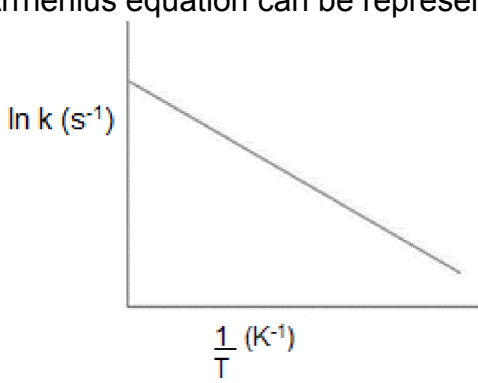


General Instructions:

Read the following instructions carefully.

- There are 35 questions in this questions paper with internal choic.
- SECTION A consists of 18 multiple-choice questions carrying 1 mark each.
- SECTION B consists of 7 very short answer questions carrying 2 marks each.
- SECTION C consists of 5 short answer questions carrying 3 marks each.
- SECTION D consists of 2 case-based questions carrying 4 marks each.
- SECTION E consists of 3 long answer questions carrying 5 marks each.
- All questions are compulsory.
- Use of log tables and calculators is not allowed.

SECTION A

1.	An raw mango placed in a concentrated salt solution to prepare pickle, shrivels because - it gains water due to osmosis - it loses water due to reverse osmosis - it gains water due to reverse osmosis - it loses water due to osmosis.
2.	Δ_m^0 for NaCl, HCl and NaAc are 126.4, 425.9 and 91.0 S cm² mol⁻¹ respectively. Calculate Δ_m^0 for HAc. 390.5 S cm² mol⁻¹. 461.3 S cm² mol⁻¹. 208.5 S cm² mol⁻¹. 643.3 S cm² mol⁻¹.
3.	Arrhenius equation can be represented graphically as follows:  The (i) intercept and (ii) slope of the graph are: (i) ln A (ii) Ea/R (i) A (ii) Ea (i) ln A (ii) - Ea/R (i) A (ii) -Ea
4.	Galvanisation is applying a coating of ____ on iron. Pb

	b. Cu c. Zn d. Cr
5.	The CFSE of $[\text{CoCl}_6]^{3-}$ is 18000 cm^{-1} the CFSE for $[\text{CoCl}_4]^-$ will be: a. 18000 cm^{-1} b. 8000 cm^{-1} c. 2000 cm^{-1} d. 16000 cm^{-1}
6.	The ionization isomer of $[\text{Cr}(\text{H}_2\text{O})_4\text{Cl}(\text{NO}_2)]\text{Cl}$ is a. $[\text{Cr}(\text{H}_2\text{O})_4(\text{O}_2\text{N})]\text{Cl}_2$ b. $[\text{Cr}(\text{H}_2\text{O})_4\text{Cl}_2](\text{NO}_2)$ c. $[\text{Cr}(\text{H}_2\text{O})_4\text{Cl}(\text{ONO})]\text{Cl}$ d. $[\text{Cr}(\text{H}_2\text{O})_4\text{Cl}_2(\text{NO}_2)] \cdot \text{H}_2\text{O}$
7.	Solution (X) is a mixture of bromoethane and chloroethane in which intermolecular interactions of A-A and B-B type are nearly same as A-B type interactions. Solution (Y) is a mixture of ethanol and acetone in which A-A or B-B type intermolecular interactions are stronger than A-B type interactions. Solution (Z) is a mixture of chloroform and acetone in which A-A or B-B type intermolecular interactions are weaker than A-B type interactions. Mark the correct answer on the basis of above information. a. Solution (Y) and (Z) will follow Raoult's law b. Solution (Z) will show positive deviation from Raoult's law. c. Solution (Y) will show negative deviation from Raoult's law d. Solution (X) will follow Raoult's law
8.	Which one of the following compounds is more reactive towards SN_1 reaction? a. $\text{CH}_2=\text{CHCH}_2\text{Br}$ b. $\text{C}_6\text{H}_5\text{CH}_2\text{Br}$ c. $\text{C}_6\text{H}_5\text{CH}(\text{C}_6\text{H}_5)\text{Br}$ d. $\text{C}_6\text{H}_5\text{CH}(\text{CH}_3)\text{Br}$
9.	The major product of acid catalysed dehydration of 1-methylcyclohexanol is: a. 1-methylcyclohexane b. 1-methylcyclohexene c. 1-cyclohexylmethanol d. 1-methylenecyclohexane
10.	The order of reactivity of alkyl halides towards elimination reaction is a. $3^\circ > 2^\circ > 1^\circ$ b. $2^\circ > 1^\circ > 3^\circ$ c. $1^\circ > 2^\circ > 3^\circ$ d. $3^\circ > 1^\circ > 2^\circ$
11.	Which of the following compounds does not undergo aldol condensation? a. Propanal b. Propanone c. Benzaldehyde d. 2-Methylpropanal.
12.	Which one of the following statements for the order of reaction is incorrect? a. Order can be determined only experimentally. b. Order is not influenced by stoichiometric co-efficient of the reactants.

	c. Order of reaction is sum of the power to the concentration terms of reactants to express the rate of reaction. d. Order of reaction is always whole number.
13.	The IUPAC name of $ \begin{array}{ccccccc} & & & & \text{CH}_2\text{OH} & & \\ & & & & & & \\ \text{CH}_3 - & \text{CH} - & \text{CH}_2 - & \text{CH} - & \text{CH} - & \text{CH}_3 \\ & & & & & \\ \text{CH}_3 & & & \text{OH} & & \end{array} $ Is 2,5-Dimethylhexan-4,6-diol. 2-Hydroxymethyl-5-methylhexan-3-ol 2, 5-Dimethylhexane-1,3-diol - None of the above
14.	Conc.HNO₃ and conc.H₂SO₄ react with benzoic acid to form - o-nitrobenzoic acid - p-nitrobenzoic acid - m-nitrobenzoic acid - o,p-dinitrobenzoic acid
15.	Given below are two statements labelled as Assertion (A) and Reason (R) Assertion (A) :KCN reacts with C₂H₅Br to give ethyl isocyanide. Reason (R) :Cyanide ion is an ambident nucleophile. Select the most appropriate answer from the options given below: - Both A and R are true and R is the correct explanation of A - Both A and R are true but R is not the correct explanation of A. - A is true but R is false. - A is false but R is true.
16.	Given below are two statements labelled as Assertion (A) and Reason (R) Assertion (A) :In zero order reaction, the concentration vs. time graph is a straight line. Reason (R) :The rate of change of concentration per unit time in zero order reaction remains constant. Select the most appropriate answer from the options given below: - Both A and R are true and R is the correct explanation of A - Both A and R are true but R is not the correct explanation of A. - A is true but R is false. - A is false but R is true.
17.	Given below are two statements labelled as Assertion (A) and Reason (R) Assertion (A) :Magnetic moment values of actinides are lesser than the theoretically predicted values. Reason (R) :Actinide elements are strongly paramagnetic. 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.
18.	Given below are two statements labelled as Assertion (A) and Reason (R) Assertion (A) : Addition 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 secondary 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.

SECTION B

19.	a. Calculate the magnetic moment of a divalent ion in aqueous solution if its atomic number is 25. b. How would you account for the increasing oxidising power in the series $\text{VO}_2^+ < \text{Cr}_2\text{O}_7^{2-} < \text{MnO}_4^-$? Or a. Why is Cr^{2+} reducing and Mn^{3+} oxidising when both have d^4 configuration? b. Name a member of the lanthanoid series which is well known to exhibit +4 oxidation state.
20.	The boiling point of benzene is 353.23 K. When 1.80 g of a non-volatile solute was dissolved in 90 g of benzene, the boiling point is raised to 354.11 K. Calculate the molar mass of the solute. K_b for benzene is $2.53 \text{ K kg mol}^{-1}$.
21.	A first order reaction has a rate constant $1.15 \times 10^{-3} \text{ s}^{-1}$. How long will 5 g of this reactant take to reduce to 3 g? (Given, $\log 5 = 0.6990$, $\log 3 = 0.4771$).
22.	Explain giving reasons: a. Transition metals and many of their compounds show paramagnetic behaviour. b. The transition metals generally form coloured compounds.
23.	Write the IUPAC name and d-orbital occupation (of central metal ion) of $\text{K}_3[\text{Co}(\text{C}_2\text{O}_4)_3]$
24.	Write the following name reaction: Wurtz reaction and Reimer-Tiemann reaction. Or Write the following name reaction: Finkelstein reaction and Kolbe's reaction.
25.	Arrange the following: a. In increasing order of boiling point Bromomethane, Bromoform, Chloromethane, Dibromomethane b. In increasing order of their acid strength: Propan-1-ol, 2,4,6-trinitrophenol, 3-nitrophenol, 3,5-dinitrophenol, phenol, 4-methylphenol.

SECTION C

26.	Answer the following:
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	a. Define Kohlrausch law of independent migration. b. State Faraday's first law electrolysis. c. Can you store copper sulphate solutions in a zinc pot? Explain.
27.	Define half-life period. The half-life for radioactive decay of ^{14}C is 5730 years. An archeological artifact containing wood had only 80% of the ^{14}C found in a living tree. Estimate the age of the sample. (Given, $\log 2 = 0.3010$)
28.	Do any three conversions: a. Propene to propyne b. Benzyl chloride to Benzyl alcohol c. Cyclohexene to hexane-1,6-dioic acid. d. Ethanol to 3-Hydroxybutanal.
29.	Answer the following question: a. The treatment of alkyl chlorides with aqueous KOH leads to the formation of alcohols but in the presence of alcoholic KOH, alkenes are major products. Explain b. There are two $-\text{NH}_2$ groups in semicarbazide. However, only one is involved in the formation of semicarbazones.
30.	Write the mechanism of hydration of ethene to yield ethanol. Or How is 1-propoxypropane synthesised from propane-1-ol? Write mechanism of the reaction.

SECTION D

The following questions are case-based questions. Each question has an internal choice and carries 4 (1+1+2) marks each. Read the passage and answer the questions that follow.

31.

Henna is investigating the melting point of different salt solutions. She makes a salt solution using 10 mL of water with a known mass of NaCl salt. She puts the salt solution into a freezer and leaves it to freeze. She takes the frozen salt solution out of the freezer and measures the temperature when the frozen salt solution melts. She repeats each experiment.

S.No.	Mass of the salt used in g	Melting point in $^{\circ}\text{C}$	
		Readings Set 1	Reading Set 2
1	0.3	-1.9	-1.9
2	0.4	-2.5	-2.6
3	0.5	-3.0	-5.5
4	0.6	-3.8	-3.8
5	0.8	-5.1	-5.0
6	1.0	-6.4	-6.3

Assuming the melting point of pure water as 0°C , answer the following questions:

a. One temperature in the second set of results does not fit the pattern. Which temperature is that? Justify your answer.

b. Why did Henna collect two sets of results?

c. In place of NaCl, if Henna had used glucose, what would have been the melting point of the solution with 0.6 g glucose in it?

OR

	What is the predicted melting point if 1.2 g of salt is added to 10 mL of water? Justify your answer.
32.	Potassium permanganate is prepared from pyrolusite which is an oxide ore of manganese. Pyrolusite is fused with KOH or K_2CO_3 in the presence of air or some oxidizing agent. The fused mass is extracted with water and filtered to get a green solution. When chlorine gas is passed through the green solution, the colour of the solution changes to purple due to formation of $KMnO_4$. Answer the following: - Write the formula of pyrolusite ore. - Write the name and formula of green coloured compound. - Write the balanced reaction of pyrolusite ore with KOH in presence of air, further oxidise the product obtained by Cl_2. OR What is the reason of purple colour of $KMnO_4$? How does the acidified potassium permanganate reacts with Fe^{2+} ions (reaction only)?

SECTION E

33.	Answer the following questions: - What are ambidentate ligands? - What is crystal field splitting energy? How does the magnitude of Δ_o decide the actual configuration of d-orbitals in a co-ordination entity? $[Fe(H_2O)_6]^{3+}$ is strongly paramagnetic whereas $[Fe(CN)_6]^{3-}$ is weakly paramagnetic. Explain.
34.	Answer the following questions: - If a current of 0.5 ampere flows through a metallic wire for 2 hours, then how many electrons would flow through the wire? - Define conductivity and molar conductivity for the solution of an electrolyte. Discuss their variation with concentration. Or - Calculate the emf of the cell in which the following reaction takes place: $Ni(s) + 2Ag^+ (0.002 M) \rightarrow Ni^{2+} (0.160 M) + 2Ag(s)$ Given that $E^0_{(cell)} = 1.05 V$. (Given $\log 2 = 0.3010$) - What are fuel cells? Write the electrode (anode and cathode) reactions of $H_2 - O_2$ fuel cell.
35.	Answer the following: - An organic compound (A) (molecular formula $C_8H_{16}O_2$) was hydrolysed with dilute sulphuric acid to give a carboxylic acid (B) and an alcohol (C). Oxidation of (C) with chromic acid produced (B). (C) on dehydration gives but-1-ene. Write equations for the reactions involved. - Give the chemical test to distinguish between following pair of compounds - Propanal and Propanone - Phenol and Benzoic acid. Or - An organic compound with the molecular formula $C_9H_{10}O$ forms 2,4-DNP derivative, reduces Tollen's reagent, and undergoes Cannizzaro reaction. On

	vigorous oxidation, it gives 1,2-benzenedicarboxylic acid. Identify the compound.
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	b. Give the chemical test to distinguish between following pair of compounds
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	(iii) Benzoic acid and Ethyl benzoate
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	(iv) Benzaldehyde and Acetophenone.
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