



MERU UNIVERSITY OF SCIENCE AND TECHNOLOGY

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University Examinations 2023/2024

THIRD YEAR, FIRST SEMESTER EXAMINATION FOR THE DEGREE OF BACHELOR OF
SCIENCE IN CHEMISTRY

SCH 3301: SYNTHETIC ORGANIC CHEMISTRY 1

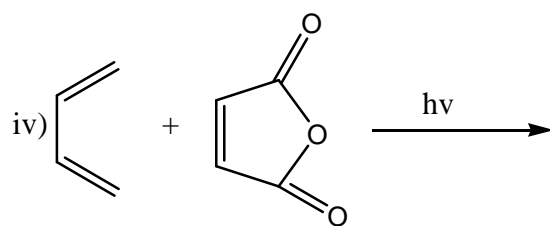
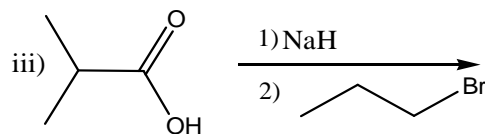
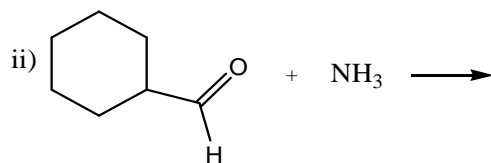
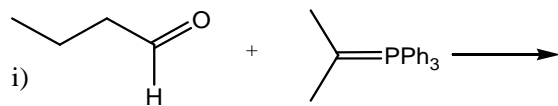
DATE: DECEMBER 2023

TIME: 2 HOURS

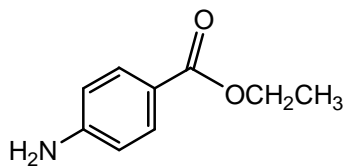
INSTRUCTIONS: *answer question one and any other two questions*

QUESTION ONE (30 MARKS)

- a) Explain the following terms as used in reactions (4 marks)
- Chemoselectivity,
 - stereoselective
 - stereospecific
 - concerted
- b) State two reasons why organic synthesis is possible (2 marks)
- c) Complete the following chemical equations by providing the product formed (8 marks)



d) Consider, benzocaine



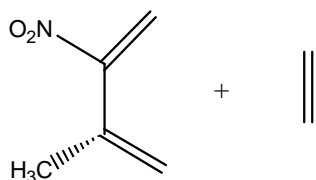
i. carry out its retrosynthesis (3 marks)

ii. write its synthesis (3 marks)

e) write resonance or canonical and corresponding hybrid structures for base or acid catalysed carbonyl compound (4 marks)

f i) what is Diels-Alder reaction? (2 marks)

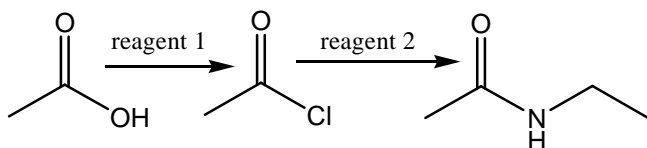
ii) write the mechanism for the reaction below and name the product obtained. (4 marks)



QUESTION TWO (20 MARKS)

a) Explain two characteristics of an ideal synthesis (4 marks)

b) Identify reagent 1 and 2 in the scheme below



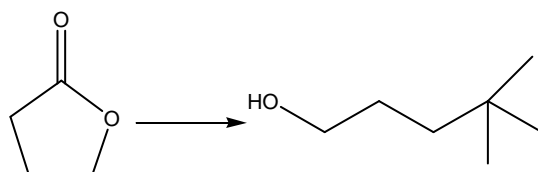
(2 marks)

c) State four qualities of a good protecting group

(4 marks)

d) Use reaction mechanism to show how would you carry out the following synthesis?

(4 marks)

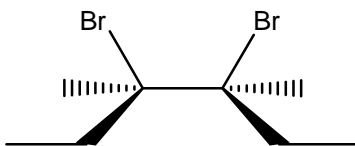


e) What is Wittig reaction?

(1 marks)

f) Starting with compounds of two carbon atoms or fewer, outline a stereospecific synthesis of *meso*-3,4-dibromohexane.

(5 marks)



QUESTION THREE (20 MARKS)

a) All the synthetic routes can be derived through a rational and penetrating analysis of the structure of target molecule (TM). State three factors you would consider

(3 marks)

b) i) Write the formula of triphenylphosphonium ylide

(1 marks)

ii) how are ylides prepared?

(3 marks)

c) Discuss the following requirements for Diels-Alder reaction

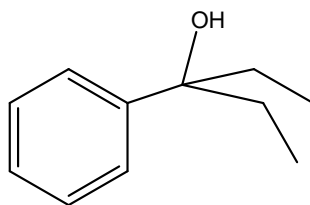
i) Conformational of the diene

(3 marks)

ii) Stereochemistry

(3 marks)

d) Study the structure below and answer questions that follows



i) Name the molecule above

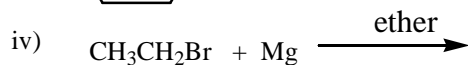
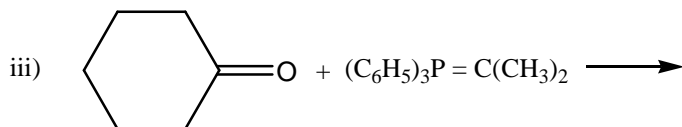
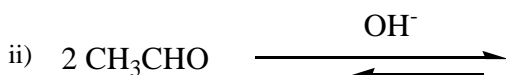
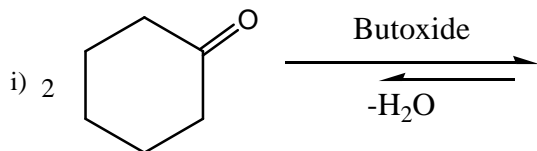
(1 marks)

ii) Show how the molecule could be synthesized by

- i. Writing a retrosynthetic analysis (3 marks)
- ii. Write reactions needed for the synthesis (3 marks)

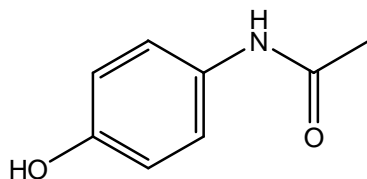
QUESTION FOUR (20 MARKS)

- a) Define the term Retrosynthesis (1 marks)
- b) give the product of the following reactions under the given reaction conditions



(8 marks)

- c) Consider, the muscle relaxant **paracetamol**



- I. carry out a retrosynthetic analysis (3 marks)
- II. write its possible synthesis. (3 marks)
- III. support your choice for the synthetic equivalent (1 marks)
- d) Using an alcohol of no more than four carbon atoms as your only organic starting material, outline a synthesis of **molecule below**: (4 marks)

