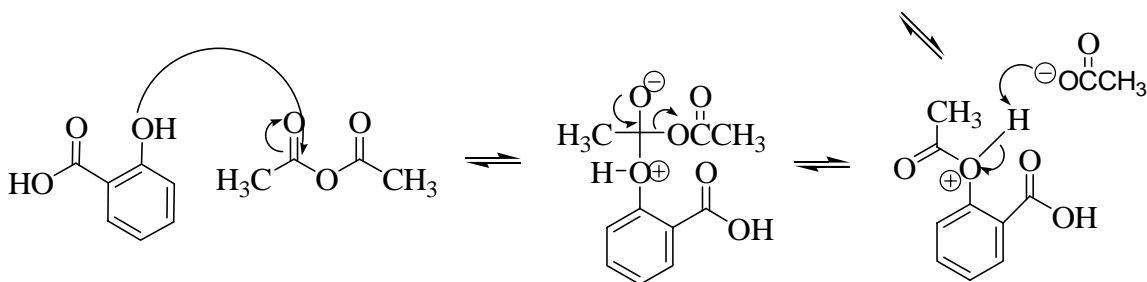
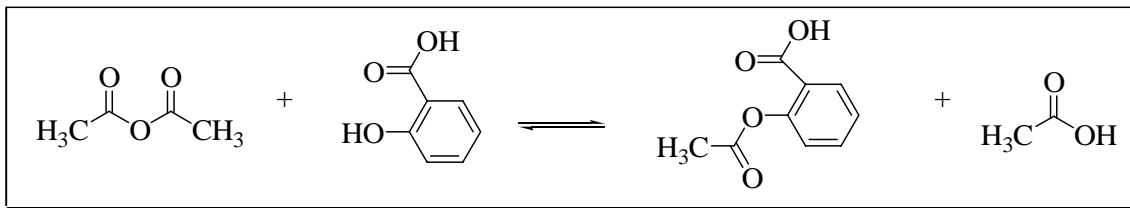


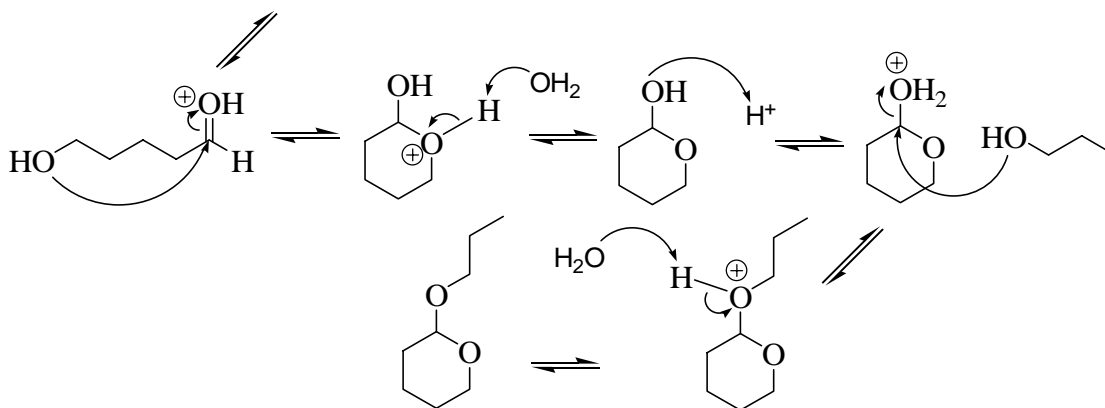
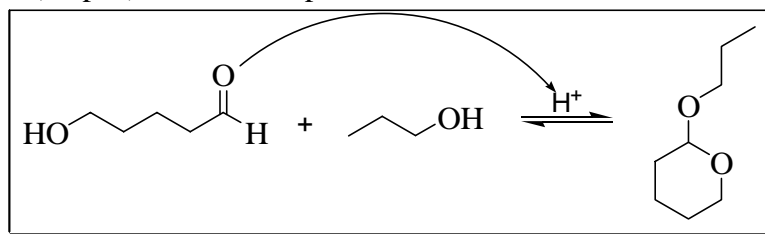
Chemistry 11 Fall 2008
Examination #4 ANSWER KEY

1. (32 pts. total) **MECHANISMS!** Provide the appropriate curved arrow notation for formation of the final products shown.

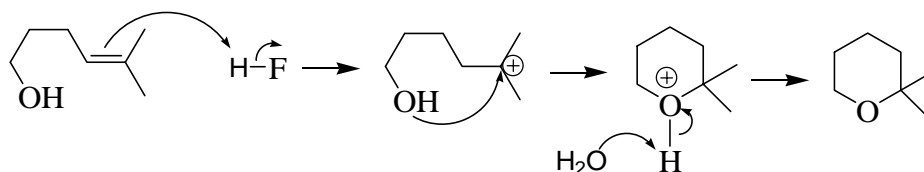
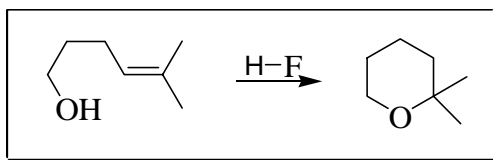
A. (6 pts.) Complete the proposed mechanism for the synthesis of aspirin:



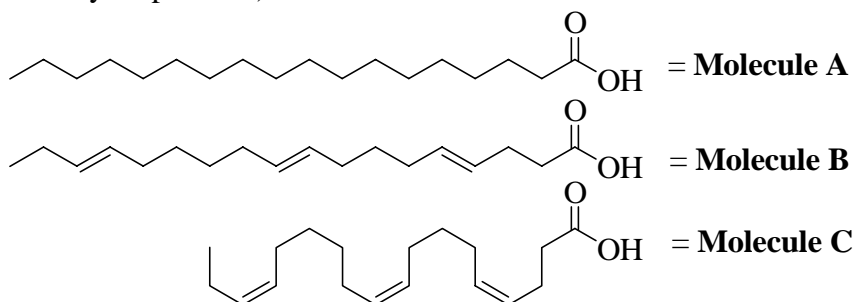
B. (18 pts.) Write the expected mechanism for the reaction below:



- C. (8 pts.) Use your knowledge of organic mechanisms to figure out the following:

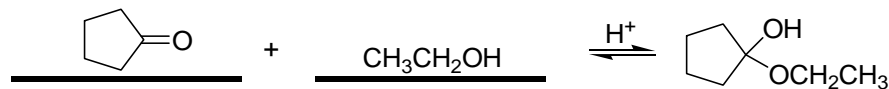
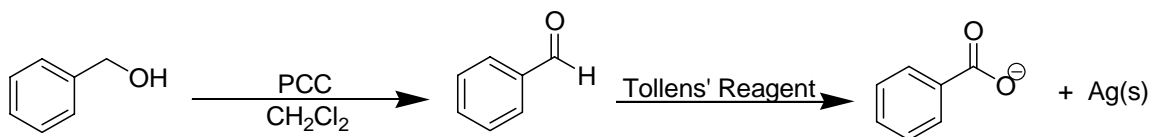
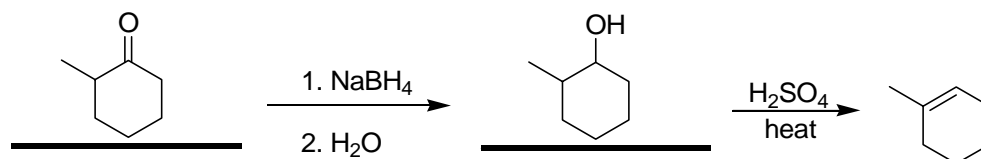
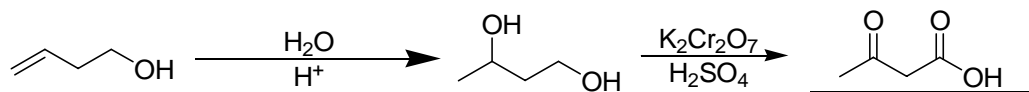
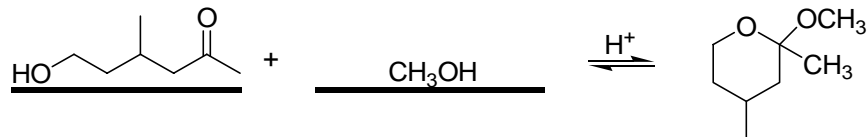


2. (16 pts. total; 2 pts. each) Consider the descriptions below and select from the three fatty acid molecules shown (may be used more than once; more than one answer may be possible):

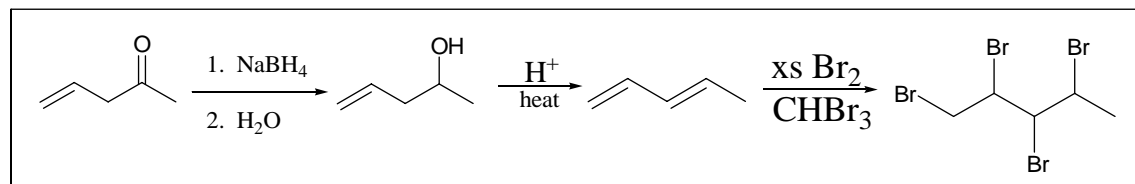
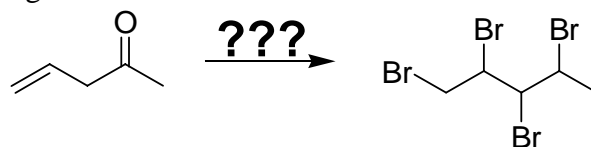


- A. expected highest melting point? **A**
- B. oil at room temperature? **B and C**
- C. fat at room temperature? **A**
- D. saturated? **A**
- E. unsaturated? **B and C**
- F. expected lowest melting point? **C**
- G. *trans* fat? **B**
- H. consumption increases the risk of cardiovascular disease? **A and B**

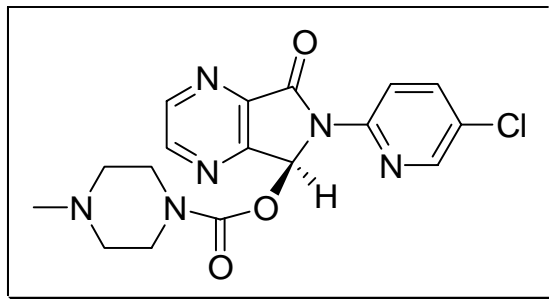
3. (20 pts. total; 2 pts. each) **SEQUENCES!** Complete each reaction sequence below by providing the reagents or structures as indicated by the “?”. *ONLY ANSWERS BY THE “?” WILL BE GRADED.*



4. (8 pts. total) **SYNTHESIS!** Design a synthetic sequence using the properly ordered and appropriate reagents on the cover page of this examination to account for the following chemical transformation:



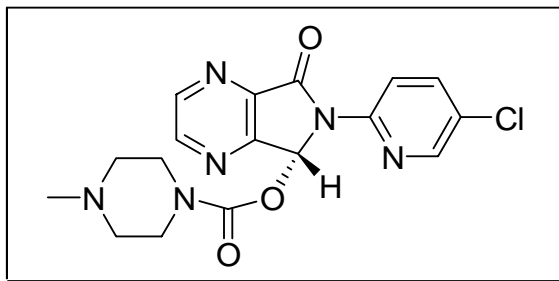
5. (24 pts. total) Consider *Lunesta*, a nonbenzodiazepine hypnotic agent (i.e. sleep-inducing drug) that is frequently advertised on T.V. commercials. Answer the questions below with respect to the given structure:



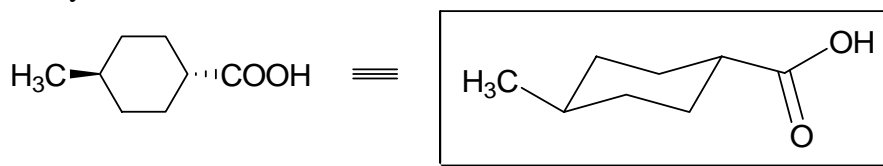
- A. (2 pts.) Write the molecular formula for *Lunesta*. $C_{17}H_{17}N_6O_3Cl$
- B. (2 pts.) Identify specific functional groups (select from a list below) that are present in *Lunesta*.
- Circle: **amide** **amine** benzene carbonyl ketone
- C. (1 pt.) How many of *Lunesta*'s rings are aromatic? Circle: 0 1 2 3 4
- D. (4 pts.) Fill in the blanks as shown: *Lunesta* has 1 stereocenter(s) and therefore $2^1 = 2$ possible stereoisomer(s). Of the possible stereocenter(s), 1 is *R*, and 1 is *S*.
- E. (2 pts.) What can we conclude about a diastereomer of *Lunesta*? Circle ALL that apply:
- The diastereomer has the same sleep-inducing effects as *Lunesta*.
 - The diastereomer does not have the same chemical formula as *Lunesta*.
 - The diastereomer has different physical properties than *Lunesta*.
 - Lunesta* does not have a diastereomer.**

- F. (2 pts.) Which of the following is true about an enantiomer of *Lunesta*? Circle ALL that apply:
- a) **The enantiomer rotates plane-polarized light in the opposite direction as *Lunesta*.**
 - b) **The enantiomer is a mirror image of *Lunesta*.**
 - c) The enantiomer has the opposite biological effects as *Lunesta*, i.e. it keeps you awake.
 - d) *Lunesta* does not have an enantiomer.

- G. (6 pts.) Draw an enantiomer of *Lunesta*. If this is NOT possible, write “not possible”, then explain why using no more than 20 words.



- H. (5 pts.) Examine a derivative of the six-membered ring found on *Lunesta*. Draw the most stable representation of this ring below, and briefly explain your identification:



***Trans* substituents reside along the equatorial position to avoid 1,3-diaxial interactions, resulting in a more stable conformation.**