



UNIVERSITY OF EMBU

2016/2017 ACADEMIC YEAR

FIRST SEMESTER EXAMINATION

THIRD YEAR EXAMINATION FOR THE DEGREE OF BACHELOR OF SCIENCE

SCH 302: STEREOCHEMISTRY AND ORGANIC SYNTHESIS

DATE: DECEMBER 2, 2016

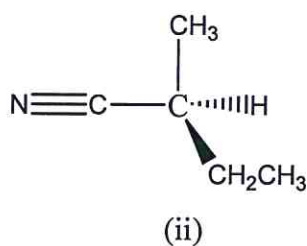
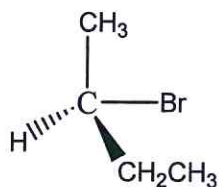
TIME: 8:30-10:30AM

INSTRUCTIONS:

Answer Question ONE and ANY Other TWO Questions

QUESTION ONE (30 MARKS)

- a) Using specific examples, explain the following concepts (3 marks)
- i) Configuration
 - ii) Stereogenic center
 - iii) Chirality
- b) Describe a racemic mixture by use of an appropriate example (3 marks)
- c) Explain one way of resolving racemers (3 marks)
- d) Classify the following compounds as S and R (3 marks)



- e) Using a specific example, explain the concept of “retention and “inversion” of configuration in stereo-specific reactions (3 marks)
- f) Using specific examples, illustrate the importance of the following reactions in organic synthesis (3 marks)
- i) Aldol condensation
 - ii) Claisen condensation
 - iii) Birch reduction
- g) Explain the value of carbanions in organic synthesis (3 marks)
- h) List three examples of stereo-selective reactions (3 marks)
- i) List three factors that affect nucleophilic substitution reactions (3 marks)
- j) List important conditions for the following phenomena (3 marks)
- i) Cis/trans isomerism
 - ii) Chirality
 - iii) Enantiomerism

QUESTION TWO (20 MARKS)

- a) Identify stereo-centers in the following molecule and indicate their configurations as R or S (6 marks)



- b) Define optical rotation (2 marks)
- c) Using specific examples, illustrate the following (6 marks)

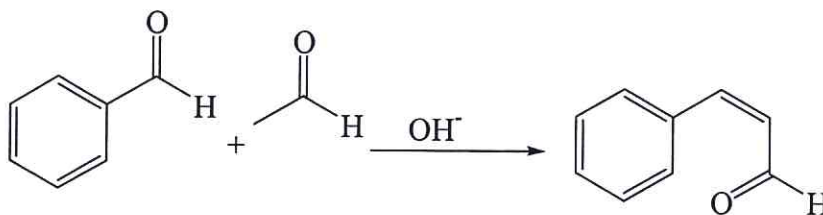
i) Arenium ion intermediate

ii) Steric hinderance

iii) Retro-synthetic analysis

d) Predict the mechanism of the following reaction

(6 marks)



QUESTION THREE (20 MARKS)

a) Using specific examples, describe the following

(8 marks)

i) Meso compounds

ii) Diastereomers

iii) Enantiomers

iv) Tautomers

b) Enamine and enols are important synthetic intermediates. With a specific example, illustrate the mechanism of keto-enol interconversion

(6 marks)

c) Illustrate the use of enamines in organic synthesis

(6 marks)

QUESTION FOUR (20 MARKS)

a) With a specific example, illustrate the use of the following reactions in synthesis

(6 marks)

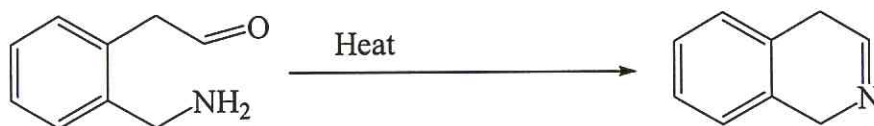
i) Wolff-Kishner reduction

ii) Manich reaction

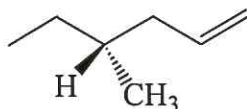
iii) Micheal addition

b) Predict the mechanism of the following reaction

(6 marks)



c) Classify the compound below as R or S sol pg 28 (3 marks)



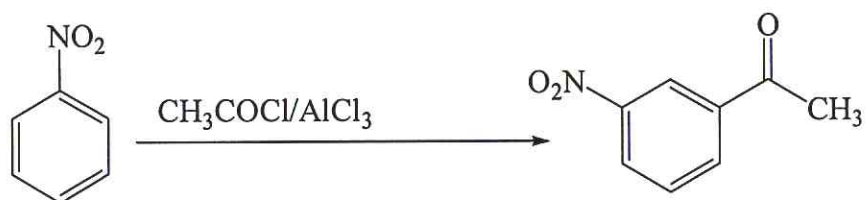
d) Enzymatic reaction can be regarded as stereo-selective. Discuss. (5 marks)

QUESTION FIVE (20 MARKS)

a) Compare levorotatory and dextrorotary molecules with respect to the following (10 marks)

- i) Optical rotation
- ii) R and S orientation
- iii) Reaction with chiral reagents
- iv) Melting point
- v) Enantiomeric purity

b) Predict the mechanism of the following reactions (6 marks)



c) Describe how you would separate two enantiomers in the lab (4 marks)

--END--