

Names of all students (please print) _____

CHEM 243 Organic Chemistry I

Points _____ (10 max)

Worksheet #6: September 17, 2021. Complete the following worksheet by collaborating with a group of 3-4 students. You can use a text book or your lecture video notes. You must work together, with the names of all students included on **ONE** sheet and turned in for a group grade.

All the problems on this worksheet are Review Questions for Exam I

(1) General format questions for the exam:

(a) What materials can you use when taking the exam? Circle all that apply:

your course notebook (paper or electronic)

the video lectures on the course web page

periodic table

worksheet 0-6 answer keys

the internet

Chegg

pKa table

IR table

my phone

Exam I Study Guide answer key

I will borrow materials from another student in the class

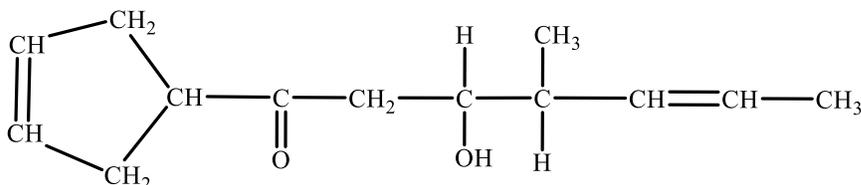
(b) **True or False (circle).** You can start the exam 10 minutes early, and have 10 minutes of extra time at the end of class.

(c) **True or False (circle).** If you aren't feeling well, you should still come to class and take the exam.

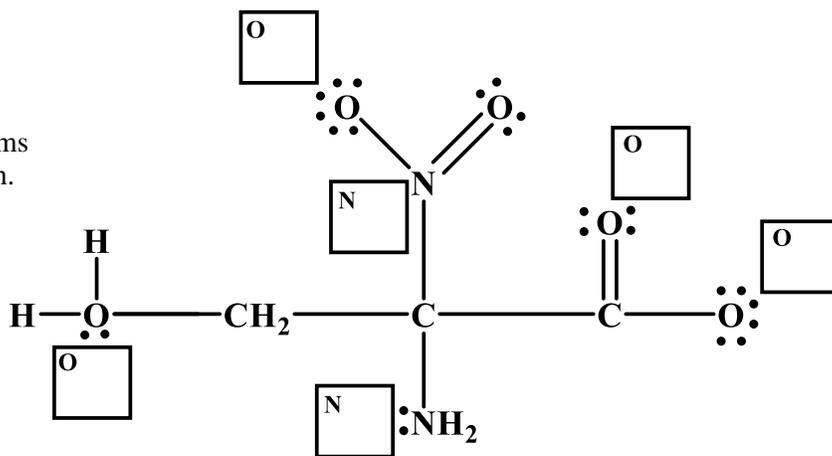
(d) **True or False (circle).** If you are not able to take the exam, you can take a make-up later in the week as long as you have an appropriate excuse.

(e) **True or False (circle).** If your alarm doesn't go off and you miss your exam, you should just do the make-up.

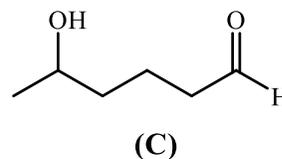
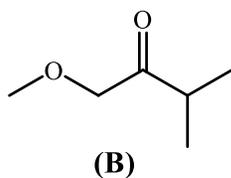
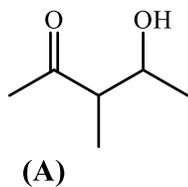
(2) For the compound drawn at the right, **CIRCLE** all 2° carbons.



(3) For the compound drawn at the right, write the **Formal Charge** in the boxes for the indicated atoms (0 or -1 or +1). All lone electron pairs are drawn.



(4) Organic Structure Identification. An unknown organic compound with a formula of $C_6H_{12}O_2$ is thought to be one of the molecules drawn below (A, B or C):



(i) Calculate the Hydrogen Deficiency (HD) for this unknown _____

(ii) Based on the HD and Formula, what type(s) of functional groups might be present? CIRCLE all possibilities from the list below:

alkene
(C=C double bond)

carbonyl
(C=O double bond)

alkyne
(C≡C triple bond)

alcohol
(R-OH)

ether
(R-O-R)

cycloalkyl
(C atoms form a ring)

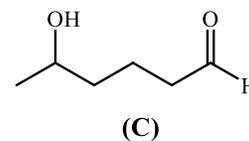
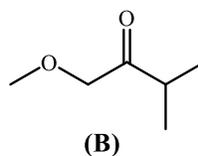
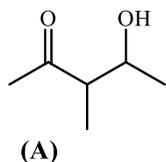
(c) Based on the information in (a) and (b), the unknown could be: (A) (B) (C) (circle all that apply)

(d) The IR spectrum has a band at 1700 cm^{-1} and $3200\text{-}3600\text{ cm}^{-1}$.

(i) What functional groups are suggested: $1700 =$ _____ $3200\text{-}3600 =$ _____

(ii) Based on the information in parts (a), (b) and (c), the unknown could be: (A) (B) (C) (circle all that apply)

(e) The unknown has one 1° , four 2° , and zero 3° carbons. Based on ALL information above, the unknown could be (circle ONE):



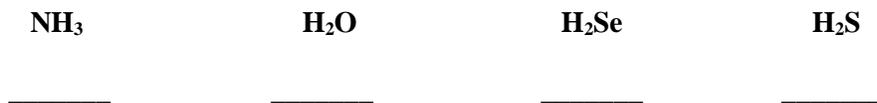
(5) Acid/Base Mechanisms. Complete the organic acid/base reaction shown below by:

- Identifying and labeling the acid and base reactants;
- Using curved arrows to indicate electron pair movement;
- Drawing the structure of and labeling the conjugate acid and base;
- Assigning appropriate pKa values to the acid species in the reactants and products;
- Drawing equilibrium arrows that clearly show in which direction the reaction is favored.

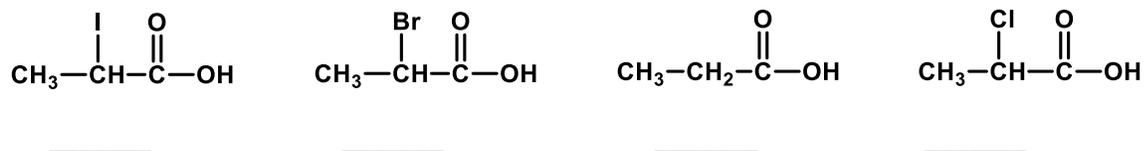


(6) Periodic Table Trends, Inductive Effects, Acid Strength and pKa's.

(a) Rank the following molecules in order of increasing acidity (1 = weakest.....4 = strongest).



(b) Rank the following molecules in order of **increasing** acidity (1 = weakest.....4 = strongest).



(7) Acid/Base Resonance Structures. Draw the correct Resonance Hybrid for the Resonance Structures drawn below:

