

**FIRST TERM EXAMINATION
CLASS-XII
CHEMISTRY THEORY (043)**

MM:70 Marks

Time: 3 Hours

General Instructions:

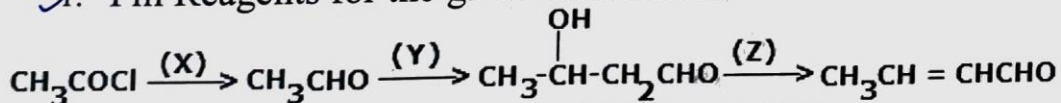
Read the following instructions carefully.

- There are 33 questions in this question paper. All questions are compulsory.
- Section A: Q.No.1 to 16 are objective type questions and carry 1 mark each.
- Section B: Q.No.17 to 21 are short answer questions and carry 2 marks each.
- Section C: Q.No.22 to 28 are short answer questions and carry 3 marks each.
- Section D: Q.No.29 to 30 are passage-based questions carrying 4 marks each.
- Section E: Q.No.31 to 33 are long answer questions carrying 5 marks each.
- There is no overall choice. However, internal choices have been provided.
- Use of calculators and log tables is not permitted.

SECTION A

Following questions (No. 1-16) are MCQ/Match the following type questions carrying 1 mark each:

✓ Fill Reagents for the given conversion:



	(X)	(Y)	(Z)
(a)	NaOH	Hydrolysis	heat
(b)	Pd/BaSO ₄	dil. NaOH	heat
(c)	NaOI	LiAlH ₄	H ₃ O ⁺
(d)	CrO ₃	Warm	CO ₂

2. Conc. H_2SO_4 is 98% H_2SO_4 by mass and has density = 1.84g/cm^3 . Volume of acid required to make one litre of $0.1\text{M H}_2\text{SO}_4$ is

- a) 43ml b) 5.55 ml c) 18.4 ml d) 30 ml

3. Which of the following statements is true?

- (a) Units of atmospheric pressure and osmotic pressure are not same.
(b) In reverse osmosis, solvent molecules move through a semipermeable membrane from a region of higher concentrated solution to a lower concentrated solution.
(c) The value of molal depression constant depends on nature of solute.
(d) Relative lowering of vapour pressure, has the units of Pa.

4. Which of the following is an example of vic-dihalide?

- (a) Dichloromethane (b) 1,2-dichloroethane
(c) Ethylidene chloride (d) Allyl chloride

5. Which of the following produces anisole?

- (a) $\text{C}_6\text{H}_5\text{-CH}_3$; CH_3COCl ; AlCl_3
(b) CH_3CHO ; RMgX
(c) $\text{C}_6\text{H}_5\text{-OH}$; NaOH ; CH_3I
(d) $\text{C}_6\text{H}_5\text{-OH}$; Neutral FeCl_3

6. The position of $-\text{Br}$ in the compound in $\text{CH}_3\text{CH}=\text{CHC}(\text{Br})(\text{CH}_3)_2$ can be classified as.

- (a) Allyl (b) Aryl (c) Vinyl (d) Secondary

7. Each polypeptide in a protein has amino acids linked with each other in specific sequence. This sequence of amino acids is said to be _____

- (a) primary structure of proteins.
(b) secondary structure of proteins.
(c) tertiary structure of proteins.
(d) quaternary structure of proteins.

8. A compound **A** has a molecular formula C_7H_7NO . On treatment with Br_2 and KOH , **A** gives an amine **B** which gives carbylamine test. **B** upon diazotization and coupling with phenol gives an azo dye. **A** can be:

- (a) $C_6H_5CONHCOCH_3$ (b) $C_6H_5CONH_2$
 (c) $C_6H_5NO_2$ (d) *o*-, *m*- or *p*- $C_6H_4(NH_2)CHO$

9. Amongst the following the most volatile species is

- (a) $CH_3CH_2CH_2NH_2$ (b) $(CH_3)_3N$
 (c) $CH_3CH_2NHCH_3$ (d) $CH_3CH_2CH_3$

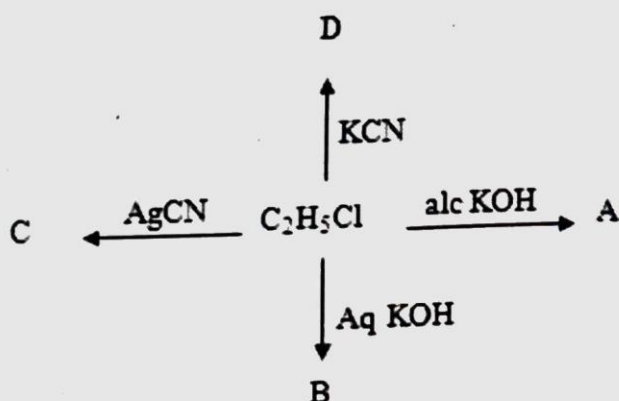
10. Which of the following statement is not correct about an inert electrode in a cell?

- (a) It does not participate in the cell reaction.
 (b) It provides surface either for oxidation or for reduction reaction.
 (c) It provides surface for conduction of electrons.
 (d) It provides surface for redox reaction.

11. Which of the following statements is not true about glucose?

- (a) It is an aldohexose.
 (b) On heating with HI it forms *n*-hexane.
 (c) It is present in furanose form.
 (d) It does not give 2,4-DNP test.

12. Identify A, B, C and D:



- (a) $A = C_2H_4$, $B = C_2H_5OH$, $C = C_2H_5NC$, $D = C_2H_5CN$
 (b) $A = C_2H_5OH$, $B = C_2H_4$, $C = C_2H_5CN$, $D = C_2H_5NC$
 (c) $A = C_2H_4$, $B = C_2H_5OH$, $C = C_2H_5CN$, $D = C_2H_5NC$
 (d) $A = C_2H_5OH$, $B = C_2H_4$, $C = C_2H_5NC$, $D = C_2H_5CN$

In the following questions (Q.No.13-16) a statement of assertion followed by a statement of reason is given. Choose the correct answer out of the following choices.

- a) Assertion and reason both are correct statements and reason is correct explanation for assertion.
- b) Assertion and reason both are correct statements but reason is not correct explanation for assertion.
- c) Assertion is correct statement but reason is wrong statement.
- d) Assertion is wrong statement but reason is correct statement.
- e) Assertion and reason both are incorrect

13. Assertion : Addition reaction of water to but-1-ene in acidic medium yields butan-1-ol

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

14. Assertion : Mercury cell does not give steady potential.

Reason : In the cell reaction, ions are not involved in solution.

15. Assertion: Propanone on reaction with alkyl magnesium bromide followed by hydrolysis will produce primary alcohol. (e)

Reason: Ketones on reduction gives Aldehyde.

16. Assertion: Aquatic species feel more comfortable in hot waters rather than in cold waters.

Reason: Different gases have same K_H values at the same temperature.

SECTION B

The following questions, Q.No17-21 are short answer type and carry 2 marks each.

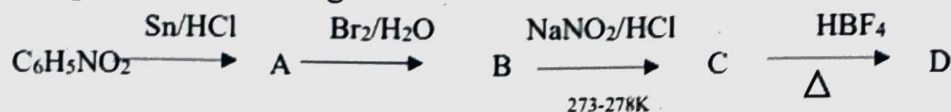
17. H_2S , a toxic gas with rotten egg like smell, is used for the quantitative analysis. If the solubility of H_2S in water at STP is 0.195m, calculate Henry's law constant.

18. (a) Why cannot aromatic primary amines be prepared by Gabriel phthalimide synthesis?

(b) Write the reaction for catalytic reduction of nitrobenzene followed by reaction of product so formed with bromine water.

OR

Complete the following:



19.(a) Write the names of two monosaccharides obtained upon hydrolysis of lactose molecule.

(b) What is the difference between a nucleoside and a nucleotide.

20. Solutions of two electrolytes 'A' and 'B' are diluted. The Λ_m 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'.

21. How will you carry out the following conversions:

(a) 3-Nitrobromobenzene to 3-Nitrobenzoic acid

(b) Ethanol to 3-Hydroxybutanal

SECTION C

Q.No 22-28 are Short Answer Type II carrying 3 mark each.

22. A solution containing 30g of non-volatile Solute exactly in 90g of water has a vapour pressure of 2.8kPa at 298k. Further, 18g of water is then added to the solution and the new vapor pressure becomes 2.9 k Pa at 298k. calculate:

(a) Molar mass of the solute

(b) Vapour pressure of water at 298k.

23. Answer the following:

(a) Haloalkanes easily dissolve in organic solvent. Why?

(b) Vinyl chloride is unreactive in nucleophilic substitution reactions?

(c) Haloalkanes react with KCN to form alkyl cyanide as main product while AgCN forms isocyanide as the chief product. Explain?

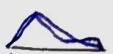
OR

Explain Why:-

(a) Chlorobenzene is ortho and para directing in the electrophilic substitution reaction?

(b) Grignard reagents should be prepared under anhydrous conditions.

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(c) C-F bond has higher electronegativity difference than C-Cl bond yet dipole moment of CH_3F is less than CH_3Cl .

24. (a) Write the mechanism of hydration of alkene to alcohol.
(b) o-Nitrophenol is more acidic than o-Methoxy phenol. Explain.

25. (a) In general ketones are less reactive than aldehydes towards nucleophilic attack. Justify?
(b) Give a chemical test to distinguish between following
(i) Methanoic acid and Benzoic acid
(ii) Acetophenone and Benzophenone

26. (a) Write the structure of main products when aniline reacts with $(\text{CH}_3\text{CO})_2\text{O}$ /pyridine
(b) Arrange the following in the increasing order of their boiling point:
 $\text{C}_2\text{H}_5\text{NH}_2$, $\text{C}_2\text{H}_5\text{OH}$, $(\text{CH}_3)_3\text{N}$

(c) How will you convert an alkyl halide in to a primary amine having one more carbon atom than the alkyl halide used?

27. (a) How are the following conversions carried out?

(i) Ethyl magnesium chloride to Propan-1-ol

(ii) Phenol to Anisole

(b) Give the IUPAC name of the compound obtained on oxidation of phenol.

28. (a) What are Anomers. Draw Haworth projection of alpha anomer of glucose.

(b) What is the difference between fibrous and globular protein.

(c) Two strands of DNA are complimentary to one another but not identical. Justify ?

SECTION D

29. Read the passage given below and answer the following questions:
(1+1+2)

It is an electrochemical cell that uses spontaneous redox reactions to generate electricity. A salt bridge also connects to the half cells. The reading of the

Voltmeter gives the cell voltage or cell potential or electromotive force. If it is positive, the reaction is spontaneous and if it is negative, the reaction is non-spontaneous and is referred to as electrolytic cell. Electrolysis refers to the decomposition of a substance by an electric current. One mole of electric charge when passed through a cell will discharge half a mole of a divalent metal ion such as Cu^{2+} . This was first formulated by Faraday in the form of Laws of electrolysis. The sulfuric acid catalyst model system or parts of the system have been characterized thoroughly by measurements of their electrical conductivity. Thus specific and molar conductivities have been obtained on a number of binary systems combining alkali pyrosulfates, alkali pyrosulfates and V_2O_5 , alkali pyrosulfates and alkali hydrogen sulfates in addition to alkali hydrogen sulfates.

- (a) Λ_m° for NaCl, HCl and NaAc are 126.4, 425.9 and 91.0 $\text{Scm}^2 \text{mol}^{-1}$ respectively. Calculate Λ_m° for HAc.
- (b) State Kohlrausch law of independent migration of ions.
- (c) State Faraday's first law of electrolysis. How much charge in terms of coulomb's is required for the reduction of 1.5 mol of MnO_4^- to Mn^{2+} .

OR

State Faraday's second law of electrolysis. How much charge in terms of coulomb's is required for the reduction of 1 mol of Mn^{2+} to Mn

30. Read the passage given below and answer the following questions:
(1+1+2)

Nucleophilic substitution reactions are of two types; substitution nucleophilic bimolecular ($\text{S}_{\text{N}}2$) and substitution nucleophilic unimolecular ($\text{S}_{\text{N}}1$) depending on molecules taking part in determining the rate of reaction. Reactivity of alkyl halide towards $\text{S}_{\text{N}}1$ and $\text{S}_{\text{N}}2$ reactions depends on various factors such as steric hindrance, stability of intermediate or transition state and polarity of solvent. $\text{S}_{\text{N}}2$ reaction mechanism is favoured mostly by primary alkyl halide or transition state and polarity of solvent, $\text{S}_{\text{N}}2$ reaction mechanism is favoured mostly by primary alkyl halide then secondary and then tertiary. This order is reversed in case of $\text{S}_{\text{N}}1$ reactions.

- (a) Neopentyl bromide undergoes nucleophilic substitution reactions very slowly. Why?
- (b) Why are Enantiomers also called optical isomers?
- (c) Out of S_N1 and S_N2 , which reaction occurs with?
- (i) Inversion of configuration
- (ii) Racemization

OR

Following compounds are given to you: 2-Bromopentane, 2-Bromo-2-methyl butane, 1-Bromopentane

- (i) Write the compound which is most reactive towards S_N2 reaction.
- (ii) Write the compound which is optically active.

SECTION E

Q.No 31 to 33 are long answer type carrying 5 marks each.

31. (a) Blood cells are isotonic with 0.9% sodium chloride solution. What happens if we place blood cells in a solution containing?

- (i) 0.2% sodium chloride solution?
- (ii) 1.4% sodium chloride solution?

(b) What should be the molar mass of compound if 6.21g of it is dissolved in 24g of chloroform form a solution that has a boiling point of 68.04°C. The boiling point of pure chloroform is 61.7°C and the boiling point elevation constant, K_b for chloroform is 3.63°C/m.

OR

(a) Calculate the freezing point of solution when 1.9g of $MgCl_2$ ($M = 95g\ mol^{-1}$) was dissolved in 50g of water, assuming $MgCl_2$ undergoes complete ionization. (K_f for water = 1.86 K kg mol^{-1}).

(b) (i) Out of 1M glucose and 2M glucose, which one has a higher boiling point and why?

(ii) What happens when the external pressure applied becomes more than the osmotic pressure of solution?

32. (a) . What happens when (give only equation)

(i) Ethyne is treated with dilute H_2SO_4 in the presence of $HgSO_4$.

(ii) Propan-2-ol is treated with Cu at 573k.

(b) An organic compound contains 69.77% carbon, 11.63% hydrogen and rest oxygen. The molecular mass of the compound is 86. It does not reduce Tollens' reagent but forms an addition compound with sodium hydrogen sulphite and give positive iodoform test. On vigorous oxidation it gives ethanoic and propanoic acid. Write the possible structure of the compound.

Pentan-3-one

OR

(a) (i) Write the chemical equation for the reaction involved in Cannizzaro reaction of benzaldehyde.

(ii) Draw the structure of the semicarbazone of ethanal.

(iii) Why pKa of F-CH₂-COOH is lower than that of Cl-CH₂-COOH?

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

(i) Stephen's reduction

(ii) Aldol condensation

C-C(=O)CH₂-CH₃

33.(a) The chemistry of corrosion is quite complex but it may be considered essentially as an electrochemical phenomenon. Explain

OR

Write a short note on lead storage battery. Write the cell reaction while charging

(b) Write Nernst equation and find out the Emf of the following cell at 25° C.

