



MACHAKOS UNIVERSITY

University Examinations 2016/2017

SCHOOL OF PURE AND APPLIED SCIENCES

DEPARTMENT OF PHYSICAL SCIENCES

FIRST YEAR SECOND SEMESTER EXAMINATION FOR

DIPLOMA IN EDUCATION (SCIENCE)

SCH 0202: ORGANIC CHEMISTRY III

DATE: 31/5/ 2017

TIME: 2 Hours

INSTRUCTIONS:

Answer Question One and any other two Questions from section B

SECTION A (COMPULSORY)

QUESTION ONE (30MARKS)

- (a) Write down the name and the condensed formula of the third member of the carboxylic acids. (4 marks)
- (b) Give the systematic names of the alkyl halides below:
- (i). $\text{CH}_3\text{CH}_2\text{CH}_2\text{Cl}$
- (ii). $(\text{CH}_3)_2\text{CHBr}$ (4 marks)
- (c) Write an equation for the reaction between Propan-1-ol and sodium. Give the systematic name of the compound formed. (5 marks)
- (d) Give the structural formulae of the following.
- (i) 2, 2-dichloropropanoic acid
- (ii) 2-methylpropanoic acid (6 marks)
- (e) Name the compound formed when propanone is refluxed with acidified Potassium dichromate (VI). Write the structural formula of the compound formed. (5 marks)
- (f) Write equations for the mechanism by which Ethanol forms Bromoethane. State whether the alcohol acts as an electrophile or nucleophile. (6 marks)

SECTION B: ANSWER ANY OTHER TWO QUESTIONS

QUESTION TWO (20MARKS)

- (a) Name the alcohol which on oxidation yields the aldehyde $(\text{CH}_3)_2\text{CHCHO}$. Write down its structural formula. (5 marks)
- (b) Show the mechanism involved when an aldehyde R-CHO reacts with water. (4 marks)
- (c) In the reaction below name with reasons the substance which acts as a nucleophile.
- $$\text{R-X} + \text{H}_2\text{O} \rightarrow \text{R-OH} + \text{HX}$$
- (5 marks)
- (d). Give systematic names and structural formulae of the following compounds.
- (i). $\text{C}_2\text{H}_5\text{CHO}$
- (ii). $\text{CH}_2\text{ClCOCH}_3$ (6 marks)

QUESTION THREE (20 MARKS)

- (a) Give the name and formula of the organic compound formed when propanoic acid reacts with methanol. (4 marks)
- (b) With reasons name the reactant which is the nucleophile in the reaction below.
- $$\text{HO}^- + \text{CH}_3\text{I} \rightarrow \text{HO-CH}_3 + \text{I}^-$$
- (4 marks)
- (c) Explain how Ethanoic acid can be prepared by the oxidation process. Write equations for the reaction. (4 marks)
- (d) Lower alkanolic acids give off hydrogen gas with metals, neutralize alkalis and liberate carbon(IV) oxide when reacted with carbonates Explain this acidic behavior. (4 marks)
- (e) Write equations for the reaction between:
- (i) Ethanoic acid and Ethanol
- (ii) Ethanoic acid and Chlorine (4 marks)

QUESTION FOUR (20 MARKS)

- (a) An alkanol can be prepared from **SYNTHESIS GAS**. Explain the term synthesis gas and give an example of the reaction. (5 marks)
- (b) Methanol reacts with Sodium to liberate Hydrogen gas. Show this acidic behavior in Methanol. (5 marks)
- (c) Show how Bromomethane can be prepared from an Hydro halogen acid. (4 marks)
- (d) Give the IUPAC name and the formulae of the following common aldehydes.
- (i) Formaldehyde
- (ii) Acetaldehyde (4 marks)
- (e) Name two uses of Ethanol (2 marks)

QUESTION FIVE (30 MARKS)

- (a) In the reaction between Hydrogen Chloride and Water, explain which substance is an electrophilic reagent. (5 marks)
- (b) Using the carbonyl group differentiate between an Aldehyde and a Ketone. (3 marks)
- (c).
- | Name | Boiling Point (°C) |
|------------|---------------------|
| Methanal | -21 |
| Ethanal | 21 |
| Propanal | 49 |
| n- Butanal | 75 |
- Explain the trend in the table above. (4 marks)
- (d) Formalin is the most important aldehyde. Name three uses to justify the statement. (3 marks)
- (e) Aldehydes combine with hydrogen cyanide to form Cyanohydrins. Give the mechanism for the formation of 2-hydroxypropanonitrile (acetaldehyde cyanohydrins). (5 marks)