	(i) Because Mn^{3+} ($3d^4$) has a tendency to gain one electron and change to more stable half-filled configuration to give Mn^{2+} ($3d^5$). Thus, it has higher value of E^0. Fe^{3+} has a more stable half-filled configuration and has no tendency to gain an electron to change into Fe^{2+}. Therefore, E^0 value for Mn^{3+}/Mn^{2+} couple is much more positive than that for Fe^{3+}/Fe^{2+}. (ii) Enthalpy of atomization depends upon the number of electrons in the outermost

	orbit. Iron has a greater number of electrons in the outermost orbit as compared to copper. Therefore, Iron has higher enthalpy of atomization than that of copper. (iii) Sc^{3+} is colourless in aqueous solution whereas Ti^{3+} is coloured. The configuration of Sc^{3+} is [Ar], there are no d-electrons and therefore there is no possibility of d-d transition. The configuration of Ti^{3+} is $3d^1$, there is possibility of d-d transition. Hence, Ti^{3+} is coloured.
10.	(i) Coordination isomerism (ii) $[Ni(H_2O)_6]^{2+}$ is an octahedral complex while $[Ni(CN)_4]^{2-}$ is a square planar complex. The two complexes are associated with different crystal field splitting. The two compounds give different colours of in d-d transition. (iii)Pentaamminecarbonatocobalt (III) chloride
11.	(a) (i) A = C_6H_5CN, B = C_6H_5COOH (ii)A = CH_3CONH_2, B = CH_3NH_2 (b) $CH_3NH_2 + C_6H_5COCl \rightarrow CH_3NHCOC_6H_5$ N-methyl benzamide
12.	(i) (a) Cinnamaldehyde (ii) (c) Rosenmund's reaction (iii) (d) Nucleophilic addition reaction (iv)(d) CH_3CHO (v)(c) hydrogen bonding