

Sultan Qaboos University  
College of Science, Department of Chemistry

Chem3321/Chem3322  
Introduction to Organic Chemistry/Organic Chemistry I

Spring 2009

**Test 1**

9 March, 2009

Test Duration: 50 minutes

Name: \_\_\_\_\_ ID: \_\_\_\_\_

Question	Earned Mark	Maximum Mark
1		30
2		40
3		30
Total		100

## Question 1

(30 marks)

a. Consider the condensed structure,  $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_3$ .

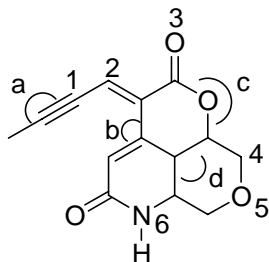
i. Convert this condensed structure into a Lewis (electron-dot) structure

ii. Convert the condensed structure into a Kekule (line-bond) structure

iii. Convert the condensed structure into a Skeletal structure

iv. Draw **two** constitutional isomers of the structure above. *On each isomer you draw, label each carbon* as primary ( $1^\circ$ ), secondary ( $2^\circ$ ), tertiary ( $3^\circ$ ) or quaternary ( $4^\circ$ ).

b. Consider the following structure:



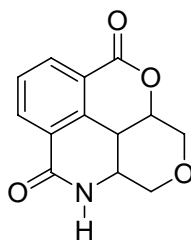
i. Determine the hybridisation of the atoms numbered 1, 2, 3, 4, 5, and 6 in the table below.

atom	hybridisation	atom	Hybridization
1		4	
2		5	
3		6	

ii. Determine bond angles a, b, c, and d

a: \_\_\_\_\_ b: \_\_\_\_\_ c: \_\_\_\_\_ d: \_\_\_\_\_

- iii. **Circle** and **identify** functional groups in the structure below:



Question 2

(40 marks)

- a. **Determine** if the indicated covalent bonds in the following molecules are **polar** or **not**. In each case, **indicate the direction of polarity**. (Electronegativity values; H:2.1, B: 2.0, C: 2.5, P: 2.1, N: 3.0, S: 2.5, Br: 2.8)

i.



ii.



iii.

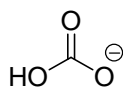


iv.



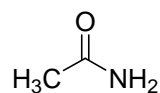
- b. Draw resonance forms for each of the following structures. *Indicate how the resonance forms are interconverted using **curved arrows***. The number of **additional** resonance forms **required to be drawn** is indicated **next** to the structure.

i.



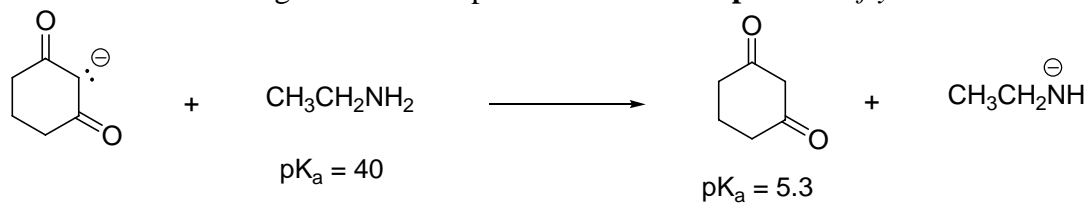
(3 additional resonance forms)

ii.

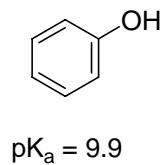
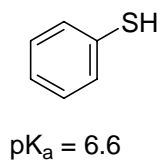


(2 additional resonance forms)

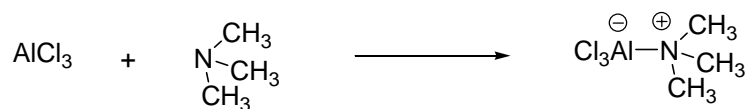
c. Will the following reaction take place as written? **Explain briefly.**



d. Consider the two substances shown below. Which of them will likely to react with the conjugate base of the other? Write an equation of the possible reaction. **Explain** your answer *briefly*.



- e. Consider the following reaction. Identify the Lewis acid and the Lewis base and *use curved arrows* to show how the reaction takes place.

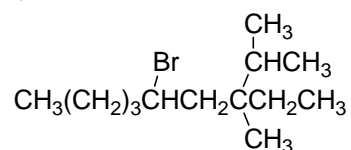


### Question 3

(30 marks)

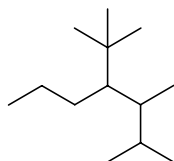
- a. Provide IUPAC names for the following structures:

i.



Name: \_\_\_\_\_

ii.



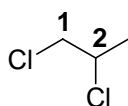
Name: \_\_\_\_\_

- b. Draw structures that correspond to the following IUPAC names:

i. 3-Methyl-4-propylheptane

ii. 2,2-Dichloro-3-isopropylhexane

c. Consider 1,2-dichloropropane (structure below). Sighting along **C1-C2** bond, answer the questions that follow.



- Draw **all** possible Newman Projections
- Label the projections as "staggered" or "eclipsed"
- Determine the type of strain in each of the projections
- Determine the most stable and the least stable projections (assume Cl is bigger in size than CH<sub>3</sub>)
- Construct a qualitative energy diagram for rotation about C1-C2 bond (assume Cl is bigger in size than CH<sub>3</sub>)