

**Chemistry 118 C
Spring 2011
First Midterm
Friday, April 22nd 2011
Instructor: Lievens**

This exam contains seven (7) pages and eight (8) problems. Please make sure that your copy contains all seven pages. If there is a problem, please tell the exam administrator prior to beginning. Please answer all questions. Remember that UC Davis Code of Academic Conduct applies to this exam and all other graded work in this class.

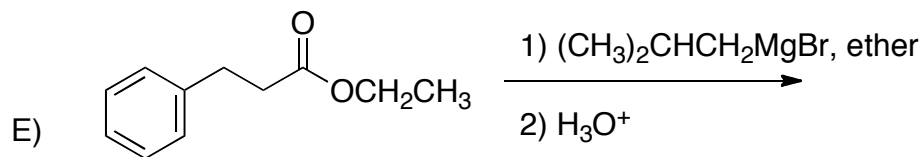
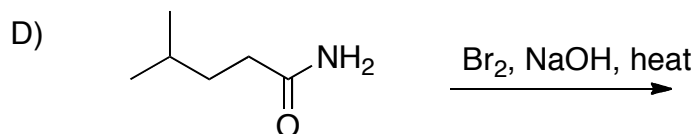
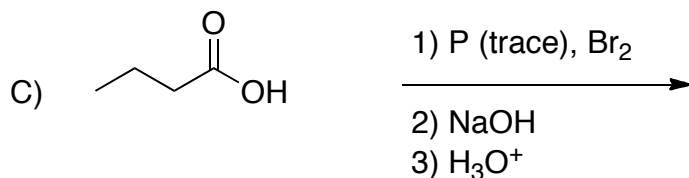
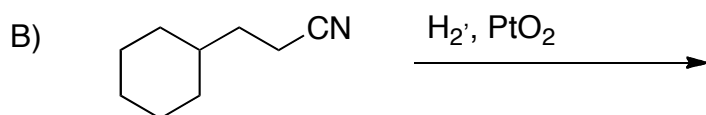
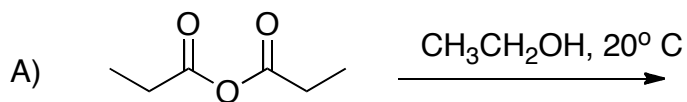
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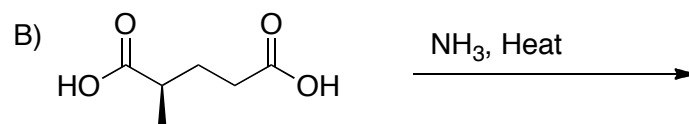
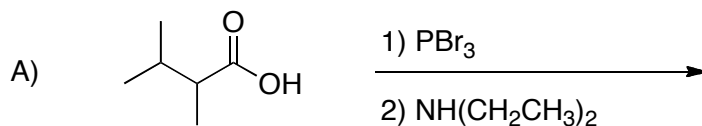
T.A./ Lab Section: _____

Problem #	Points
1	
2	
3	
4	
5	
6	
Total (118)	

1. **Reactions:** (24 pts). Draw the structure of the expected organic product(s) formed in the following reactions *including correct relative stereochemistry*, if the reaction is racemic indicate this by either drawing both enantiomers or drawing one and writing racemic. Assume all reagents listed are present in *excess* unless otherwise noted. If no reaction occurs, state 'No Reaction'.



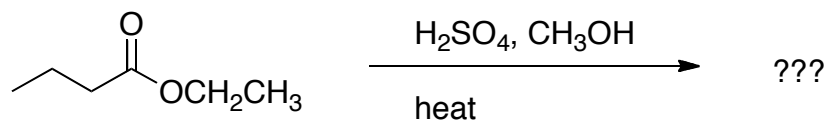
2. **Reactions:** (12 pts). Draw the structure of the expected organic product(s) formed in the following reactions *including correct relative stereochemistry*, if the reaction is racemic indicate this by either drawing both enantiomers or drawing one and writing racemic. Assume all reagents listed are present in *excess* unless otherwise noted. If no reaction occurs, state 'No Reaction'.



3. **Vocabulary:** (13 pts) Fill in the blanks with the appropriate vocabulary word. If multiple boldfaced words are given circle the correct word.

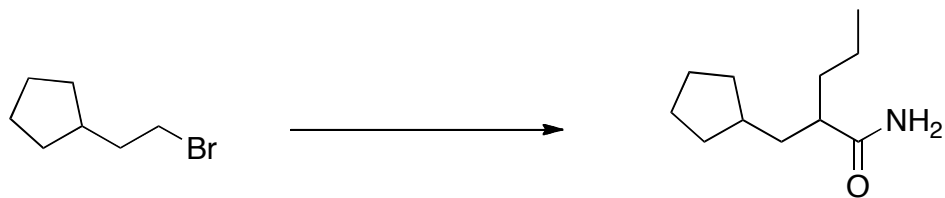
- A) An **amide** / **ester** / **acyl halide** is more reactive with nucleophiles due to **increased** / **decreased** resonance of the leaving group with the carbonyl.
- B) The pKa of a typical carboxylic acid is about _____, while a typical amine is about _____.
- C) Ketones are most easily distinguished from esters by comparing their ¹H NMR / ¹³C NMR / IR.
- D) Waxes, triglycerides and phospholipids are examples of what organic functional group? _____
- E) What functional group gets priority in naming **carboxylic acid** / **aldehyde** / **alkene**.
- F) Conversion of an ester to a carboxylic acid is called _____ and occurs by an _____ mechanism. It is best catalyzed with **acid** / **base** / **either** / **no catalyst**.
- G) The common name for HCOO⁻ is a _____ group.
- H) The molecular mass of a molecule with a single nitrogen is usually **even** / **odd**.
- I) **True** / **False** Mass spectrometry allows us to identify the presence of an acid by a molecule's fragmentation pattern.

4. **Mechanism:** (17 pts.). Show a detailed reaction mechanism for the following reaction. Include the structure of the expected products and appropriate stereochemistry for all steps. Assume all reagents are in excess.

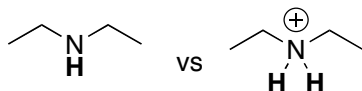
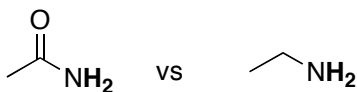
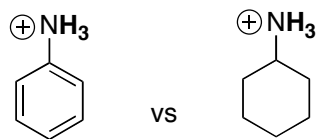
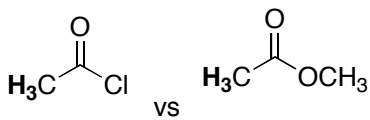
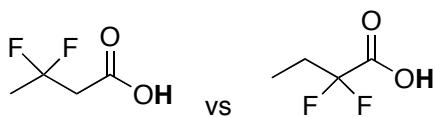


- A) The name of the mechanism used in this reaction is _____.
- B) This kind of reaction is generally called a _____ reaction.

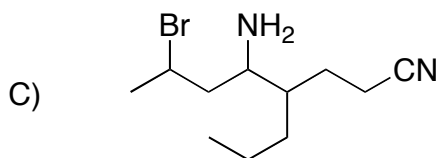
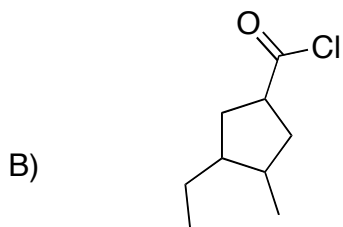
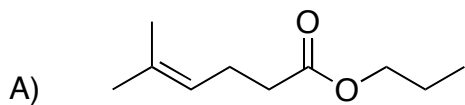
5. **Synthesis:** (16 pts) Show how you would carry out the following synthesis. Include the reagents you would need for each step and the structure of the intermediate products formed in each step. You may use any inorganic reagents you need and organic reagents of five or less carbons.



6. **Acids and Bases:** (8 pts). Circle the compound in each of the given pairs of molecules that is more acidic at the boldface H.



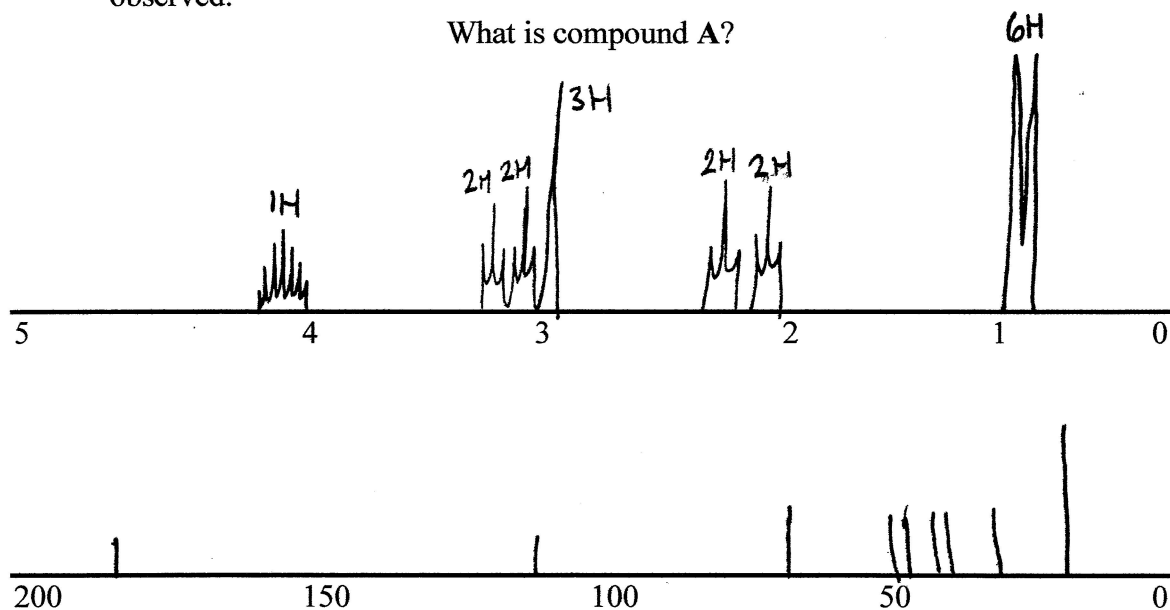
7. **Nomenclature:** (8 pts.) Provide the systematic names or structure of each of the following compounds include E/Z or R/S where relevant.



- D) N,N-diethyl-2-methyl-3-aminocycloheptanecarboxamide

8. **Spectroscopy:** (20 pts.) The unknown compound A ($C_{10}H_{18}N_2O_2$) gives the following proton and carbon NMR spectra. Significant IR peaks were also observed.

What is compound A?



IR: ν 2957, 2254, 1732, 1210 and fingerprint cm^{-1} .