THE CATHOLIC UNIVERSITY OF EASTERN AFRICA

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MAIN EXAMINATION

JANUARY – APRIL 2019 TRIMESTER

FACULTY OF SCIENCE

DEPARTMENT OF NATURAL SCIENCE (CHEMISTRY)

REGULAR PROGRAMME

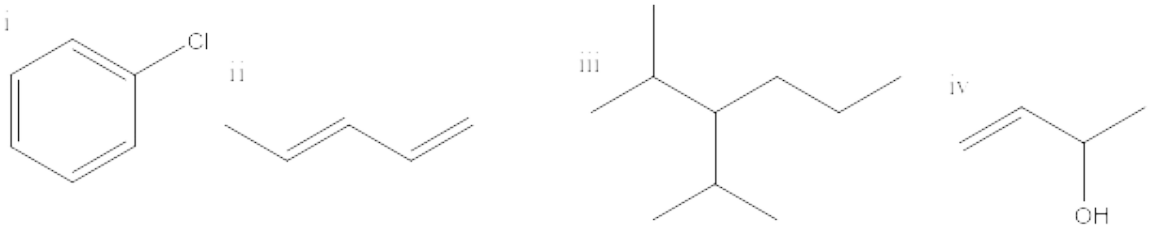
CHEM 101: ORGANIC CHEMISTRY I

Date: APRIL 2019	**Duration: 2 Hours**
INSTRUCTIONS: Answer Question ONE and ANY OTHER TWO Questions	

Q1. a) Draw the structures of molecules with the formula C_4H_8O that contain: **(4 marks)**

i) An alcohol
ii) An ether
iii) A ketone
iv) An aldehyde

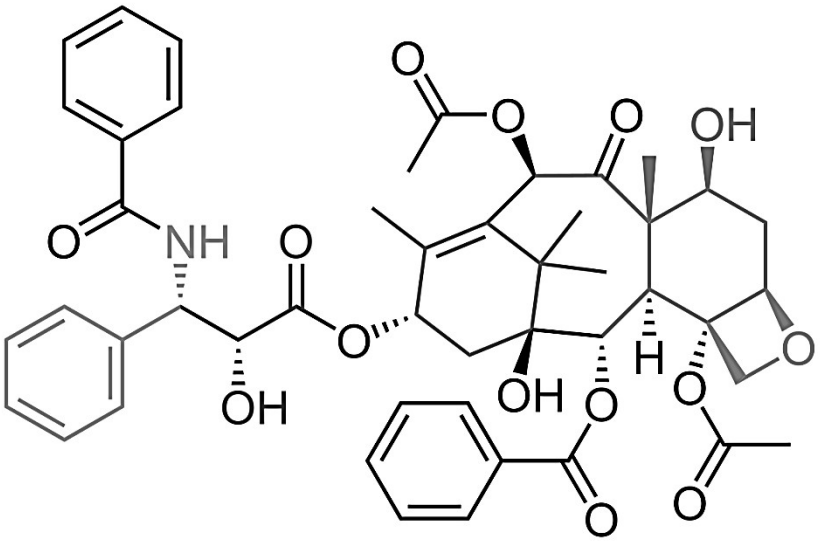
b) Give the IUPAC names of the following compounds. **(4 marks)**



c) Write the structural formulas and the names of the isomeric C_5H_{12} alkanes. **(3 marks)**

d) Draw the structures (including geometric isomers) of all the alkenes with the molecular formula $C_2H_2Cl_2$. Give IUPAC name for each compound you draw. **(3 marks)**

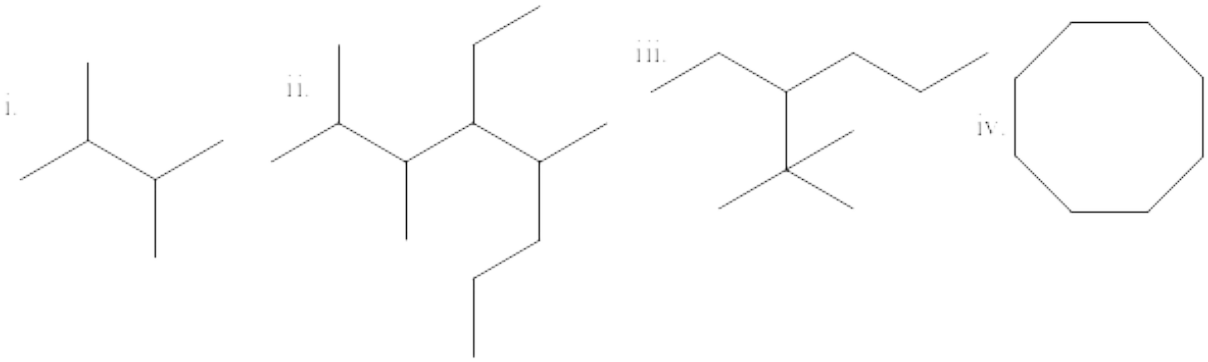
e) Taxol is a compound, originally obtained from the bark of the Pacific yew tree; inhibits the growth of certain cancers.



Taxol

Write down the names of the functional groups in Taxol indicating the number of times each functional group appears. **(6 marks)**

f) Name the following alkanes **(5 marks)**



Q2. a) Using an alkane with four carbon atoms as an example, discuss the chemistry of alkanes. Include :

i) Different ways of representing alkane structures,
ii) Naming straight, branched and cyclic alkane structures,
iii) Three methods of preparation,
iv) Three reactions
v) Two uses. **(10 marks)**

b) Using an aldehyde with three carbon atoms as an example, discuss the chemistry of aldehydes. Include :

i) Functional group present

ii) Nomenclature
iii) Three methods of preparation
iv) Three different reactions
v) Two uses **(10 marks)**

Q3. a) Study the diagram in Figure 1 and answer the following questions

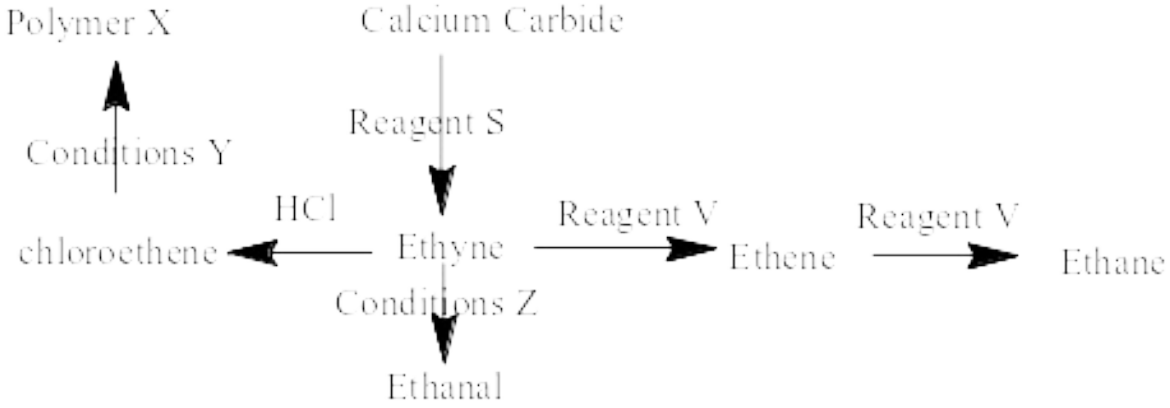


Figure 1

b) Identify i) Reagents S and V **(2 marks)**
ii) Condition Y and Z **(2 marks)**
iii) Polymer X **(1 mark)**

c) Discuss the bonding in alkanes in terms of hybridization. **(10 marks)**

d) Describe a chemical test to differentiate Propanal from propanone (Give a test and the observations). **(5 marks)**

Q4. a) Study the flow chart in Figure 2 and answer the questions that follow.

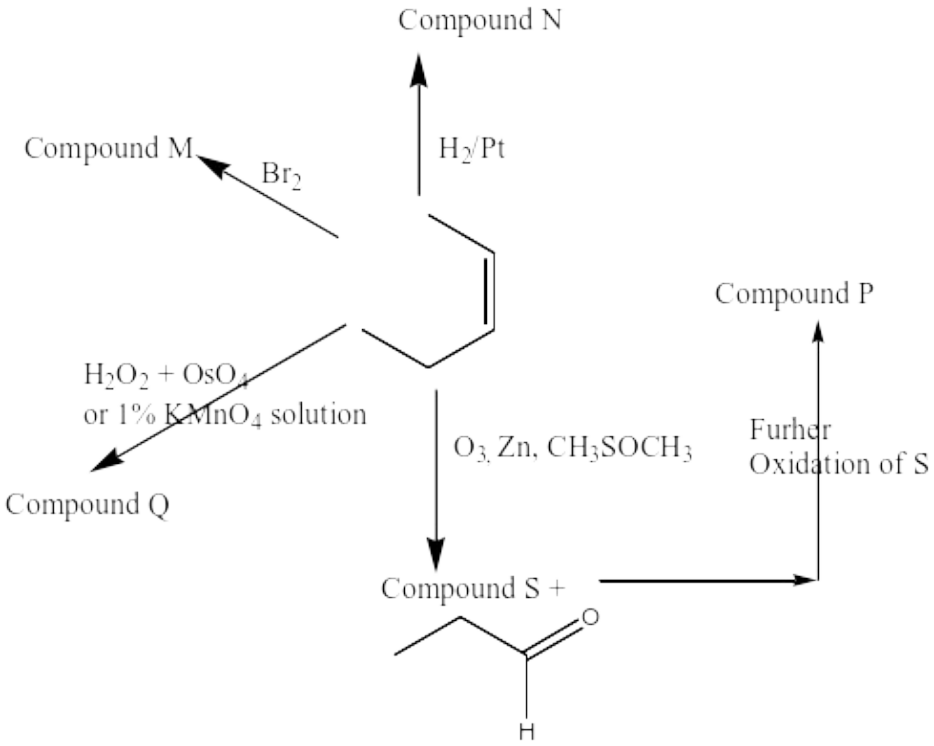


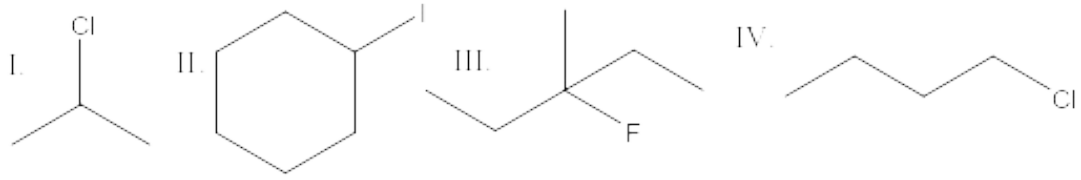
Figure 2

Draw the structures of compounds M, N, P, Q and R. **(5 marks)**

b) Describe what happens during fractional distillation of crude oil. **(5 marks)**

c) i) Using chloroethane as an example, describe two reactions of halo alkanes **(4 marks)**

ii) Name the following halo alkanes and classify them as 1,2 or 3 **(6 marks)**



Q5. a) Using an alcohol with four carbon atoms as an example, discuss the chemistry of alcohols. Include :

i) Functional group present
ii) Nomenclature
iii) Classification
iv) Three methods of preparation
v) Two uses **(10 marks)**

b) Explain why methanol with molecular mass of 32 g/mol is a liquid at room temperature but propane with a molecular mass of 44 g/mol is a gas at room temperature. **(2 marks)**

c) Describe two ways in which organic compounds can be classified giving an example in each case. **(5 marks)**

d) Write the reaction mechanism for chlorination of methane. **(3 marks)**

END