

FACULTY OF SCIENCE

		DEPARTMENT OF CHEMICAL SCIENCES													
MODU! SECTIO		CEM1B01 - INTRODUCTION TO PHYSICAL AND ORGANIC CHEMISTRY B ORGANIC CHEMISTRY													
CAMPUS:		APK 07 JANUARY 2020													
MODEF	RATOR:	PROF CM MAUMELA													
MARKS	:	50													
INSTRU	ICTIONS:														
(1)	The exam	consists of 8 pages including cover page and periodic table.													
(2)	You can u	se a pen of any color except RED to write the exam.													
(3)	You are N	OT ALLOWED TO USE PENCIL. IF YOU DO, YOU CANNOT QUERY YOUR MARKS AFTE	R												
	THE EXAM	1 HAS BEEN MARKED.	_												
NAME:		SURNAME:													
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(5)

Bedaquiline is a drug used to treat active tuberculosis (TB), more specifically drug-resistant TB. Study the chemical structure of this drug and answer the questions that follow.

1.1 List all the 5 functional groups present in the chemical structure of bedaquiline

1.2 How many stereogenic centers does the molecule have? (1)

1.3 How many isomers do you expect the molecule to have? (1)

1.4 Insert the correct number of lone pair electrons around central atoms that have lone pairs. (Do it on the structure above) (2.5)

QUESTION 2 [4]

Study the pair of compounds below and state if they are constitutional isomers, conformational isomers, enantiomers, diastereoisomers or same compounds.

$$CH_{2}OH$$

$$CI$$

$$CH_{2}CH_{3}$$

$$CH_{2}CH_{3}$$

$$CH_{2}CH_{3}$$

$$CH_{3}CH_{2}C$$

$$CH_{3}$$

$$CH_{2}CH_{3}$$

$$CH_{3}$$

$$CH_{2}CH_{3}$$

$$CH_{3}$$

$$CH_{2}CH_{3}$$

$$CH_{3}$$

$$CH_{3$$

$$CH_3$$
 CH_3 CH_3 CH_3 CH_3 CH_3 CH_3 CH_3 CH_3 CH_3

QUESTION 3 (3)

Assign E/Z stereochemistry to the following compounds: (show your analysis)

Study the reaction below and identify the major product of the reaction. Propose a detailed reaction mechanism showing how the major product is formed.

QUESTION 5 [3]

Draw the most stable chair conformation of *cis-*3-bromocyclohexanol and its ring-flipped isomer.

QUESTION 6 [8]

Complete each of the following reaction equations by **providing the missing information** (A, B, C, D, E and F). In each case **state the type of reaction**.

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QUESTION 7 [18]

The reaction below describes the synthesis of compound G. Study it and answer the questions below.

7.1 Draw the product that you would form if more than 2 equivalences of H_2 was used in the first step. (1)

7.2 What is the role of Pd/C in the reaction? (2)

7.3 Name the reagent used to form C. (1)

7.4 Give the TOPAC names of A and B	(4)
7.4 Draw the structure of product D	(1)
7.5 Assign R/S configuration on the carbon attached to the OH functional group in your working.	n structure E. Show (3)
7.6 Draw structure of product G, with the correct stereochemistry.	(2)
7.7. Propose a two-step method that you can use to synthesize G from B.	(4)

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