



FACULTY OF SCIENCE

DEPARTMENT OF CHEMICAL SCIENCES

MODULE: CEM1B01 - INTRODUCTION TO PHYSICAL AND ORGANIC CHEMISTRY

SECTION: B ORGANIC CHEMISTRY

CAMPUS: APK

EXAM DATE: 15 NOVEMBER 2019

ASSESSOR: DR P MOSHAPO

MODERATOR: PROF CM MAUMELA

MARKS: 50

INSTRUCTIONS:

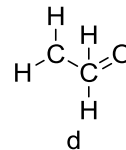
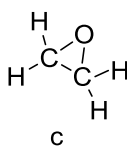
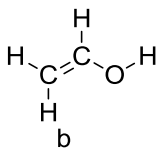
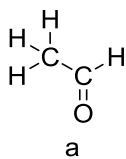
- (1) The exam consists of 9 pages including cover page and periodic table.
 - (2) You can use a pen of any color except RED to write the exam.
 - (3) You are NOT ALLOWED TO USE PENCIL. IF YOU DO, YOU CANNOT QUERY YOUR MARKS AFTER THE EXAM HAS BEEN MARKED.
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NAME: _____ **SURNAME:** _____

STUDENT NUMBER: _____

QUESTION 1**[4]**

The molecular formula C_2H_4O can be converted into three line-bond (Kekulé) structures that are consistent with valence rules.



a) Which one of the Kekulé structures (a to d) is not consistent with valence rules?

(1)

b) Provide an explanation for your choice.

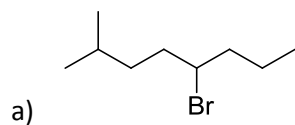
(2)

c) Which type of isomers are the three correct structures?

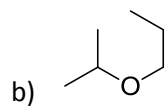
(1)

QUESTION 2**[10]**

Provide *IUPAC* names or skeletal structures for the following:



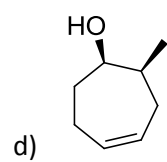
(2)



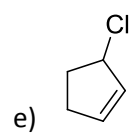
(2)

c) (E)-6-isopropyldec-7-en-2-yne

(2)



(2)



(2)

QUESTION 3

[6]

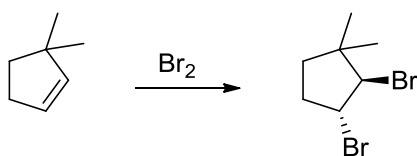
3.1 Draw one staggered and one eclipsed Newman projection of 3-bromo-2-methylpentane viewing along the C2 and C3 bond. (4)

3.2 How many chiral centres does the molecule in 3.1 have? (1)

3.3 How many stereochemical isomers do you expect for this molecule? (1)

QUESTION 4 [6]

4.1 Write the complete stepwise mechanism for the following reaction. Show all the intermediate structure(s) and all electron flow with arrows. (3)

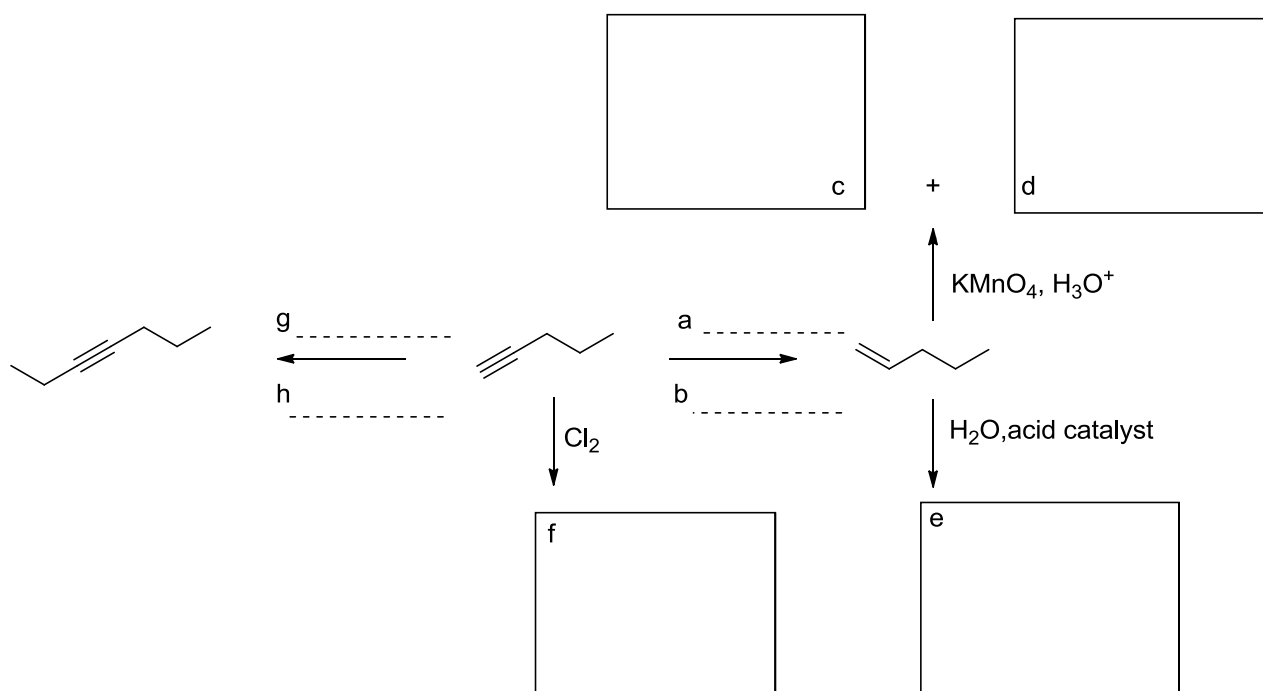


4.2 Propose a simple yet labelled energy diagram showing the reaction in 4.1. Assume that the reaction is exothermic. (3)

QUESTION 5

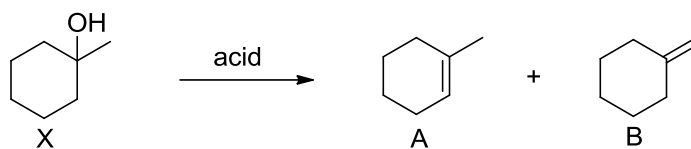
[7]

Alkynes are useful starting materials for the synthesis of different organic compounds. Study the scheme below and provide the names of all the missing reagents or product structures (a – h).



QUESTION 6**[3]**

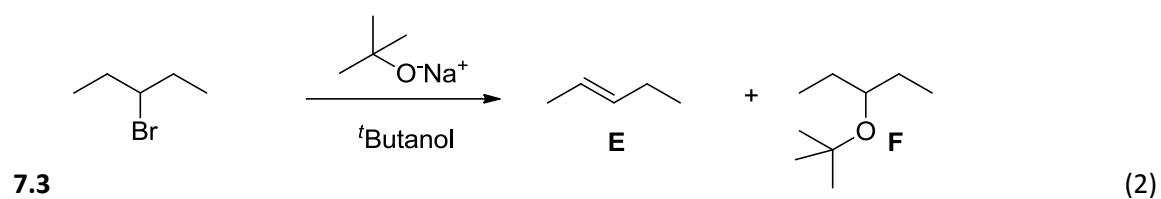
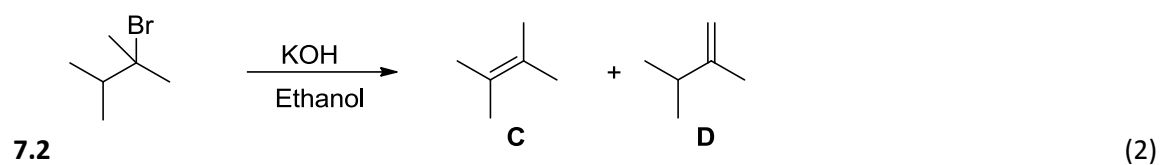
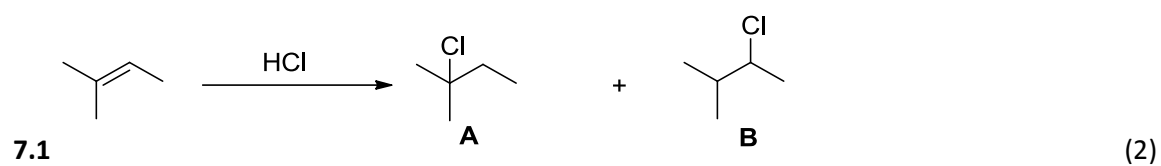
Compound X forms products A and B upon treatment with a strong acid. Propose a mechanism by which the products are formed.



QUESTION 7

[6]

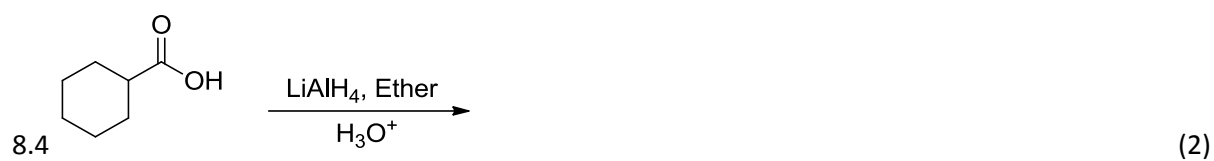
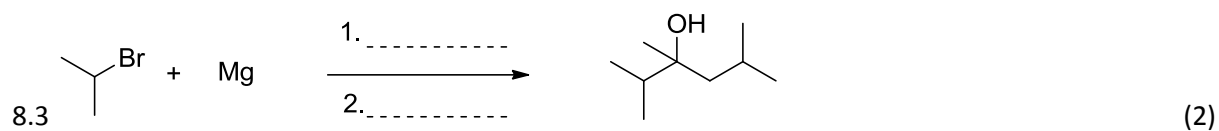
Propose the major product in the reactions below and provide a reason for your choice.



QUESTION 8

[8]

Provide structures or names of the missing reagents or products for the reactions below



The Periodic Table

[illegible]