

KABARAK



UNIVERSITY

UNIVERSITY EXAMINATIONS

2010/2011 ACADEMIC YEAR

FOR THE DEGREE OF BACHELOR OF EDUCATION SCIENCE

COURSE CODE: CHEM 312

COURSE TITLE: ORGANIC CHEMISTRY III

STREAM: SESSION VII & Y3S1

DAY: SATURDAY

TIME: 9.00 – 11.00 A.M.

DATE: 16/04/2011

INSTRUCTIONS:

- Answer ALL questions

PLEASE TURN OVER

QUESTION ONE

- a. Explain the following;
- i. Simple aldehydes and ketones are soluble in water. (3 marks)
 - ii. Ketones are less reactive towards nucleophilic additions than aldehydes. (3 marks)
 - iii. Carboxylic acids are stronger acids than alcohols. (3 marks)
 - iv. Phenols are stronger acids than methanol, ethanol and water. (3 marks)
 - v. The boiling points of aldehydes and ketones are higher than those of alkanes with relatively similar molecular mass. (3 marks)
 - vi. Carboxylic acids form dimers. (3 marks)
- b. Compare the following.
- i. The acidity of ethanoic acid and mono-chloroethanoic acid. (3 marks)
 - ii. Addition reactions of ethanal and propanone. (3 marks)
 - iii. The basicity of ethanamine and methylamine. (3 marks)
 - iv. The hydrolysis of ethanoyl chloride and ethyl ethanoate. (3 marks)

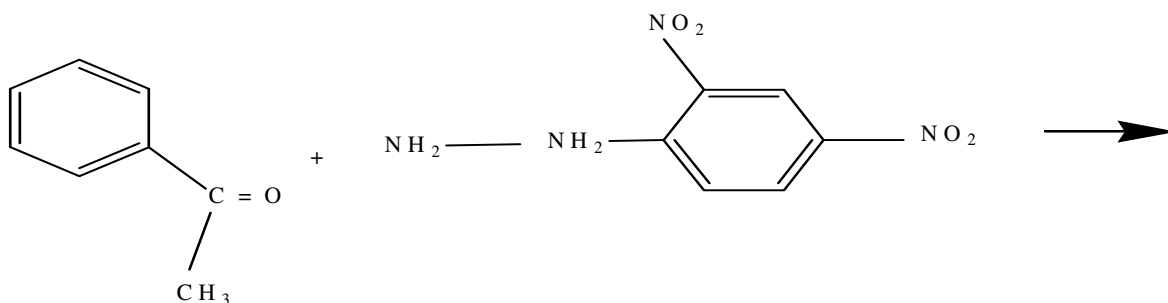
QUESTION TWO

- a. Outline the mechanisms of the following reactions using curly arrows.
- i. Addition of hydrogen to ketones using LiAlH_4 . (2 marks)
 - ii. Nucleophilic addition of hydrogen cyanide to methanol. (2 marks)
 - iii. Nucleophilic addition of amines (R-NH_2) to ketones. (2 marks)
- b. Organic compounds have a wide variety of applications. Name four uses and cite an example in each case. (6 marks)
- c. Explain, using examples what is Esterification? (3 marks)

QUESTION THREE

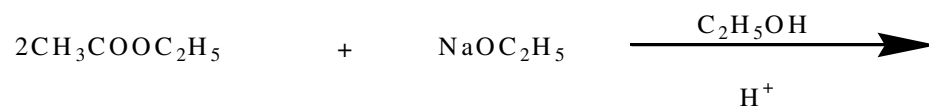
Indicate the products and show the mechanisms of the following reactions;

i.



(5 marks)

ii.



(5 marks)

QUESTION FOUR

- When carboxylic acids and ethanol are heated in the presence of a concentrated mineral acid an ester is formed. Show the two pathways and products that can be followed in this reaction. (4 marks)
- Distinguish between the hydrogen bonds formed by 2-nitrophenol and 4-nitrophenol. Use diagrams to illustrate. (4 marks)
- Outline the mechanism using curly arrow show how the following reactions proceed;
 - Nitration of benzene. (3.5 marks)
 - Sulphonation of benzene. (3.5 marks)