

CHUKA



UNIVERSITY

UNIVERSITY EXAMINATIONS

EXAMINATION FOR THE AWARD OF MASTER OF SCIENCE IN CHEMISTRY

CHEM 831: MODERN METHODS OF ORGANIC SYNTHESIS

STREAMS: BSC (CHEM)

TIME: 3 HOURS

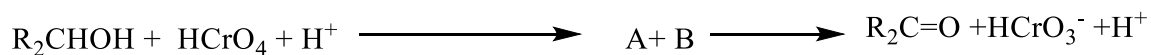
DAY/DATE: MONDAY 06/04/2020

2.30 P.M. – 4.30 P.M.

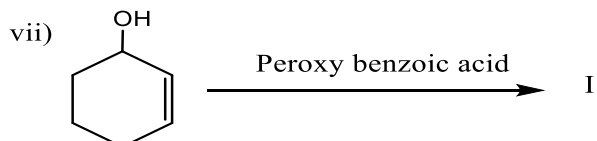
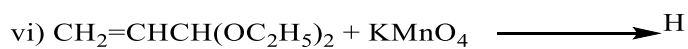
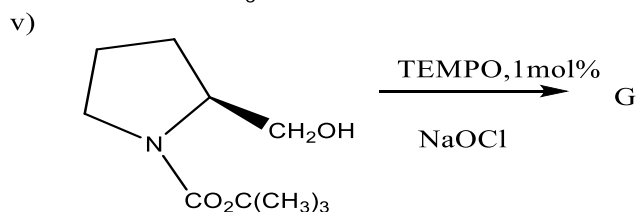
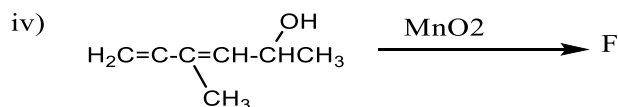
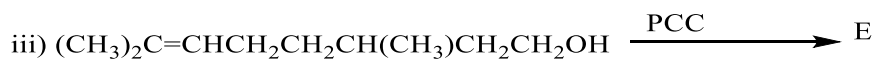
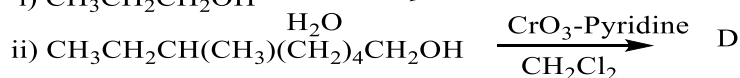
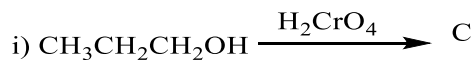
INSTRUCTIONS: ANSWER ALL QUESTIONS

QUESTION ONE (20 marks)

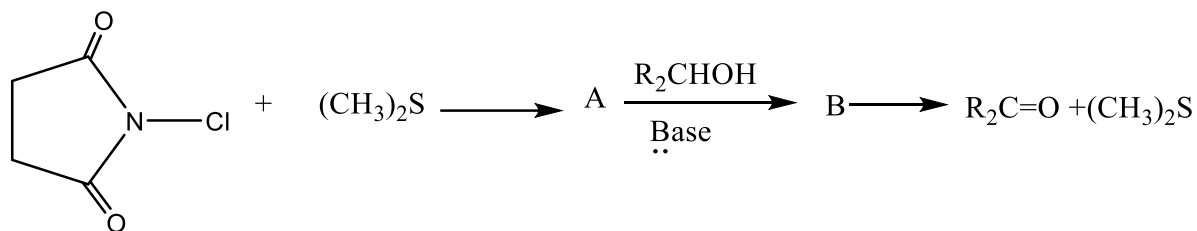
- a) Write the mechanism and the products A and B in the following reaction (3 marks)



- b) Write the product(s) of the following reactions below (7 marks)



- c) Write the mechanism of the following reaction (3 marks)



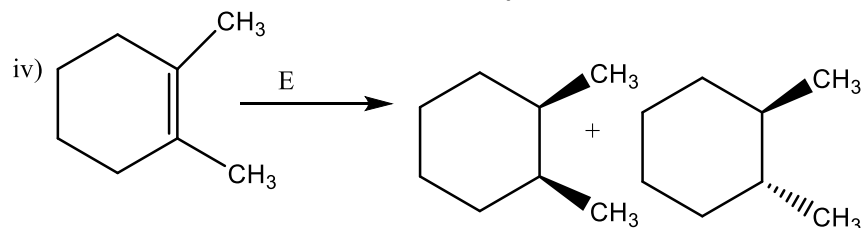
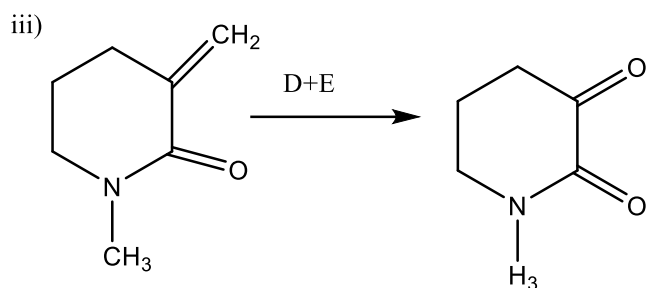
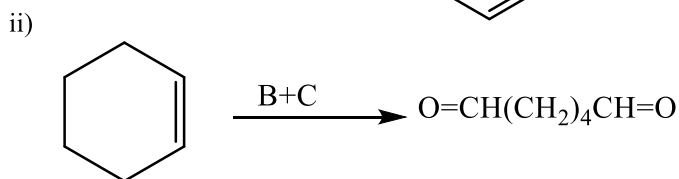
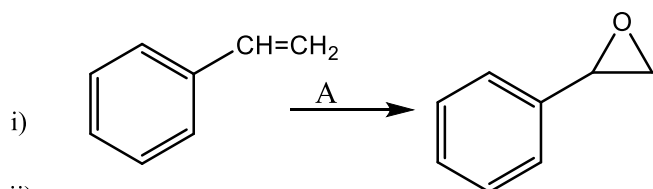
- d) Write one way to protect and deprotect the following functional groups (6 marks)

- i) Amino group
- ii) Hydroxyl group
- iii) Carbonyl group

- e) Differentiate between constitutional and stereoisomers (1 mark)

QUESTION 2 (20 MARKS)

- a) Write the reagents required for the following reactions (4 marks)

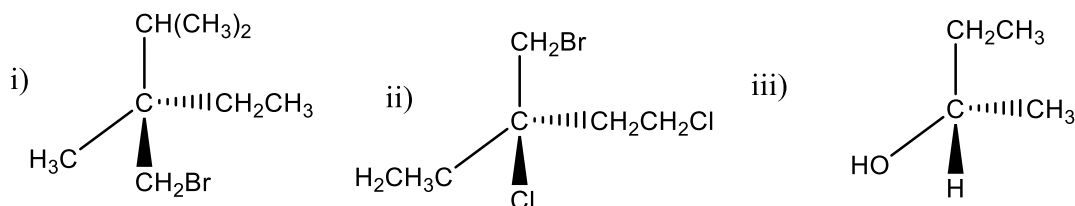


- b) Draw the cis and trans isomers for the following compounds (2 marks)

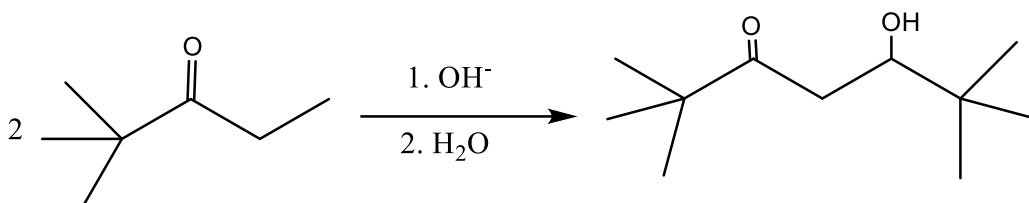
- i) 1-ethyl-3-methylcyclobutane
- ii) 1-bromo-4-chlorocyclohexane

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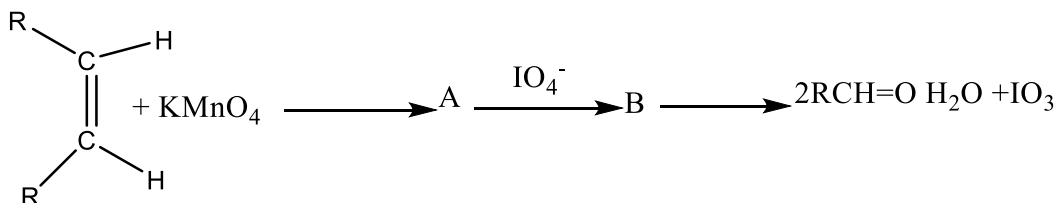
- c) Indicate whether each of the following structures has the R or the S configuration (3 marks)



- d) A solution prepared by mixing 10 ml of a 0.10 M solution of the R enantiomer and 30 ml of a 0.10 M solution of the S enantiomer was found to have an observed specific rotation of + 4.8°. What is the specific rotation of each enantiomer (4 marks)
- e) Write the mechanism of the following reaction (5 marks)

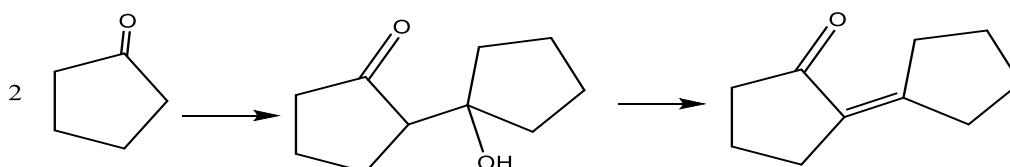


- f) Write the mechanism and products of the following reaction (2 marks)

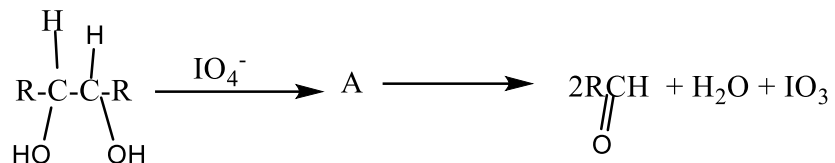


QUESTION THREE (20 marks)

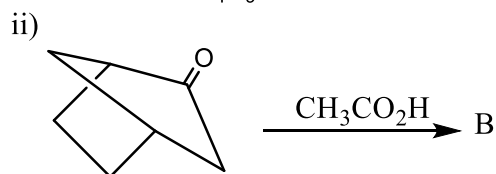
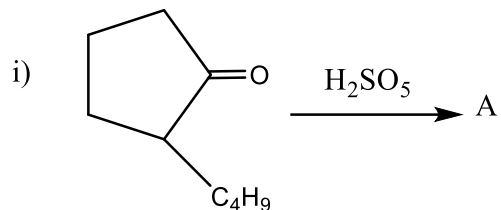
- a) i) Define a protective group (1mk)
- ii) Enumerate three considerations when choosing an appropriate protective group (3 marks)
- b) Differentiate between the following terms (3 marks)
- Regioselective and stereospecific reaction
 - Chiral and achiral compound
 - Erythro enantiomers and threo enantiomers
- c) Write the mechanism of the following acid catalyzed aldol reaction of cyclopentanone (5 marks)



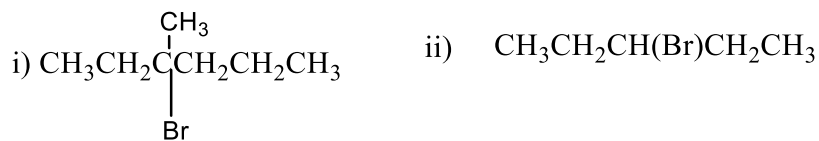
d) Write the mechanism of the following cleavage of glycols (2 marks)



e) Write the products of the following reactions (2 marks)



f) Indicate the asymmetric carbons in the following compounds (2 marks)



g) Write the product of the following reaction (2 marks)

