



NATIONAL OPEN UNIVERSITY OF NIGERIA
PLOT 91, CADASTRAL ZONE, NNAMDI AZIKIWE EXPRESSWAY, JABI - ABUJA
FACULTY OF SCIENCES
DEPARTMENT OF PURE & APPLIED SCIENCES
2020_2 EXAMINATION

COURSE TITLE: ORGANIC CHEMISTRY III **COURSE CODE CHM 305**
TIME ALLOWED 3 HOURS **CREDIT UNIT: 3**
INSTRUCTIONS: ANSWER QUESTION 1 AND ANY OTHER 4 QUESTIONS

QUESTION 1

a. Using appropriate reaction equations explain the process of preparation of an alcohol by

- i. Hydration of alkene (**2 marks**)
- ii. Fermentation of carbohydrates (**3Marks**)

b. Draw the chemical structure of the following compounds (**3 maerks**)

- i. 2, 2-dimethyl propan-1-ol
- ii. 3-ethyl pentan-2-ol
- iii. 2-methyl pentan-1-ol

1c. Briefly explain the following terms with respect to the properties of an alcohol (**6 marks**)

- i. Density
- ii. Solubility
- iii. Melting and boiling point

1di. State the characteristics of monosaccharaides (**3 marks**)

- ii. Mention the uses of cellulose (**3 marks**)
- iii. Explain the action of iodine solution on starch (**2 marks**)

QUESTION 2

a. Explain the bromination of an ethanol using- (**3 marks**)

- i. Using NaBr
- ii. Phosphorus (III) bromide

- iii. Phosphorus tribromide
- 2b. Explain the following processes stating the reaction conditions
 - i. Dehydration of an alcohol (**2 marks**)
 - ii. Formation of ether from ethanol (**1 marks**)
 - iii. Esterification reaction (**3 marks**)
- 2c. Distinguish between a primary, secondary and tertiary alcohols by a detailed reaction equation of oxidation of an alcohol. (**3 Marks**)

QUESTION 3

- ai. Differentiate between functional group isomerism and metamerism (**3 marks**)
example
- ii. State the four physical properties of an ether (**3Marks**)
- 3b. Discuss the following methods of preparation of ether showing suitable reactions
(6 marks)
 - i. Dehydration of alcohols
 - ii. Williamson synthesis
 - iii. Heating alkyl halides with dry silver oxide
- 4ai. What are epoxides? (**1 marks**)
- ii. List two methods of preparation of epoxides and explain them. (**5 marks**)
- 4b. Discuss the reactions of epoxides with
 - i. Methanol under pressure (**2 marks**)
 - ii. Grignard reagent (**2 marks**)
 - iii. Lithium aluminum hydride (**2 marks**)
- 5a. Give the chemical structure of the following compounds (**6 marks**)
 - i. 2,3- dichloro propanoic acid
 - ii. 2-methyl propanoic acid
 - iii. Methyl ethanoate
- 5b. Discuss the following physical properties of carboxylic acids (**4 marks**)
 - i. Boiling points
 - ii. Solubility in water

- 5c. Explain the preparation of carboxylic acids from Hydrolysis of esters (**2 mark**)
- 6a. Explain the reactions of carboxylic acids under these headings (**6 marks**)
- i. Oxidation of methanoic acid
 - ii. Decarboxylation
 - iii.** Formation of aldehyde
- 6bi. State the properties of acyl chlorides (**2 marks**)
- ii State and briefly discuss the general methods for formation of acyl chlorides (**3 marks**)
 - iii. Using an equation explain the ester formation of acid anhydrides (**1 mark**)