

Chemistry 334

Final Examination

December 8, 1997

Professor Charonnat

Name: _____

Be certain that your examination has ten (10) pages including this one.

Put your name on **each** page of this examination booklet.

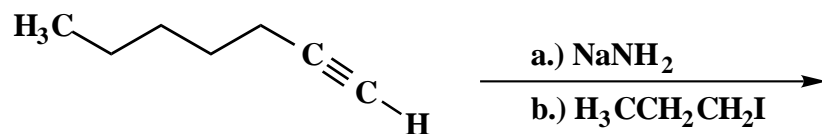
By putting your name on this examination booklet you agree to abide by California State University, Northridge policies of academic honesty and integrity.

Name: _____

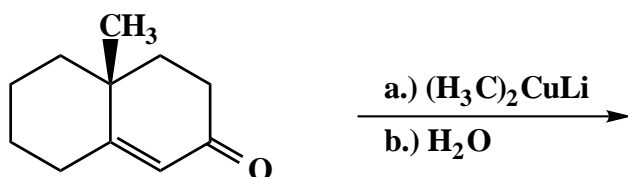
1. (25 points)

For each of the following five (5) questions draw the structure of the expected major organic product. If relevant, explicitly specify absolute and/or relative stereochemistry.

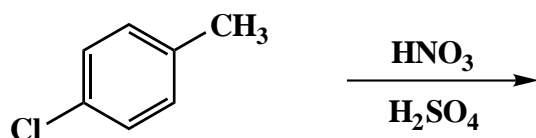
A.



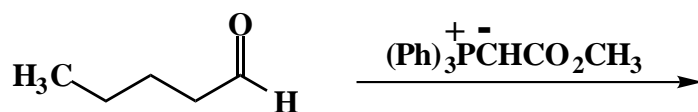
B.



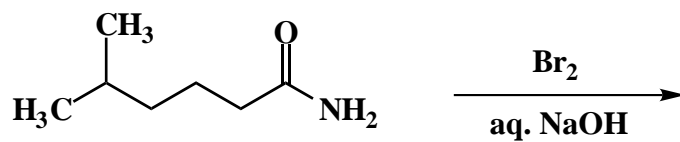
C.



D.



E.



Name: _____

2. (30 points)

Answer the following three (3) questions precisely, succinctly and with correct grammar.

A. What is meant by the term, "essential amino acid"? Draw a specific example of such an amino acid.

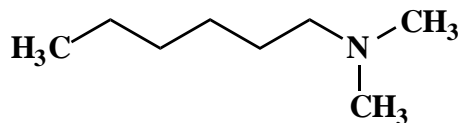
B. What is meant by the term, "saturated fatty acid"? Draw a specific example of such a fatty acid.

C. Describe the solubility characteristics of glycerophospholipids. Draw an annotated structure to illustrate your answer.

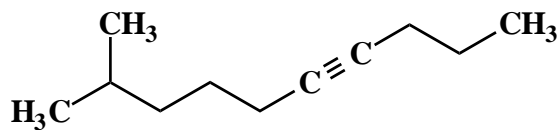
3. (20 points)

Use IUPAC nomenclature to write the systematic name for each of the following two (2) compounds.

A.



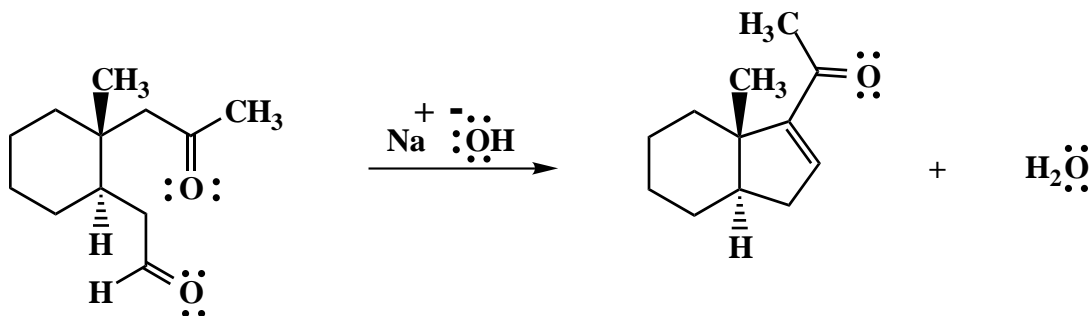
B.



Name: _____

4. (25 points)

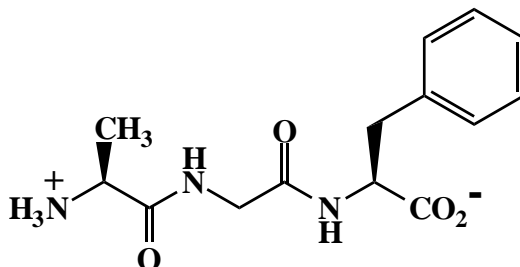
Draw the mechanism of the following reaction, using the curved-arrow notation to indicate the reorganization of electron density. Show all intermediates and denote all unshared electrons, formal charges and countercharges where appropriate. Clearly denote reversibility or irreversibility for each primary mechanistic step.



Name: _____

5. (25 points)

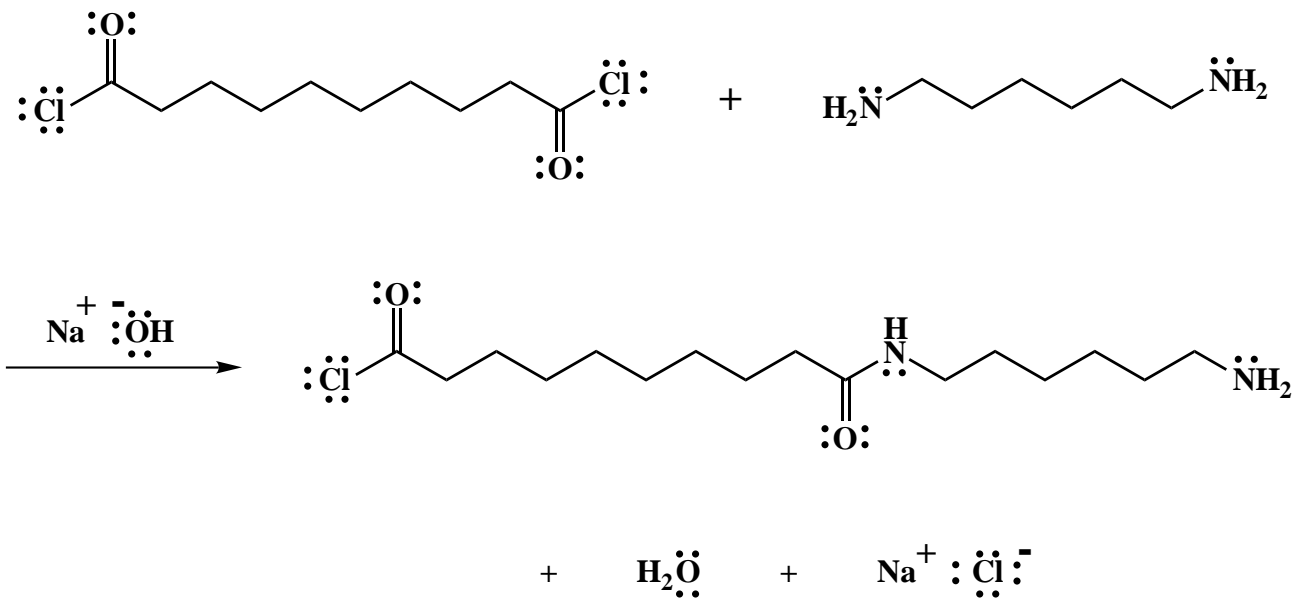
Design a synthesis of the following tripeptide from the corresponding BOC-protected α -amino acids. Use any inorganic and organic reagents that are necessary. Show all reagents and stable synthetic intermediate compounds. (**N.B.** Do not draw mechanisms for each synthetic transformation!)



Name: _____

6. (25 points)

You synthesized the polyamide, Nylon-6,10, in the Chemistry 334L laboratory this semester by the reaction of sebacoyl chloride with 1,6-hexanediamine and aqueous sodium hydroxide. Draw the mechanism of the first amide bond formation (shown below), using the curved-arrow notation to indicate the reorganization of electron density. Show all intermediates and denote all unshared electrons, formal charges and countercharges where appropriate. Clearly denote reversibility or irreversibility for each primary mechanistic step.

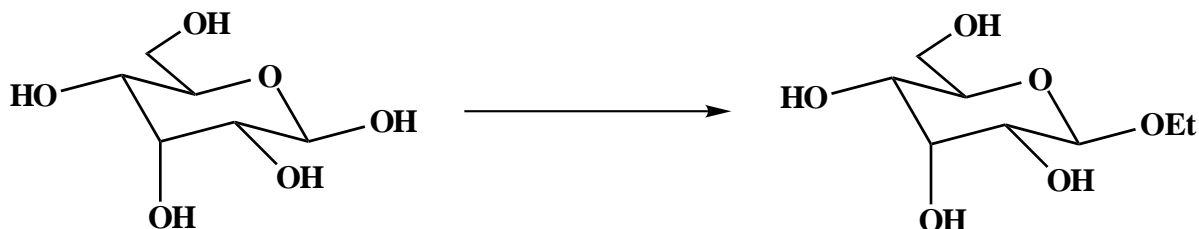


Name: _____

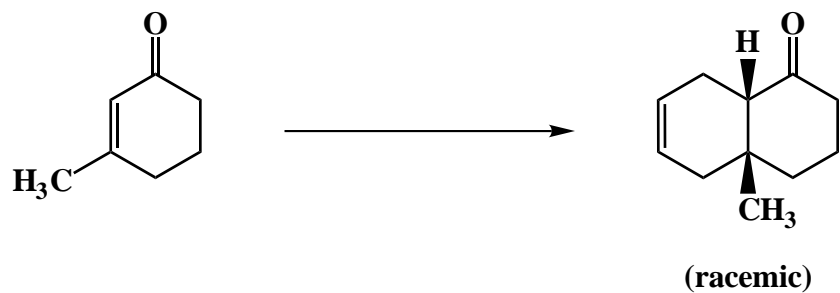
7. (25 points)

For each of the following five (5) questions draw the specific reagent(s) necessary to effect the transformation shown. If more than one reaction is involved in an answer, be certain to distinguish the individual steps clearly.

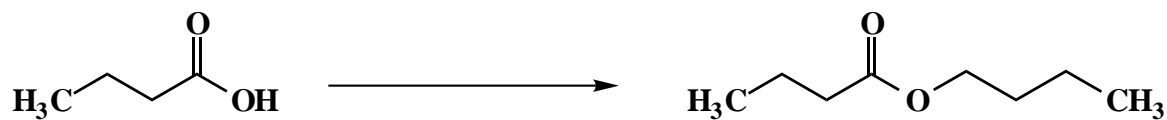
A.



B.



C.



D.



E.



Name: _____

8. (25 points)

The infrared, ^1H NMR and ^{13}C NMR (broadband ^1H decoupled) spectra of compound A ($\text{C}_4\text{H}_{11}\text{N}$) are shown below. Clearly assign all the resonances that you can identify with certainty and draw the structure of compound A. (Correlation tables are included separately.)

The infrared spectrum is unavailable due to copyright considerations.

Name: _____

8. (continued)

The ^1H NMR and ^{13}C NMR spectra are unavailable due to copyright considerations.

Name: _____

8. (continued)

Infrared absorption assignments:

wave number (cm ⁻¹)	functional group	type of vibration (stretch or bend)
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¹H NMR assignments:

chemical shift (ppm)	assignment	explanation of multiplicity
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¹³C NMR assignments:

chemical shift (ppm)	assignment	explanation of multiplicity
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structure of compound A:

Congratulations!

1	/25
2	/30
3	/20
4	/25
5	/25
6	/25
7	/25
8	/25
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Total:	/200