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SET B



INDIAN SCHOOL MUSCAT FINAL EXAMINATION CHEMISTRY

CLASS: XII

Sub. Code: 043

Time Allotted: 3 Hrs.

17.11.2019

Max. Marks:70

General Instructions:

- All questions are compulsory.
- Marks for each question are indicated against it.
- Section A: Question numbers 1 to 20 are very short answer questions and carry 1 mark each.
- Section B: Question numbers 21 to 27 are short answer questions and carry 2 marks each.
- Section C: Question numbers 28 to 34 are also short answer questions and carry 3 marks each.
- Section D: Question numbers 35 to 37 are long answer questions and carry 5 marks each.
- There is no overall choice. But internal choice has been provided. You have to attempt only one choice in such questions.
- Use log tables if necessary, use of calculators is not allowed.

SECTION A

Read the given passage and answer the questions 1 to 5 that follow:

Ethers are prepared in the laboratory using Williamson's synthesis. Both symmetrical and unsymmetrical ethers are prepared by this method. The reaction involves SN_2 attack on an alkoxide ion on a primary alkyl halide. Better results are obtained if the alkyl halide is primary. In case of secondary and tertiary alkyl halides, elimination competes over substitution. It is because alkoxides are not only nucleophiles but strong bases as well. Ethers are least reactive functional groups. The cleavage of C-O bond in ethers takes place under drastic conditions with excess hydrogen halides. The reaction of alkyl halide gives two alkyl halides molecules. Alkyl aryl ethers yield phenol and alkyl halide.

1. Name the alkyl halide obtained when ethoxy benzene is treated with HBr. 1
2. Predict the products of the following reaction 1
 $(CH_3)_3C-OC_2H_5 + HI \rightarrow$
3. Starting from ethanol and 3-Methylpentan-2-ol, how will you obtain 2-Ethoxy-3-methylpentane? 1
4. Using curved arrows, show the step, that depicts bimolecular nucleophilic attack, in the mechanism of dehydration of ethanol to ether at 413K. 1
5. Name the alkyl halide and alkoxide suitable for the preparation of anisole. 1

Questions 6-10 are one word answers:

6. Rate constant of a reaction is $3 \times 10^{-4} \text{ L}^{-1} \text{ mol s}^{-1}$. Identify the order of the reaction. 1

- 7 Name any one macromolecule that is chosen as drug target. 1
- 8 Name the catalyst used in the polymerization of ethene to give high density polyethene. 1
- 9 Name the reagent used in Hinsberg's test for amines. 1
- 10 What type of linkage is responsible for the primary structure of proteins? 1

Questions 11-15 are multiple choice questions:

- 11 Which among the following is a homopolymer? 1
a) Nylon 6,6 b) Dacron c) Teflon d) Melamine
- 12 Which among the following doesn't answer Fehling's test? 1
a) Propanal b) Benzaldehyde c) Ethanal d) Butanal
- 13 How many Faradays of charge is required for the reduction of one mole of MnO_4^- to Mn^{2+} ? 1
a) 5F b) 3F c) 2F d) 7F
- 14 Among the following identify the most basic amine in aqueous solution 1
a) NH_3 b) $(\text{CH}_3)_3\text{N}$ c) $(\text{CH}_3)\text{NH}_2$ d) $(\text{CH}_3)_2\text{NH}$
- 15 Identify achiral compound from the following 1
a) Butan-2-ol b) 2-Chlorobutane c) Propan-2-ol d) 2-Bromopropanoic acid.

Questions 16-20

- (A) Both assertion and reason are correct statements, and the reason is the correct explanation of the assertion
(B) Both assertion and reason are correct statements, but reason is not the correct explanation of the assertion
(C) Assertion is correct, but reason is wrong statement
(D) Assertion is wrong, but reason is correct statement

- 16 Assertion: Gabriel phthalimide reaction is suitable for preparation of primary alkyl amines. 1
Reason: Alkyl amines do not undergo nucleophilic substitution reaction with phthalimide ion.
- 17 Assertion: Carboxylic acids contain a carbonyl group but does not give characteristic reactions of carbonyl group. 1
Reason: The electrophilic nature of the carbonyl group is reduced due to resonance in carboxylic acid when compared to aldehydes or ketones.
- 18 Assertion: Acetaldehyde undergoes Cannizzaro reaction. 1
Reason: Cannizzaro reaction is shown by aldehydes that does not contain α -hydrogen atom.
- 19 Assertion: Amino acids exist as zwitter ions. 1
Reason: Amino acids are colorless, crystalline solids.
- 20 Assertion: Van't Hoff factor for ethanoic acid in benzene is less than one. 1
Reason: Ethanoic acid undergoes association in benzene.

SECTION B

- 21 Differentiate between order and molecularity of a reaction.[2 points each] 2

OR

What do you understand by a pseudo first order reaction? Give an example of pseudo first order reaction and write the rate equation for the same.

- 22 State Henry's law and mention two of its important applications. 2
- 23 a) Define limiting molar conductivity of an electrolyte. 2
b) How does molar conductivity change with dilution for a weak electrolyte?
- 24 a) Illustrate Hell-Volhard-Zelinsky reaction. 2
b) Which is more acidic and why: 4-Methoxy benzoic acid or 4-Nitro benzoic acid?

- 25 a) Write the IUPAC name of $\text{ClCH}_2\text{C}\equiv\text{CCH}_2\text{Br}$ 2
 b) Draw the structure of 2-(2-bromophenyl) butane. 2
- 26 Account 2
 a) Grignard reagents are prepared in anhydrous conditions.
 b) p- dihalo benzenes have higher melting points
- 27 Explain the reactions in the extraction of gold. 2

OR

Account

- a) The reduction of metal oxide is easier if the metal formed is in the liquid state at the temperature of reduction.
 b) Silica is added to sulphide ore of copper during the extraction of copper.

SECTION C

- 28 What is the role of 3
 a) Pine oil in froth flotation
 b) Cryolite in the metallurgy of aluminium
 c) Iodine in metallurgy of titanium
- 29 A solution is prepared by dissolving 8.95mg of a gene fragment in 35 ml of water has an osmotic pressure of 4×10^{-4} atm at 25°C . Assuming the gene fragment is a non-electrolyte, determine its molar mass. [Given $R = 0.0821 \text{ L atm/K/mol}$] 3

OR

A solution is made by dissolving 30g of a non-volatile solute in 90g of water. It has a vapour pressure of 2.8kPa at 298K. Calculate the molar mass of the solute. [Given vapour pressure of pure water at 298K is 3.64kPa]

- 30 Calculate the potential for half-cell containing 0.10M aqueous potassium dichromate, 0.20M aqueous Cr^{3+} and $1.0 \times 10^{-4}\text{M}$ aqueous H^+ . The half-cell reaction is $\text{Cr}_2\text{O}_7^{2-}(\text{aq}) + 14\text{H}^+(\text{aq}) + 6\text{e}^- \rightarrow 2\text{Cr}^{3+}(\text{aq}) + 7\text{H}_2\text{O}(\text{l})$ and the standard electrode potential is given as $E^\circ = 1.33\text{V}$. 3
- 31 Explain with an example 3
 a) Narcotic analgesics b) Bactericidal antibiotics c) Antipyretics
- 32 Draw the structures of the monomer units of the following polymers 3
 a) Bakelite b) Buna-N c) Polystyrene
- 33 What happens when D-glucose is treated with the following reagents[write reactions]- 3
 a) Hydrogen iodide b) HCN c) conc. HNO_3

OR

Give one difference between the following:

- i) Vitamin A and Vitamin B [solubility in fat]
 ii) Globular protein and Fibrous protein [solubility in water]
 iii) DNA and RNA [in the base unit]
- 34 a) Convert the following to aniline i) Benzamide ii) Nitrobenzene 3
 b) Aniline does not undergo Friedel Craft's reaction. Why?

SECTION D

- 35 a) Illustrate the following 5
 i) Etard's reaction
 ii) Clemmensen's reduction
 b) Give a chemical test to distinguish between ethanal and propanal.
 c) How would you obtain the following
 i) But-2-enal from ethanal

- ii) Benzoic acid from toluene

OR

- a) What happens when [give chemical equations]:
i) Benzene is treated with carbon monoxide and hydrogen chloride in the presence of anhydrous aluminum chloride
ii) Benzoyl chloride is hydrogenated over catalyst palladium on Barium sulphate
iii) Cyclohexanone is treated with hydroxylamine
b) Arrange the following in the increasing order of property mentioned in the bracket:
i) Ethanal, ethanol, methoxy methane, propane [boiling point]
ii) Ethanal, propanal, butanone, propanone [reactivity to nucleophilic addition reaction]

36

- a) Show that in case of a first order reaction, the time required for 99.9% of the reaction to take place is about ten times than required for half the reaction. 5
b) A reaction was found to be zero order in A. In 8.33 seconds its initial concentration changed from 0.10M to 0.075M. Calculate rate constant and half-life of this reaction.

OR

- i) A reaction is of first order in X and of second order in Y. How will its initial rate be affected if the concentrations of both X and Y is doubled?
ii) The rate constant k of a reaction increases four times when the temperature changes from 300K to 320K. Calculate the activation energy for the reaction.
[Given: $R = 8.314 \text{ J/mol/K}$]

37

- a) Explain the preparation of potassium dichromate from chromite ore with equations. 5
b) Assign reasons for the following
i) Transition metals and many of their compounds act as good catalyst
ii) Zn, Cd and Hg are not regarded as transition metals

OR

- i) Complete the following chemical equations:
a) $\text{MnO}_4^- (\text{aq}) + \text{C}_2\text{O}_4^{2-} + \text{H}^+ \rightarrow$
b) $\text{MnO}_4^- (\text{aq}) + \text{I}^- + \text{H}_2\text{O} \rightarrow$
ii) Explain giving reasons
a) Actinoids exhibit greater range of oxidation states than lanthanoids
b) Copper (I) ion is not known in aqueous solution
c) Cr^{2+} is reducing in nature while Mn^{3+} is an oxidising agent

End of the Question Paper