QUAID-I-AZAM UNIVERSITY

DEPARTMENT OF CHEMISTRY

M. Phil Admission Test (Organic Chemistry)

SSemester **Dated:**

Time Allowed: 1 hour 30 min. **Max Marks: 40**

Note: Attempt all the questions. All questions carry equal marks.

SAMPLE PAPER for M. PHIL ADMISSION PREPARATION

Q.1

1.1 Draw structures for the following names (0.5x1)

a) Ethyl 3-(5-oxocyclopent-1-en-1-yl)propanoate

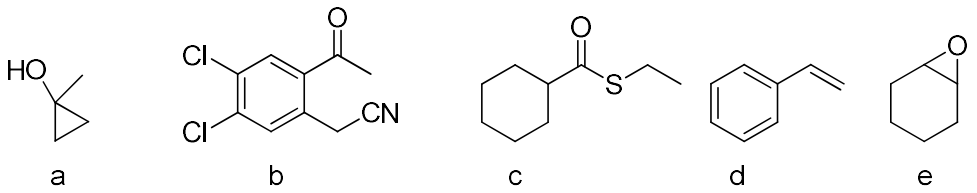
b) Dicyclohexylcarbodiimide

c) Ninhydrin

d) Salicylaldehyde

e) DMAP

1. 2 Write IUPAC names of the following structures (0.5x1)

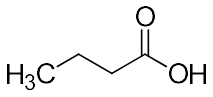


a b c d e

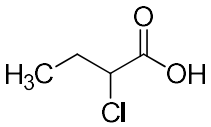
Q. 2: Answer the following three parts.

1) Which one is NOT a primary source of scientific literature? 1
   a) Conference paper
   b) Review article
   c) Journal article
   d) Thesis and dissertation

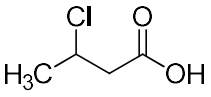
2) Arrange the following carboxylic acid in increasing order of acidity starting from weak acid 1



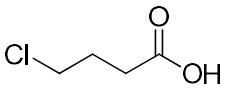
A



B



C



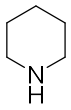
D

3) Cyclopentadiene is an unsaturated hydrocarbon with *p*Ka value ~16. Usually hydrocarbons exhibit higher *p*Ka values. Explain the unusual acidity. 1

4) Arrange the following in INCREASING ORDER OF BASICITY. 2

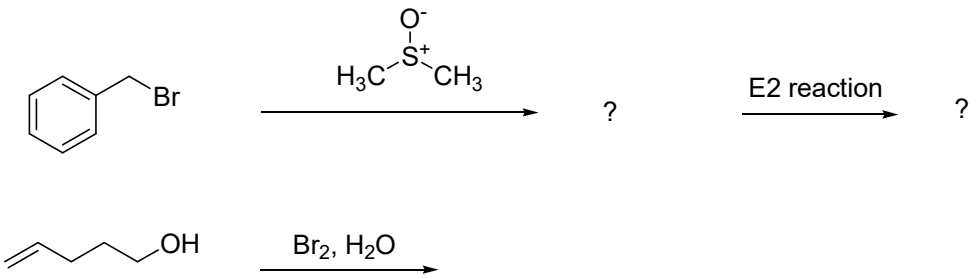
a) 

b) 

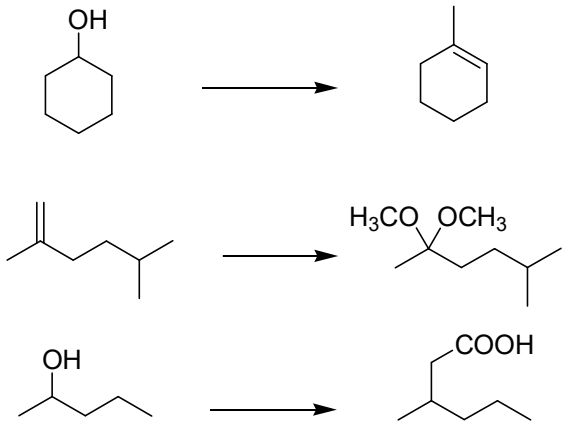
c) 

Q. 3

(a) Suggest the products of the following reactions with detailed mechanism? (2)



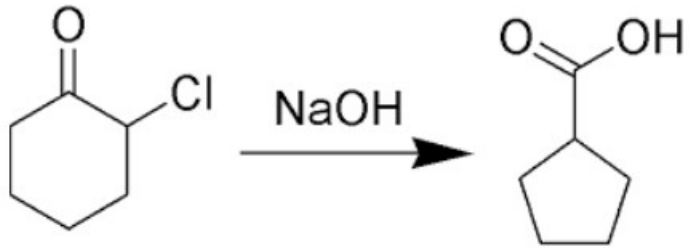
b) How would you carry out the following transformations? More than one step may be needed (3)



Q.4.

(a) What is meant by the term “Thermodynamic and kinetic control”? Give one example. (2+0.5)

(b) Consider the following reaction: (0.5+1+1)



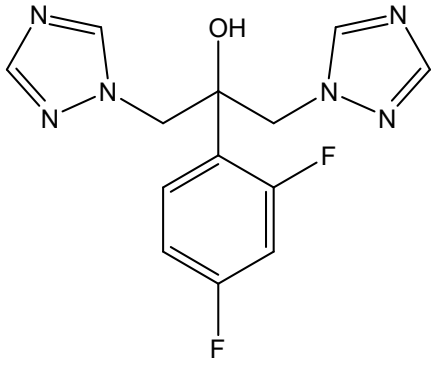
I. Name the reaction.

II. Write down its stepwise mechanism.

III. Give one evidence in favour of your proposed mechanism.

Q. 5

Plan a synthesis of the Pfizer anti-fungal agent fluconazole using a disconnection approach. (5)



Q. 6: In the following set of questions, encircle the most appropriate option: (5x1)

1. Which statement is correct?

a) Wavelength is directly proportional to energy.

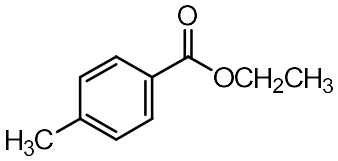
b) Wavelength is directly proportional to frequency.

c) Wavenumber is directly proportional to wavelength.

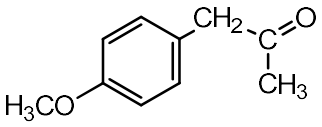
d) Wavenumber is directly proportional to energy.

2. If the IR spectrum from a compound of formula $C_{10}H_{12}O_2$, has a strong absorption at 1680 cm^{-1}, what is its likely structure?

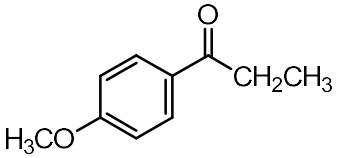
a)



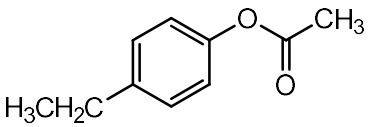
b)



c)



d)



3. The correct order for the basic features of a mass spectrometer is:

a) acceleration, deflection, detection, ionization

b) ionization, acceleration, deflection, detection

c) acceleration, ionization, deflection, detection

d) acceleration, deflection, ionization, detection

4. In ^1H NMR, the most highly shielded protons which are typically encountered are:

a) Carboxylic acid protons

b) *tert*-butyl groups

c) Aromatic protons

d) The methyl groups of tetramethyl silane

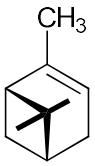
5. In the "aromatic" region of the ^{13}C NMR spectrum, a symmetrically 1,4-disubstituted aromatic compound will generally display, in a proton-decoupled spectrum:

a) Six peaks
b) Three peaks
c) Four peaks
d) Two peaks

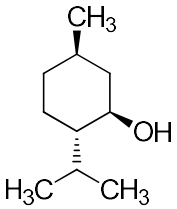
Q. 7: Appropriately answer the following question.

Terpenoids are biosynthetic combination of isoprene units. Identify the isoprene units in the following terpenoids by encircling each isoprene unit. 1

i) α-Pinene



ii) Menthol

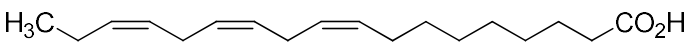


a) Write the basic core structure for the following class of compounds. 2

i. Coumarin

ii. Flavonoid

b) The fatty acid can be conveniently represented by lipid numbers. Identify the lipid number for the following fatty acids. 1



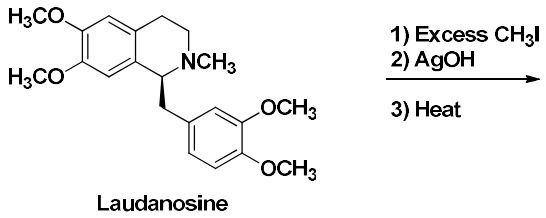
a. C18:3 (9*E*, 12*E*, 15*E*)
b. C9:18 (9*Z*, 12*Z*, 15*Z*)

c. C18:3 (3*Z*, 4*Z*, 9*Z*)

d. C18:3 (9*Z*, 12*Z*, 15*Z*)

e.

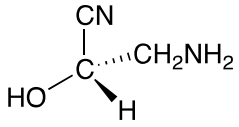
c) Hoffmann exhaustive methylation (also known as Hoffmann elimination) can be utilized to study the nitrogen position and its degree of substitution in alkaloids. Write down the product for the following reaction where it has been applied in structure elucidation of Laudanosine. 1



Laudanosine

Q. 8. Fill in the blanks; (1x5)

1. Enantiotopic ligands are isochronous in …… media. (chiral/achiral)
2. Racemization proceeds through formation of a ----------structure.
3. Addition of Bromine to alkenes is a ---------- reaction.
   (Stereoselective/Stereospecific)
4. The absolute configuration of the chiral center in following molecule is ……..



5. The following pair is an example of ……. structures. (same, diastereomeric, enantiomeric)