B.K. BIRLA CENTRE FOR EDUCATION

SARALA BIRLA GROUP OF SCHOOLS
A CBSE DAY-CUM-BOYS' RESIDENTIAL SCHOOL

Pre- Board-1 Examination 2025-26
Chemistry (043)

Class: XII   **Time: 3hrs**
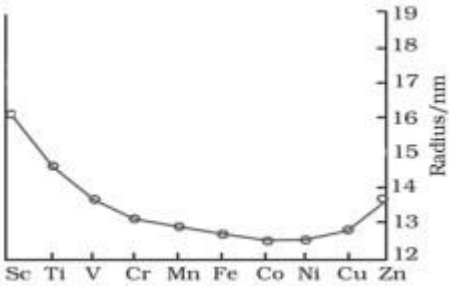**Date: 12.11.25**   **Max Marks: 70**
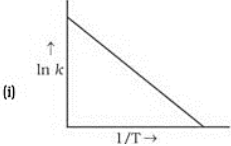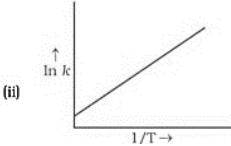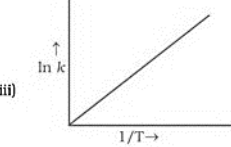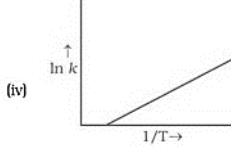**Admission no:**   **Roll no: ____**

General Instructions: Read the following instructions carefully and follow them

(i) This question paper contains 33 questions. All questions are compulsory.

(ii) SECTION A –Question number 1-16 are multiple -choice type questions each question carries 1 mark

(iii) SECTION B - Question number17-21 are very short answer type questions each question carries 2 mark

(iv) SECTION C- Question number22-28 are short answer type questions each question carries 3 marks .

(v) SECTION D- Question number 29-30 are case - based questions each question carryies 4 marks.

(vi) SECTION E- Question number 31-33 are long answer type questions each question carries 5 marks.

(vii) There is no overall choice given in the question paper.However an internal choice has been provided in few questions in all the sections except Section A.
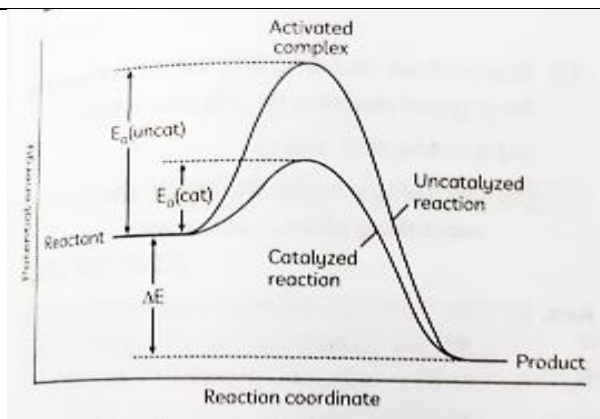
(viii) Use of log tables and calculators is not allowed.

SECTION A
Question no 1to 16 are multiple choice type questions carrying 1 mark each.

1	The quantity of charge required to obtain one mole of aluminium from Al_2O_3 is (a) 1F (b) 6F (c) 3F (d) 2F
2	If the initial concentration of substance A is 1.5 M and after 120 seconds the concentration of substance A is 0.75 M, the rate constant for the reaction if it follows zero - order kinetics is: (a) 0.00625 $molL^{-1}s^{-1}$ (b) 0.00625 s^{-1} (c) 0.00578 $molL^{-1}s^{-1}$ (d) 0.00578 s^{-1}
3	The trend of which property is represented by the following graph?

(a) ionization enthalpy   (b) atomic radii   (c) enthalpy of atomization   (d) melting point

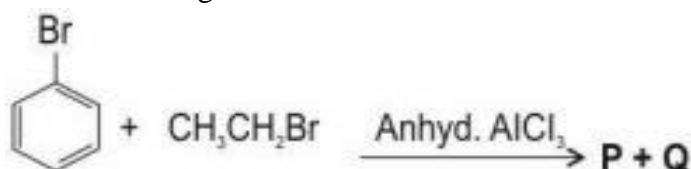| 4	Anisole undergoes bromination with bromine in ethanoic acid even in the absence of iron (III) bromide catalyst (a) Due to the activation of benzene ring by the methoxy group. (b) Due to the deactivation of the benzene ring by the methoxy group. (c) Due to the increase in electron density at the ortho and para positions (d) Due to the formation of a stable carbocation.
5	According to the Arrhenius equation rate constant k is equal to $A\, e^{-Ea/RT}$. Which of the following options represents the graph of ln k vs 1/T
6	Which of the following reagents can be used to prepare a ketone from acid chloride.? (a) $LiAlH_4$ (b) Grignard reagent (c) di methyl cadmium (d) cadmium chloride
7	Which of the following is not correct? (a) In haloarenes, the electron pairs on halogen atom are in conjugation with π-electrons of the ring. (b) The carbon-magnesium bond is covalent and non-polar in nature. (c) During SN_1 reaction, the carbocation formed in the slow step, being sp^2 hybridised, is planar. (d) Out of $CH_2= CH-Cl$ and $C_6H_5CH_2Cl$, $C_6H_5CH_2Cl$ is more reactive towards SN_1 reaction.
8	How many 'd' electrons are in present Cr^{1+} ion (a) 1 (b) 3 (c) 5 (d) 7

9	Sucrose (cane sugar) is a disaccharide. One molecule of sucrose on hydrolysis gives ___.
	    (a) 2 molecules of glucose (b) 2 molecules of glucose + 1 molecule of fructose
	    (c) 1 molecule of glucose + 1 molecule of fructose (d) 2 molecules of fructose

10	Diksha wants to form structural isomers for primary amine having formula $C_4H_{11}N$.Help her to find out the total no of structural isomers. (a) 1 (b) 2 (c) 3 (d) 4
11	Phenol is less acidic than _____. (a) ethanol (ii) o-nitro phenol (iii) o-methyl phenol (iv) o-methoxy phenol

12	In Clemmensen Reduction carbonyl compound is treated with _____.
	(i) Zinc amalgam + HCl (ii) Sodium amalgam + HCl
	(iii) Zinc amalgam + Nitric acid (iv) Sodium amalgam + HNO_3
	The following questions 13 to 16 consist of two statements –
	Assertion (A) and **Reason** (R). Answer these questions by selecting the appropriate option given below:
	A. Both A and R are true, and R is the correct explanation of A.
	B. Both A and R are true, and R is not the correct explanation of A.
	C. A is true but R is false.
	D. A is false but R is true.
13	Assertion (A): IUPAC name of $CH_3CH_2NH_2$ is propanamine
	Reason (R):. It contains 2 carbons in the chain and NH_2 group
14	Assertion (A): IUPAC name of $CH_3CH_2CH_2COOH$ is butanoic acid.
	Reason (R):. In IUPAC system aliphatic carboxylic acids are named by replacing the ending -e in the name of the corresponding alkane with -oic acid.
15	Assertion : In maltose, two alpha-D-glucose units are linked through glycosidic linkage.
	Reason : A linkage between two monosaccharide units through an oxygen atom is called glycosidic linkage.
16	Assertion: Mercury cell gives a constant voltage throughout its life.
	Reason: Overall reaction for the cell does not involve any ion in the solution whose concentration can change during its life.
	SECTION B
17	Sameer collected at 10 ml each of freshwater and ocean water he observed that one sample labelled 'P' freezes at $0\,^{\circ}C$ while the other 'Q' at -1.3 $^{\circ}C$ Sameer forgot which of the two "P" and "Q" was ocean water. Help him identify which container contains ocean water, giving a rationalization for your answer.
18	Prove that the presence of 5 -OH groups in glucose. Give a chemical reaction.
19	Arrange the following according to the property mentioned.
	(a) $CH_3CH_2CH_2CHO$, $CH_3CH_2CH_2CH_2OH$, $C_2H_5OC_2H_5$, $CH_3CH_2CH_2CH_2CH_3$
	(increasing order of boiling point)
	(b) acetaldehyde, acetone, ditert butyl ketone, methyl tert butyl ketone
	(reactivity towards HCN)
20	Observe the graph given below.

In the above graph Ea is given ,what is Ea define it.

OR

What is the effect of adding a catalyst on
(i) Activation energy
(ii) Gibbs energy of reaction
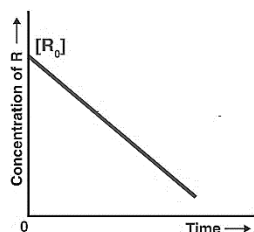
| 21 | In the reaction given below. |

(i) Identify P and Q.
(ii) Which of them is the major product and why?

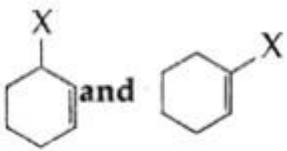**SECTION C**

| 22 | Attempt any three of the followings |

a. For a reaction: $P + 2Q \rightarrow$ Products, Rate $= k [P]^{1/2}[Q]^1$. What is the overall order of reaction?

b. Write the rate equation for the reaction $2A + B \rightarrow C$ if the order of the reaction is zero.

c. A reaction: Reactant $\rightarrow$ Product is represented by the graph:

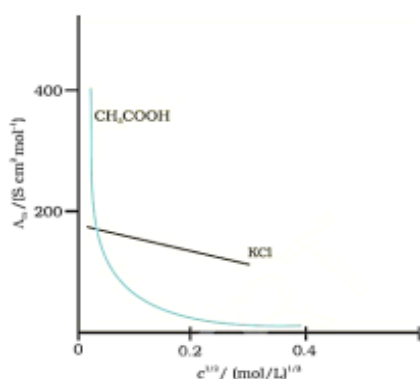   (i)   Predict the order of the reaction.
    (ii)   What does the slope of the graph represent?

(d) Time required to decompose SO_2Cl_2 to half of its initial amount is 60 minutes. If the decomposition is a first order reaction, calculate the rate constant of the reaction.

| 23 | *Which compound in each of the following pairs will react faster in S$_N$2 reaction with –OH?* |

(i) CH_3Br or CH_3I
(ii) $(CH_3)_3CCl$ or CH_3Cl
(iii) Out of A and B which is an example of allylic halide?

	A B

24	(i) Lata took four acids. Help her to arrange the acids from left to right in the increasing order of their acidity.
	
	   2,4,6-trinitrophenol, acetic acid, phenol, and benzoic acid.
	
	(ii) Write the mechanism of the following reaction.
	
	   $CH_2=CH_2 + H_2O \xrightarrow{H^+} CH_3CH_2OH$

25	Calculate E_{cell} for the following reaction at 298 K
	   $2Cr(s) + 3Fe^{2+} (0.01\ M) \rightarrow 2Cr^{3+} (0.01\ M) + 3Fe(s)$
	   Given: $E^o_{cell} = 0.261\ V$ (log 10=1, log 2=0.3010)

26	a) Although both $[NiCl_4]^{2-}$ and $[Ni(CO)_4]$ have sp^3 hybridization ,yet $[NiCl_4]^{2-}$ is paramagnetic and $[Ni(CO)_4]$ is diamagnetic. Give a reason. (Atomic number of Ni=28) (b)Give two examples of coordination compounds which are used in medicines.
27	(i) Deficiency of which vitamin causes rickets? (ii) Give an example for each of fibrous protein and globular protein. (iii) Write the product formed on reaction of D-glucose with Br_2 water.
28	(i)Write the chemical reaction involved in wolff-kishner reduction. (ii) A and B are two functional isomers of compound C_3H_6O. On heating with NaOH and I_2, isomer B forms yellow precipitate of iodoform whereas isomer A does not form any precipitate .write the formulae of A and B.
	SECTION D The following questions are case-based questions. Each question has an internal choice and carries 4 marks.
29	Strong and weak electrolytes behave differently in solution because of the difference in their degree of ionization .the conductance behavior and effect of concentration on conductance is different for both strong and weak electrolytes. Molar conductivity is the product of specific conductance of an electrolyte and the volume of solution containing 1 gram mole of the electrolyte.the dissociation of a weak electrolyte is much lesser as compared to a strong electrolyte and so its molar conductivity is low. We use Kohlrausch law of independent migration of ions for determining the limiting molar conductivity of weak electrolytes. Kohlrausch law states that the infinite dilution molar conductivity of an electrolyte is equal to the sum of the conductivities of the anions and cations. The following curve is obtained when molar conductivity, Λ_m is plotted against the square root of concentration, $C^{1/2,}$ along y and the x-axis, respectively, for the two electrolytes X and Y.

Y = CH_3COOH

X= KCl

a) What do you know about the nature of these two electrolytes? 1

b) How can you determine Λ_m^o for these electrolytes? 1

c) How do you account for the increase in Λ_m for the electrolytes X and Y with dilution.

OR

The conductivity of 0.001 M acetic acid is 4 x 10^{-5} S/m. Calculate the dissociation constant of acetic acid if $\lambda^0 m$ for acetic acid is 390 S cm^2 mol^{-1}. 2

| 30 | Alfred Werner was the first chemist who studied the complexes and propose the concept of primary and secondary valencies for a metal.In a series of compounds of Co(III) chloride with ammonia, it was found some chloride ions could be precipitated as AgCl when treated with $AgNO_3$ while some remained in solution. And this helped Werner in proposing the concept of ionic and nonionic valencies. Below is the table given showing complexes formed from Cobalt(III) chloride and ammonia by Alfred Werner. Observe the table carefully and answer the questions that follow |

Compound	Colour	Moles of AgCl formed from 1 mol of compound	Total no. of ions produced
(A)$CoCl_3.4NH_3$	Violet	1	2
(B)$CoCl_3.5NH_3$	Rose	2	3
(C) $CoCl_3.3NH_3$	Blue green	0	0

   (i)   Write the formula of Compound B. 1

   (ii)   What is the primary and secondary valences of cobalt in compound A. 1

   (iii)   Draw geometrical isomers of compound A. 2

OR

Draw geometrical isomers of compound C and identify their names.

SECTION E

The following questions are long answer type and carry 5 marks each. All questions have an internal choice.

| 31 | (a) Two solutions A and B are prepared. Both solutions A and B contain an equal amount of organic compounds P and Q, respectively as solutes in 500 g of benzene (as a solvent). The boiling point of solution A is 0.4°C higher than that of pure benzene and the boiling point of solution B is 0.8°C higher than that of pure benzene.
(i) Calculate the ratio of the molecular weight of P: Q
(ii) If the molecular weight of P is 200, what is the minimum value of the sum of molecular |

weights of P and Q.

(b) Rakesh took 20 g of solute A to prepare a 50 ml solution. This solution is isotonic to another solution of the same volume with a weight of 40 g of a different solute B.

(i) If both the solution is prepared at the same temperature, then what is the ratio of molecular mass of solute A to that of B?

(ii) If the two solutions are placed at different temperatures, keeping all other variables constant, and separated by SPM, will the osmosis happen?

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

(a) Two liquids A and B on mixing form an ideal solution. At 30^0C vapour pressure of solution containing 3 mol of A and 1 mol of B is 550 mmHg. But when 4 mol of A and 1 mol of B are mixed. The vapour pressure of the solution thus formed is 560 mm Hg. What would be the V.P of pure A and B?

(b)Define the molal elevation constant for a solvent.

(c) Elevation of boiling point of 1 M KCl solution is nearly double than that of 1 M sugar solution.Explain

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32 Attempts any five of the following questions :

(a) Aryl diazonium salts undergo reductive removal of the diazonium group in the presence of weak acids. Which product will be formed during this process?

(b) Write the chemical equation involved in the following reaction: Hofmann bromamide degradation reaction.

(c) Two isomers, n- $C_4H_9NH_2$ and $(C_2H_5)_2NH$ have molar mass of 73 each. Compare their boiling point.

(d) Why is the group of aniline acylated before carrying out nitration?

(e) Parul was given two test tubes. One of the test tubes contained ethylamine and the other contained aniline.To distinguish between the two compounds,she adds a reagent X to both the test tubes. She observes that in only one of the test tubes, a yellow dye is formed. Identify the reagent X.

(f) Carry out the following conversion p-nitro toluene to 2-bromo benzoic acid.

(g) Identify the best reagent to convert nitrile to primary amine?

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33 (a) Shown below is a step-wise process for the formation of an orange-coloured crystalline compound C. Identify the compound C and write the chemical reactions to show the formation of compounds A, B, and C

(b) Give a reason for the following:

(i) What is a characteristic property of d-block elements regarding their oxidation states?

(ii) Why do d-block elements form colored compounds?

(iii) What is the magnetic property commonly found in d-block elements?

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

Lanthanoid contraction is a gradual decrease in atomic and ionic radii as one moves across

the lanthanoid series On the basis of Lanthanoid contraction, explain the following.

(i) Nature of bonding in Lu_2O_3 and La_2O_3

(ii) Trends in the stability of oxo salts of lanthanides from La to Lu.

(iii) Stability of the complexes of lanthanides.

(iv) Radii of 4d and 5d block elements

(v) Trends in acidic character of lanthanide oxides.

**********************ALL THE BEST**********************