CHM1321 D: Organic Chemistry I

Mid-Term 1- Winter 2022

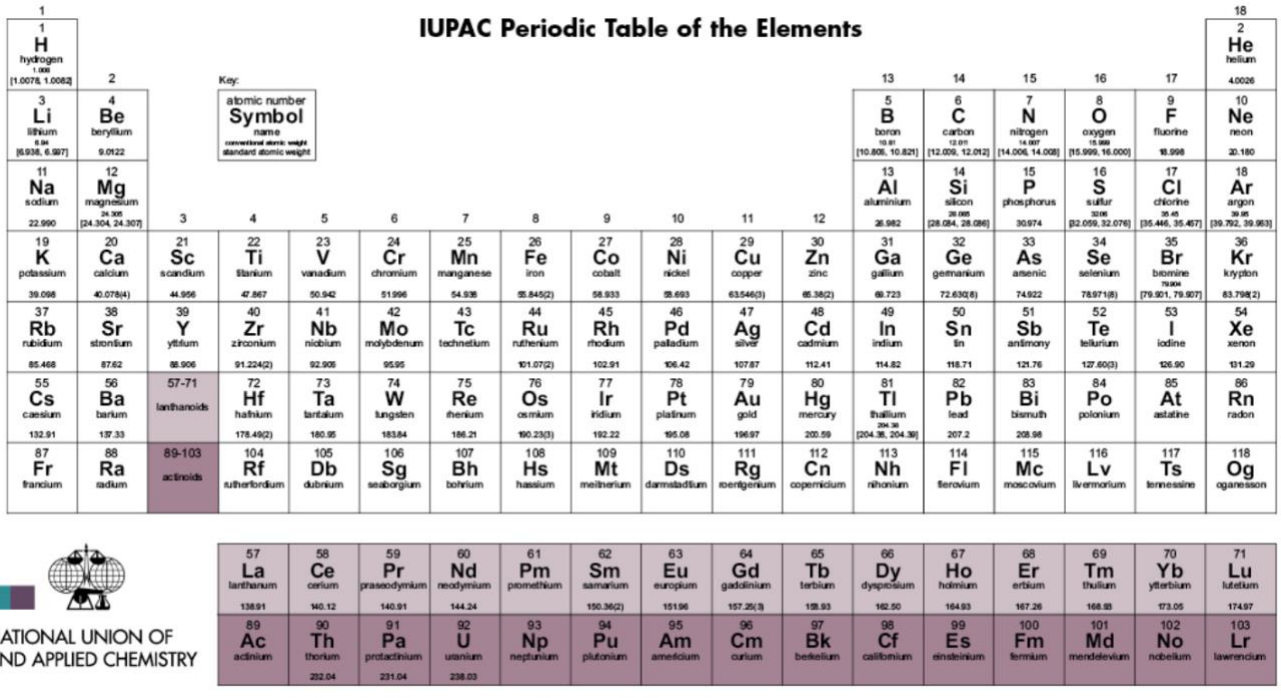
Exam time: 75 minutes

(+15 minutes for scanning and uploading your document)

There are 15 questions on this exam. This is a **closed book** exam. No other resources besides pen, pencil, blank paper and molecular model kits (optional) are permitted. Use of virtual molecular models is not allowed.

Submit your document as a single pdf document. The submission must be under the file "Midterm 1 - submission". All pages should be upright and in the right order, and your answers must be legible to be graded.

Note: Your camera must be located so that we can see what is in front of you, especially your hands and all the exam papers you are writing on, as well as your head whether it is from the front or from the side. The camera must stay on at all times during the exam including when you are scanning and uploading your document.

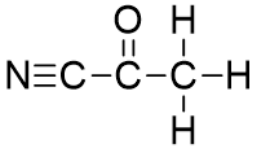


Question 1 (3 pts)

Draw the line structure of the following condensed structure:
$CH_3(CH_2)_3CH(CH_3)COCH_2COOH$

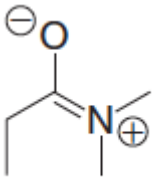
Question 2 (10 pts)

Assign the electron pair geometry and hybridization around each non-hydrogen atom in the molecule shown below:



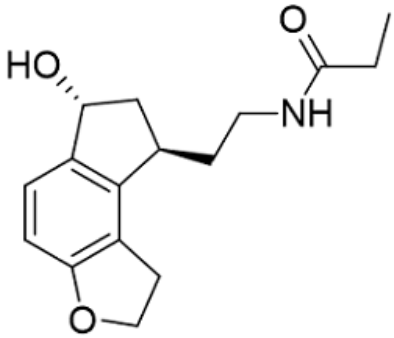
Question 3 (4 pts)

Convert the following to Lewis structure:



Question 4 (8pts)

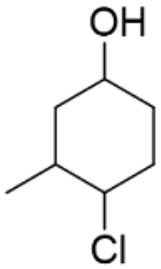
Which functional groups are present in the molecule shown below? Mark each and write the name of the functional group.



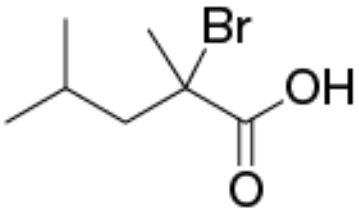
Question 5 (8pts)

What is the IUPAC name of the following compounds (For this question, you do not need to include R/S nomenclature)

A)



B)

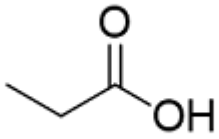


Question 6 (3 pts)

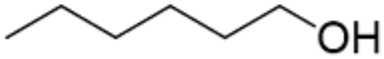
Rank the following in order of increasing solubility in water. Make sure to explain your answer.

a.

b.



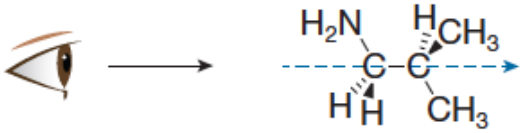
c.



Question 7 (10 pts)

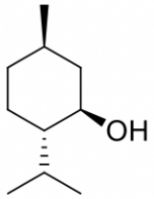
Part A) Draw the Newman projection of the following molecule along the indicated bond (the eye shows the desired perspective)

B) Draw the two conformers of this molecule that have the highest and lowest energy level. Label these two conformers. Which one is staggered, and which one is fully eclipsed?



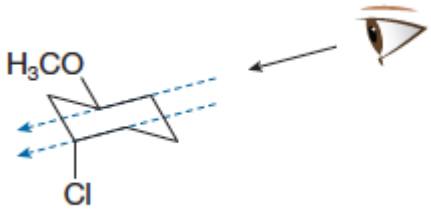
Question 8 (8 pts)

Draw both chair conformations of the molecule below. Indicate which is more stable and why?



Question 9 (8 pts)

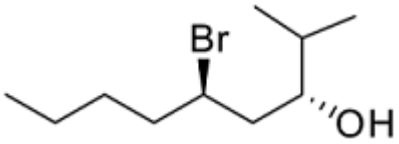
A) Convert the chair conformation into Newman projection, sighting the molecule along the bonds indicated by the arrow.



B) Draw this compound in a planar projection as viewed from above.

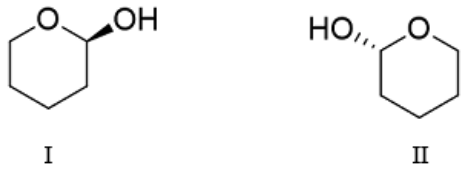
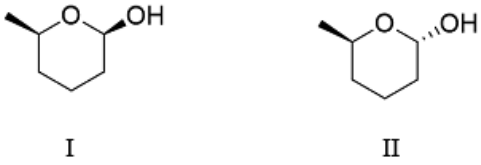
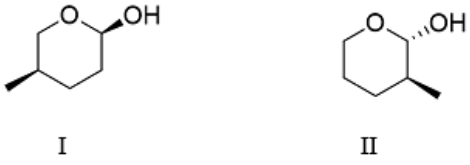
Question 10 (10 pts)

Determine the absolute configuration of the chiral center(s) in the molecule (R/S). Make sure to show the process you used to assign R/S.



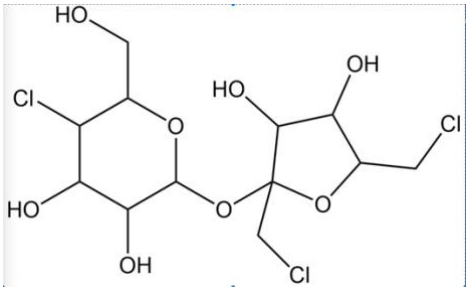
Question 11 (4 pts)

For each pair below, determine the stereochemical relationship (The stereochemical relationship between I and II: Identical molecules, Enantiomers, Diastereomers, Constitutional isomer). Make sure to explain/show how you reached your answer.

A)  I II	B)  I II
C)  I II	D)  I II

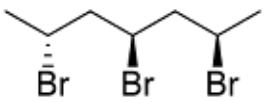
Question 12 (8 pts)

Sucralose™ is a sweetener found in soft drinks and low-calorie foods such as yogurt. The structure of Sucralose is shown. How many chirality centers (stereogenic centers) are present? Mark all the chirality centers.

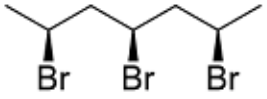


Question 13 (4pts)

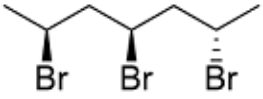
Which of the compounds shown is/are meso? Why?



I



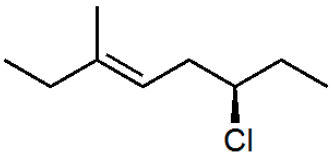
II



III

Question 14 (8 pts)

Name the compound below (make sure to include R/S or E/Z if applicable)



Question 15 (4 pts)

Indicate whether the following statements are true or false.

A) Enantiomers have the same physical and chemical properties.

B) D/L is used to describe the way enantiomers rotate the angle of polarized light where D stands for counterclockwise rotation and L stands for clockwise rotation.

C) Among the intermolecular forces, hydrogen bonding is the strongest of all.

D) π bonds are weaker than σ bonds due to having higher energy.