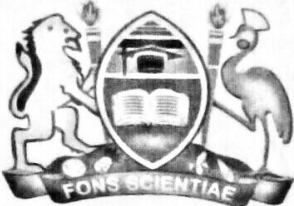


KISII UNIVERSITY



UNIVERSITY EXAMINATIONS

**THIRD YEAR EXAMINATION FOR THE AWARD OF THE
DEGREE OF BACHELOR OF EDUCATION [SCIENCE]
FIRST SEMESTER 2016/2017
(JANUARY - MAY, 2017)**

CHEM 332: ORGANIC CHEMISTRY III

STREAM: Y3S1

TIME: 2 HOURS

DAY: WEDNESDAY, 12:00-2:00 PM

DATE: 17/05/2017

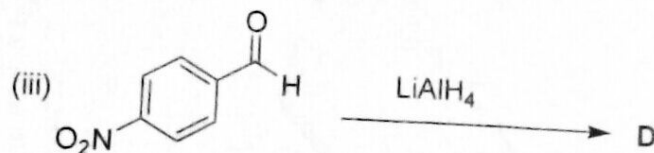
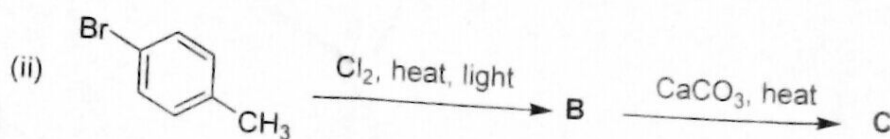
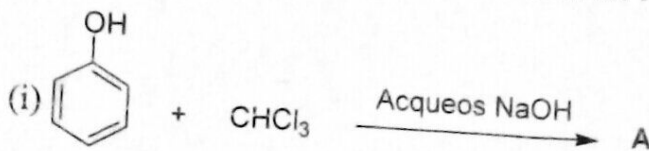
INSTRUCTIONS

- 1. Do not write anything on this question Paper.*

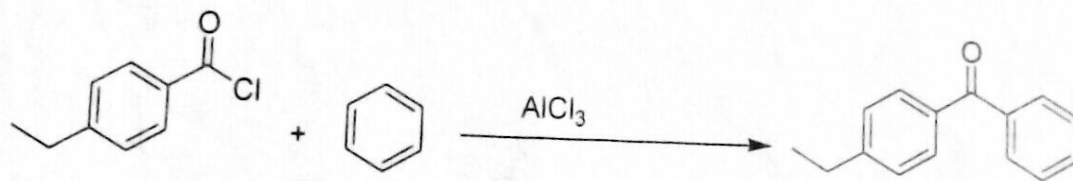
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END SEMISTER EXAMINATIONS
CHEM 332: ORGANIC CHEMIII (Y₃S₁)
JAN-APRIL 2016-2017

SECTION I(40MKS): COMPULSORY

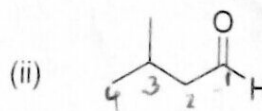
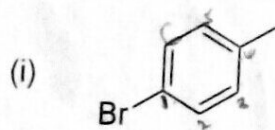
- 1.(a) Alkanals are soluble in water unlike their corresponding alkanes. Explain this phenomenon. (2 mks)
(b) Explain any two important roles played by the carbonyl as a functional group. (2mks)
(c) With the aid of structures show the difference between butanol, 2-butanone and butanoic acid. (3mks)
2.(a). Draw the structures of the products labeled A,B,C and D in the following reactions. (4mk)



- (b). Show the reaction mechanism involved in the following organic reactions. (4mks)



- 3 (a) Give the IUPAC names for the following organic compounds. (2mks)



- (b). Draw structures of the following organic compounds (2 mks).

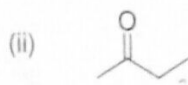
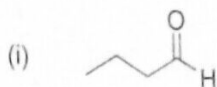
i. 3,4-dimethylhexanol



ii. 3-bromo-3-methyl-2-butanone.

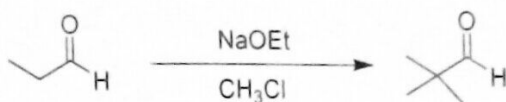
4(a). Carbonyl is an important functional group in organic reactions. Explain two ways which the carbonyl helps to initiate reactions in organic chemistry. (3mks)

(b). The structures given below represent organic compounds in two different classes.



Describe a chemical test that can be used to distinguish the two compounds (5mks)

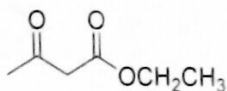
5(a) Show the reaction mechanism for the synthesis of 2,2-dimethyl propanal using the scheme given below. (5mks)



(b). Acetoacetic ester is a β -dicarbonyl compound that is readily converted into an enalote using strong bases such as sodium ethoxide.

i) Explain what is meant by the term enalote (2 mks)

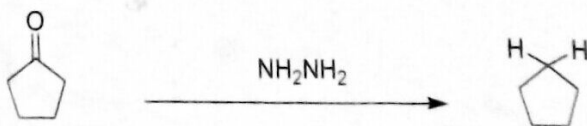
ii) Show the reaction mechanism for the conversion of acetoacetic ester into an enalote. The structure of acetoacetic ester is given below (3 mks)



iii) Explain why it is easier to convert acetoacetic ester into an enalote as compared to ethyl-ethanoate (3mks)

SECTION II (30MKS): ANSWER ANY TWO QUESTIONS

6. (a) Show the reaction mechanism that involves the following conversions (5 mks)

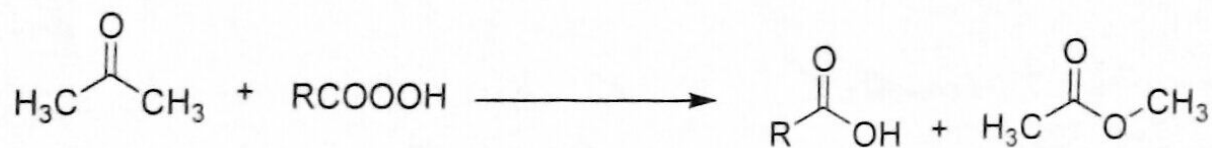


(b) Show the reagents and the steps involved in the synthesis of 2-ethylpentanoic acid using malonic ester synthesis (10 mks)

7. An aliphatic aldehyde **A** has the formula RCHO.

- (a) **A** reacts with 2,4-dinitrophenylhydrazine.
- Name this type of reaction and explain what happens (3 mks)
 - Show how the product of the reaction could be used to identify compound **A** (3 mks)
- (b) **A** reacts with warm acidified potassium dichromate ($K_2Cr_2O_7$) to yield compound **B**. As well, compound **A** reacts with lithium aluminium hydride to yield compound **C**. **B** and **C** react to yield compound **D**.
- Identify compounds **B**, **C** and **D** (3 mks)
 - Show the reaction mechanism for formation of compound **D** from **B** and **C** (3 mks)
- (c) Which of the compounds have the highest boiling point? Explain (2 mks)

8(a) Baeyer villiger oxidation reaction involves oxidation of ketones using peracids to synthesis esters show the mechanism for the following oxidation reaction. (7mks)



(b) Distinguish between aldol and claisen condensation reactions (3mks)

(c) α β - unsaturated carbonyl compounds can be synthesized through Michael addition reaction . Show the reaction mechanism for the following synthetic reaction (5 mks)

