

Moorpark College Chemistry 11
Fall 2008

Instructor: Professor Torres

Examination #3: Section Three
October 27, 2008

Name: _____ (print)

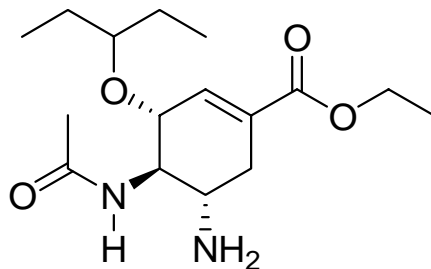
Name: _____ (sign)

*alkene < alkyne < amine < alcohol < ketone < aldehyde < amide < acyl halide < ester
< carboxylic acid*

Directions: Make sure your examination contains EIGHT total pages (including this cover sheet) when instructed to do so. Answer all the questions in the spaces provided.

Question	Points
1. (52 pts.)	
2. (14 pts.)	
3. (18 pts.)	
4. (16 pts.)	
TOTAL (100 points)	

1. (52 pts. total) *Oseltamivir* (sold under the trade name *Tamiflu*[®]) is a prescription antiviral drug that is used in the treatment of both *Influenzavirus A* and *Influenzavirus B*.



Answer the questions below relating to this drug.

- A. (5 pts.) Label ALL the functional groups present in *Oseltamivir* in the structure above. If any alcohols or amines are present, determine if they are primary, secondary, or tertiary.
- B. (2 pts.) Add, subtract, or otherwise change NO MORE THAN 3 ATOMS in *Oseltamivir* to create a new molecule that contains one more ketone than *Oseltamivir* has. (You may remove other functional groups if necessary).

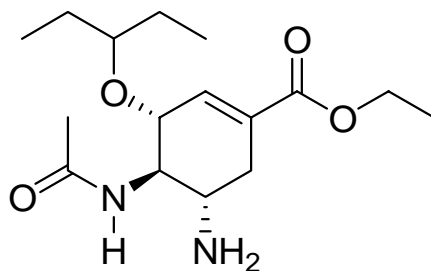
- C. (2 pts.) Circle one answer in each row so that your entire answer best describes the O=C-N geometry and bond angle in *Oseltamivir*:

Linear		Trigonal Planar		Tetrahedral
60°	90°	109.5°	120°	180°

- D. (4 pts.) The molecular formula of *Oseltamivir* is _____.
- E. (4 pts.) Place a check mark in the box next to all the words that describe *Oseltamivir*:

- Chiral
- Achiral
- Optically active
- Optically inactive
- Racemic

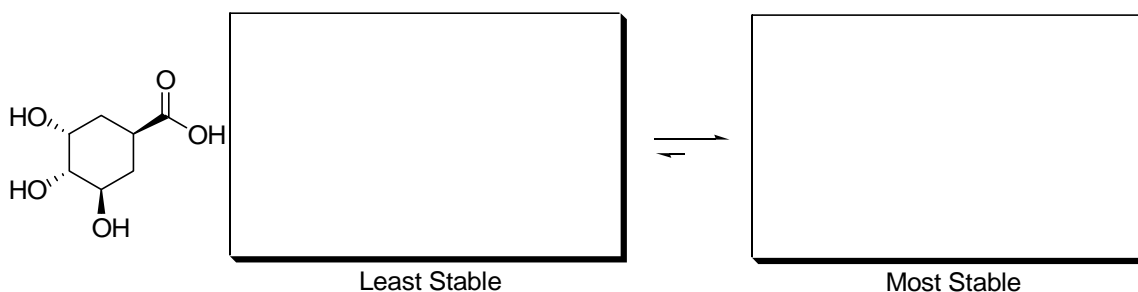
- F. (6 pts.) On the structure below, clearly label all the stereocenters (if any) present in *Oseltamivir* as either *R* or *S*.

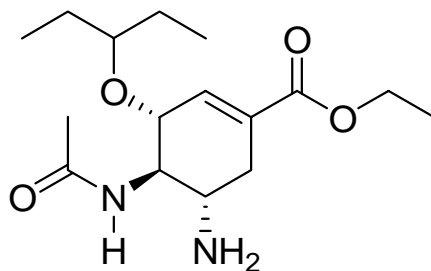


- G. (4 pts.) Draw an enantiomer of *Oseltamivir*. If this is NOT possible, write “not possible”, then explain why using no more than 20 words.

- H. (4 pts.) Draw a diastereomer of *Oseltamivir*. If this is NOT possible, write “not possible”, then explain why using no more than 20 words.

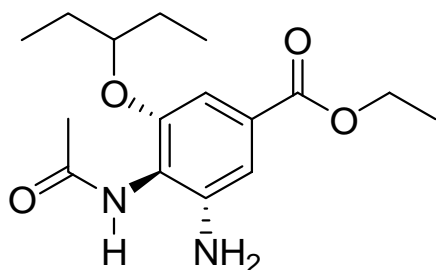
- I. (8 pts.) *Oseltamivir* is synthesized starting from shikimic acid, which can be partially hydrogenated to form the compound shown below. Draw the most stable and least stable conformations of the molecule shown:





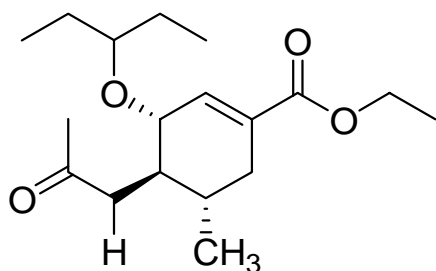
- J. (4 pts.) Recall our discussion of intermolecular forces in section 2. List and briefly describe ALL the intermolecular forces that would need to be overcome in order for *Oseltamivir* (shown above) to boil.

- K. (8 pts. total; 4 pts. each) For each of the following molecules, circle whether you would expect it to have a HIGHER or LOWER boiling point than *Oseltamivir*. Briefly explain your answer.



would have a (CIRCLE ONE) higher lower
boiling point than *Oseltamivir*.

EXPLANATION:



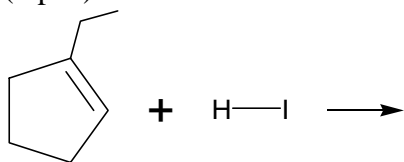
would have a (CIRCLE ONE) higher lower
boiling point than *Oseltamivir*.

EXPLANATION:

- L. (1 pt.) What is the maximum number of stereoisomers possible for *Oseltamivir*?

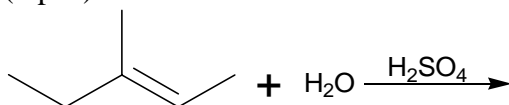
2. (14 pts. total) **REACTIONS AND MECHANISMS!** Predict the MAJOR product for the reactions listed below, and give the appropriate curved arrow notation where requested. Write NR if no reaction occurs.

A. (4 pts.)



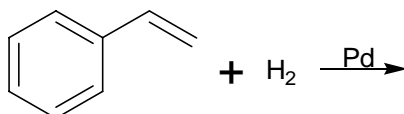
mechanism:

B. (4 pts.)

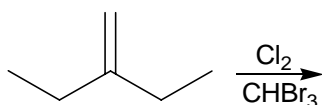


mechanism:

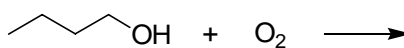
C. (2 pts.)



D. (2 pts.)



E. (2 pts.)



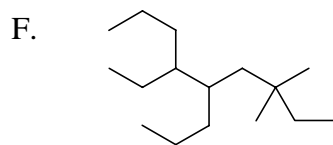
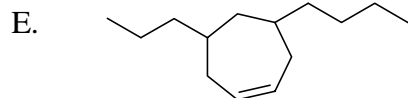
3. (18 pts. total; 3 pts. each) **NOMENCLATURE!** Use the appropriate IUPAC notation to name/draw each of the organic structures below:

A. *cis*-4-hepten-3-ol

B. *o*-dichlorobenzene

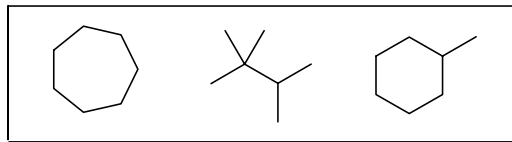
C. 4,6-diethyl-2,7-dimethyl-5-propylnonane

D. 4,4-dimethyl-2-pentyne

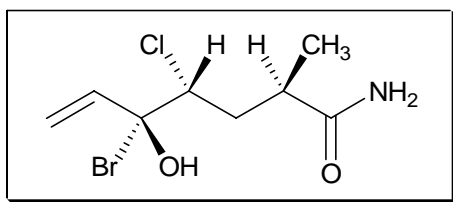


4. (16 pts. total) **SHORT ANSWERS!** Respond to each of the questions below.

A. (4 pts.) Arrange the following compounds in order of expected increasing boiling points, and briefly explain your ordering.



B. (6 pts.) Draw a Fischer projection on the right to correspond to the given structure on the left.



C. (6 pts.) Consider each of the drugs listed below. Describe whether each is sold as a single enantiomer or a racemic mixture. How does consumption of each drug affect the human body?

1) Thalidomide

2) Ibuprofen

3) Captopril