MERU UNIVERSITY OF SCIENCE AND TECHNOLOGY

P.O. Box 972-60200 – Meru-Kenya
Tel: +254(0) 799 529 958, +254(0) 799 529 959, + 254 (0) 712 524 293,
Website: info@must.ac.ke Email: info@must.ac.ke

University Examinations 2024/2025

SECOND YEAR FIRST SEMESTER EXAMINATION FOR THE DEGREE OF BACHELOR OF SCIENCE (CHEMISTRY)

SCH 3203: STEREOCHEMISTRY AND REACTION MECHANISM

DATE: JANUARY 2024 **TIME: 2 HOURS**

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

QUESTION ONE (30 MARKS)

a) Define the following terms (3 marks)
   i. Reaction mechanism
   ii. Stereochemistry
   iii. Regioselective reaction

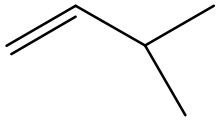
b) With suitable examples, distinguish between
   i) enantiomer and diastereomer (4 marks)
   ii) electrophile and nucleophile (4 marks)

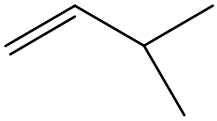
c) Using chemical equations show how alcohols behave as an acids and as a base (4 marks)

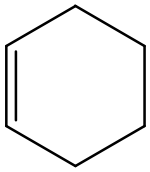
d) Name and give the structures of carbonyl compounds formed after ozonolysis of the alkene, 2-methybut-2-ene , $(CH_3)_2 C = CHCH_3$ (3 marks)

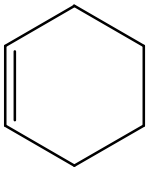
e) Compare the kinetics of S_N1 and S_N2 reactions (3 marks)

f) Complete the reactions below by providing the products formed and state the stereochemistry (4 marks)

i)  HCl →

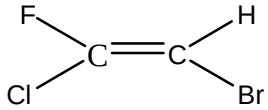
ii)  H_3O+ →

iii)  1. Hg(OAc)2; H2O
2 $NaBH_4$, NaOH →

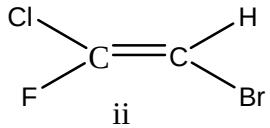
iv)  1. BH3
2. H_2O_2, NaOH →

g) Give a simple chemical test that would distinguish primary from secondary alcohols and secondary from tertiary alcohols (3 marks)

h) Give the *E-Z* designation of each of the following (2 marks)



i



ii

QUESTION TWO (20 MARKS)

a) I) What do the following abbreviation stand for? (2 marks)

i. S_N1

ii. **S_N2**

II) Compare S_N1 and S_N2 reactions. Under the subheading

i. kinetics of S_N1 and S_N2 reactions. (2 marks)

ii. the stereochemical consequences (2 marks)

b) Distinguish between constitutional isomers and stereoisomers (2 marks)

c) Suggest a suitable reaction mechanism for the chlorination of benzene (5 marks)

d) The reactivity of haloalkanes is affected by the halogen involved.

i) State with reasons which haloalkanes are most stable (2 marks)

ii) Using equations give any three methods by which bromoethane may be prepared (5 marks)

QUESTION THREE (20 MARKS)

a) i. Define the term resolution (2marks)

ii. Discuss three methods employed in resolving racemic compounds (6 marks)

b) Distinguish between

i) enantiomers and diastereomers. (2 marks)

ii) dextrorotatory and laevorotatory, (2 marks)

c) i) Define the term racemization (2 mark)

ii) Discuss three methods used for resolution of racemic mixtures (6 marks)

QUESTION FOUR (20 MARKS)

a) Distinguish between conformation and configuration (2 mark)

b) Discuss the chemistry of double bond (2 mark)

II) Write the mechanism for the reaction between ethene and bromine (4 marks)

c) With suitable examples, distinguish between chiral and achiral molecule (4 marks)

d) Explain the elements of symmetry with suitable examples. (8 marks)