PRUDENCE SCHOOL, DWARKA 22
PREBOARD EXAMINATION -2
SESSION: 2025-2026
SUBJECT: CHEMISTRY (043)
CLASS: XII
SET- A

Name of Student:
Day & Date: Friday 12.12.2025
Roll no.:
Invigilator's name & Sign:

Max Marks: 80
Duration: 3 hours

General Instructions:
Read the following instructions carefully.
a) There are 33 questions in this question paper with internal choice.
b) SECTION A consists of 16 multiple-choice questions carrying 1 mark each.
c) SECTION B consists of 2 very short answer questions carrying 2 marks each.
d) SECTION C consists of 7 short answer questions 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 tables and calculators is not allowed

Q1. Benzyl alcohol is obtained from benzaldehyde   1
   a. Fitting's reaction
   b. Cannizzaro's reaction
   c. Kolbe's reaction
   d. Wurtz's reaction

Q2. What is the molar conductance at infinite dilution for sodium chloride if the molar conductance at   1
   infinite dilution of Na^+ and Cl^- ions are 51.12×10^{-4} Scm^2/mol and 73.54×10^{-4} Scm^2/mol
   respectively?
   a. 124.66 Scm^2/mol
   b. 22.42 Scm^2/mol
   c. 198.20Scm^2/mol
   d. 175.78 Scm^2/mol

Q3. What happens to the atomic size of lanthanides as the atomic number increases?   1
   a. The radius remains unchanged
   b. The radius first increases and then decreases
   c. The radius increases
   d. The radius decreases

Q4.   1

'A' $\xrightarrow{\text{Reduction}}$ 'B' $\xrightarrow{HNO_2}$ CH_3CH_2OH

The compound 'A' is _____ .
(a) propane nitrile   (b) ethane nitrile   (c) nitro methane   (d) methyl isocyanate

Q5. In reaction $A \rightarrow B$, the rate of reaction is doubled on increasing the concentration of the reactants   1
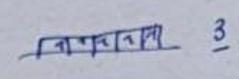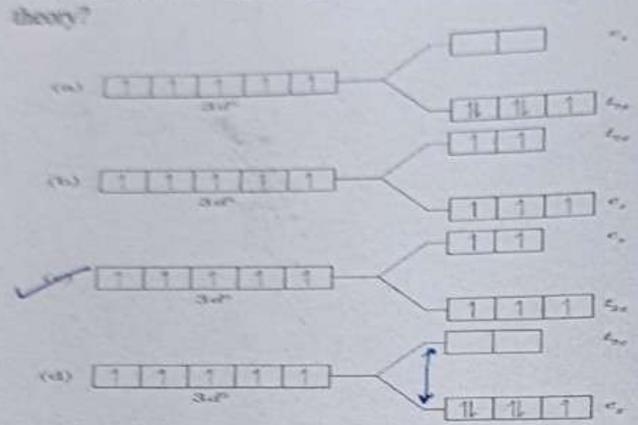   four times. The order of the reaction is :
   a. 1
   b. 2
   c. 4
   d. Zero

Q6. Which of the following will not give iodoform test?   1
   (a) Ethanol   (b) Ethanal   (c) Pentan-3-one   (d) Pentan-2-one

1

Q7 Which of the following energy level diagram for $[FeF6]^{3-}$ is correct on the basis of crystal field theory?

(handwritten notes)
$$x + (-6) = -3$$
$$x = -3 + 6$$
$$x = 3$$

$Fe_{26} = [Ar]_{18}\, 4s^2\, 3d^6$

$Fe^{3+} = [Ar]\, 4s^0\, 3d^5$

Q8 The rate of first order reaction is 0.04 mol L^{-1} s^{-1} at 10 sec. and 0.03 mol L^{-1} s^{-1} at 20 seconds after initiation of the reaction. $t_{1/2}$ of reaction is _____.
(a) 44.1 s (b) 54.1 s (c) 24.1 s (d) 34.1 s

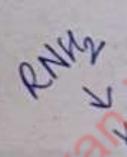(handwritten) $\log \frac{K_1}{K_2} = \log \frac{E_a}{R}\left[\frac{1}{T_1} - \frac{1}{T_2}\right]$

$\frac{0.693}{K}$

Q9 Which of the following is the correct order of decreasing SN^2 reactivity?
(a) $RCH_2X > R_2CHX > R_3CX$
(b) $R_3CX > R_2CHX > RCH_2X$
(c) $R_2CHX > R_3CX > RCH_2X$
(d) $RCH_2X > R_3CX > R_2CHX$

Q10 The reaction between $RNH_2 + CHCl_3 + KOH$ (alc.) is known as:
(a) Coupling reaction
(b) Carbylamine reaction
(c) Hoffmann bromamide reaction
(d) Schmidt reaction

Q11 NO_2^- is a
(a) Monodentate ligand
(b) Bidentate ligand
(c) Ambidentate ligand
(d) Hexadendate ligand
(e)

Q12. Which of the following reaction confirms the presence of carbonyl group in glucose?
(a) Reaction with HI
(b) Reaction with NH_2OH
(c) Reaction with HCN
(d) both (b) and (c)

Q13 Assertion (A): Stronger ligands cause larger splitting in an octahedral field.
Reason (R): The magnitude of tetrahedral splitting is smaller than that of octahedral complexes.
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.

Q14 Assertion (A): Proteins are found to have two different types of secondary structures viz alpha-helix and beta-pleated sheet structure.
Reason (R): The secondary structure of proteins is stabilized by hydrogen bonding.
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.

2

Assertion (A): Addition reaction of water to but-1-ene in acidic medium yields butan-2-ol

Reason (R): Addition of water in acidic medium proceeds through the formation of primary carbocation.

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

1

Q16 **Assertion :** Hoffmann's bromamide reaction is given by primary amines.

Reason : Primary amines are more basic than secondary amines.

(a) Both Assertion and Reason are true but Reason is not the correct explanation of Assertion.

(b) Both Assertion and Reason are true and Reason is the correct explanation of Assertion.

(c) Assertion is false but Reason is true.

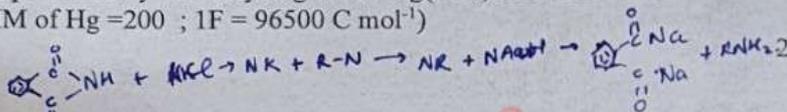(d) Assertion is true but Reason is false.

1

SECTION B

Q17 How many moles of mercury will be produced by electrolyzing 1.0 M $Hg(NO_3)_2$ solution with a current of 2 A for 3 hours?(Given MM of Hg =200 ; 1F = 96500 C mol^{-1})

2

Q18 Explain the following reactions:

(i) Gabriel Phthallimide synthesis

(ii) Ammonolysis of alkyl halides

2

Q19 Write the structures and names of the compounds formed when compound 'A' with molecular formula, C_7H_8 is treated with Cl_2 in the presence of $FeCl_3$.

2

Q20 For a reaction, the energy of activation is zero. What is the value of rate constant at 300 K, if k= $1.6 \times 10^6\ s^{-1}$ at 298 K? (R= 8.31 J K^{-1} mol^{-1})

2

Q21 (i) What is meant by coordination number?

(ii) Which compound is used to estimate the hardness of water volumetrically?

2

SECTION C

Q22 Account for the following:

a. There are 5 OH groups in glucose.

b. Glucose is a reducing sugar

c. Sucrose is invert sugar

OR

What happens when D – glucose is treated with the following reagents

a. Bromine water

b. HNO_3

c. NH_2OH

3

Q23 When a coordination compound $CrCl_3.6H_2O$ is mixed with $AgNO_3$, 4 moles of AgCl are precipitated per mole of a compound. Write

(i) Structural formula of the complex

(ii) IUPAC name of the complex.

(iii) Hybridisation and magnetic behaviour of this complex

OR

Write IUPAC name of the complex $[Co(en)_2(NO_2)Cl]^+$. What type of structural isomerism is shown by this complex?

3

Q24 Write the structure of the major organic product in each of the following reactions:

(i) C_6H_5ONa + C_2H_5Cl →

(ii) $(CH_3)_3CBr$ + alc. KOH →

(iii) C_6H_5OH + Br_2 (water)

3

Q25 Give reason why-

(i) Aryl halides are less reactive towards nucleophilic substitution reaction than Alkyl halide?

(ii) Alkyl chloride react with aqueous KOH leads to the formation of alcohols but in presence of alcoholic KOH leads to formation of alkenes.

(iii) Write the structure of an isomer of compound C_4H_9Br which is most reactive towards S_N1 reaction

3

Q26 Following data are obtained for the reaction:

$N_2O_5 \rightarrow 2NO_2 + \frac{1}{2} O_2$

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

i) Show that it follows a first order reaction.
ii) Calculate the half-life.
(Given log 2= 0.3010; log4 =0.6021

Q27 (i) Arrange the following in decreasing order of acidity.
(a) CH_3OH , H_2O , C_6H_5OH
(ii) Explain why carboxylic acids are stronger acids than alcohols?
(iii) Anisole is undergoing nitration.

Q28 A 5% solution by mass of cane sugar in water has a freezing point of 271 K. Calculate the freezing point of 5% glucose in water if the freezing point of pure water is 273.15 K. Molar mass of cane sugar = 342 g mol-1 ; glucose = 180 g mol-1

SECTION D

Q29 Observe the table in which azeotropic mixtures are given along their boiling points of pure components and azeotropes.

Some Azeotropic Mixtures					
A	B	Minimum Boiling Azeotropes	A	B	Mixture Azeotropes
H_2O	C_2H_5OH	95.37%	373K	351.3K	351.15
H_2O	C_2H_5OH	71.69%	373K	370.19K	350.72
CH_3COCH_3	CS_2	67%	329.25K	319.25K	312.30
H_2O	HCl	20.3%	373K	188K	383K
H_2O	HNO_3	68.0%	373K	359K	393.5K
H_2O	$HClO_4$	71.6%	373K	383K	476K

Answer the following questions :
(a) Why do ethanol and H_2O show positive deviation from Raoult's law ?
(b) Why do H_2O and HCl form maximum boiling azeotropes?
(c) (i) What are azeotropes ?
(ii) How are azeotropes separated ?

Q30 Carbohydrates play a vital role in our daily life. These are classified as monosaccharides, oligosaccharides and polysaccharides depending upon the number of smaller molecules on hydrolysis. It has been suggested that monosaccharides do not have a free aldehydic or ketonic group but have cyclic hemiacetal or hemiketal structures. D-glucose exists in two stereo isomeric forms; α-D-glucose and β-D-glucose which have different positions of H and OH groups on first carbon atom. Disaccharides such as sucrose, maltose, lactose etc. give monosaccharides on hydrolysis. Polysaccharides are starch, cellulose, glycogen having molecular formula (C6H10O5) n.

Answer the following questions:
(i) What is the name of the linkage which holds together monosaccharide units is sucrose?
(ii) Name the water insoluble component of starch.
(iii) Why does glucose not give 2, 4-DNP?
(iv)When glucose is heated with methyl alcohol in the presence of dry HCl gas, it forms two methyl glycosides. Is it true or false?

(i) Write the Nernst equation and find the emf of the following cells at 298K   5
Fe(s) Fe2+ (0.001M) H+(1M) H2(g) (1bar) Pt(s) Given, Eo /Fe = − 0.44V
Fe2±

(ii) Calculate the Standard Gibb's free energy change $\Delta G0$ of the reaction: $Ni(s) + 2Ag+(aq)$
$\rightarrow Ni2+(aq) + 2Ag(s)$; E^0cell =1.05 V, (1F=96500C)   − 202·65,   −nfE°.

<div align="center">OR</div>

(i) Conductivity of 2.5×10^{-4} M methanoic acid is 5.25×10^{-5} Scm⁻¹. Calculate its molar
conductivity and degree of dissociation. Given $\lambda^0 (H^+) = 349.5$ Scm²mol⁻¹ and λ^0 HCOO⁻) = 50.5
Scm² mol⁻¹

(ii) State Kohlrausch law alongwith example. → $\kappa_m^0 \rightarrow \pi$

Q32   How would you account for the following?   5

(i) Of the d^4 species, Cr^{2+} is strongly reducing while Mn^{3+} is strongly oxidising.
(ii) Transition metals show variable oxidation states
(iii) The d^1 configuration is very unstable in ions.
(iv) Separation of a mixture of Lanthanoid elements is difficult.
(v) Transition metals form a large number of complexes.

<div align="center">OR</div>

(i) Out of Sc^{3+}, Co^{2+} and Cr^{3+} ions, only Sc^{3+} is colourless in aqueous solutions. (Atomic no. Co=
27; Sc=21; Cr = 24)
(ii) Higher oxidation state of Mn with fluorine is +4 whereas with oxygen is +7.
(iii) Atomic radii of 4d and 5d series elements are nearly same.
(iv) Ce^{4+} is a strong oxidizing agent.
(v) Transition metals are act as a catalyst.

Q33   A compound 'A' (Molecular formula C2H6O) on oxidation by heating on Cu at 573 K gives   5
compound B. The compound B gives positive 2, 4-DNP test. This compound B on reaction with
dilute alkali and on subsequent heating gives C'. Compound B on oxidation with KMnO4 forms a
monobasic carboxylic acid D with molecular weight of 60g/mol.(D) reacts with ethanol to form
ester (E) Deduce structures of A, B, C, D and E also write the reactions involved.

<div align="center">OR</div>

(i) Give chemical tests to distinguish between the following pairs of compounds. a) Acetophenone
and Benzophenone
      b) Propanal and Propanone
(ii) Prepare the following: a) Hydrazones of propanone
            b) 2-chlorobutanoic acid from Butanoic acid
            c) 2-Hydroxybenzoic acid from benzene