



JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE AND TECHNOLOGY
SCHOOL OF BIOLOGICAL & PHYSICAL SCIENCES
UNIVERSITY EXAMINATION FOR DEGREE OF BACHELOR OF EDUCATION
SCIENCE
4th YEAR 1st SEMESTER 2018/2019 ACADEMIC YEAR
REGULAR

COURSE CODE: SCH 411

COURSE TITLE: STEREOCHEMISTRY

EXAM VENUE:

STREAM: (BEd. Science)

DATE:

EXAM SESSION:

TIME: 2.00 HOURS

Instructions:

- 1. Answer question 1 (Compulsory) in Section A and ANY other 2 questions in Section B.**
- 2. Candidates are advised not to write on the question paper.**
- 3. Candidates must hand in their answer booklets to the invigilator while in the examination room.**

Question One (30 marks)

- A. With three examples briefly define the term isomerism. (4 marks)
- B. Differentiate between a rational formula, structural formula and a molecular formula. (6 marks)
- C. Name and draw two chiral compounds with no stereogenic centres and explain why they are chiral. (4 marks)
- D. Explain why substitution reactions are not very common for substituted cyclohexane. (2 marks)
- E. Distinguish the following terms; (4 marks)
- (i) Stereoisomers and constitutional isomers
 - (ii) Stereospecific and regiospecific reactions
- F. In the groups (ligands) mentioned below assign their priorities if they were to be attached as substituents. (5 marks)
- i. benzyl
 - ii. Methyl
 - iii. Iodo
 - iv. Isopentyl
 - v. Methoxy
- G. Using a potential energy diagram carry out a conformational analysis for ethane. (5 marks)

Question Two (20 marks)

- A. Differentiate between angle strain and torsional strain on terms of ring strain. (2 marks)
- B. Define the term stereoisomers, name and give a brief description of four types and how they are related using a simple diagram (8 marks)
- C. With the aid of a potential energy diagram explain why cyclohexane has been shown to be the most stable cycloalkane (consider, the chair, boat and twisted conformations). (8 marks)
- D. With an example explain whether geometrical isomerism is possible for single bonded compounds. (2 marks)

Question Three (20 marks)

- A. Differentiate between meso forms and enantiomers and by using 2,3-dibromobutane draw its two meso forms and its two enantiomers. (6 marks)
- B. Name and explain the main causes of the differences in the relative stabilities of cyclopropane, cyclobutane, cyclopentane. (6 marks)

- C. With the aid of a potential energy diagram explain why cyclohexane has been shown to be the most stable cycloalkane (consider, the chair, boat and twisted conformations).
(8 marks)

Question Four (20 marks)

- A. Draw the two conformations of *tert*-butylcyclohexane at equilibrium showing the most favoured one giving plausible reason for your answer. (6 marks)
- B. Sometimes, the enantiomers of a drug may have completely different therapeutic properties. With examples give a brief explanation of how this occurs in a biological system. (4 marks)
- C. Account for the disappearance of optical activity observed when (*R*)-2-butanol is allowed to stand in aqueous H₂SO₄ and when (*S*)-2-iodooctane is treated with aqueous KI solution. (4 marks)
- D. Describe optical isomerism and with an explanation tell whether the following compound is optically active. (6 marks)

