Name: _____ SID: _____

Signature: _____

PRINT YOUR NAME CLEARLY!!

Chem 3BL F08 **Final Exam** **02DEC08**
Neil O.L. Viernes

This exam has 10 pages; **make sure you have them all.**

Please place answers in designated spaces. **Please write clearly.** Messy or ambiguous answers will not be graded.

This exam is 60 minutes long. No clarifying questions will be answered by the GSI's after the exam begins.

Mark one of the following.

___ Completing I Grade

___ 101 WRAY, CURTIS

___ 102 YOTPHAN, SIRILATA

___ 103 DULATAS, LEA

___ 111 BAGULEY, TYLER

___ 112 LIPKE, MARK

___ 113 SCHAWEL, ADAM

___ 201 BRANDT, LAURA

___ 202 WITUS, LEAH

___ 203 GREENWALD, STEPHEN

___ 204 MITCHELL, WILLIAM

___ 211 SMITH, ELIZABETH

___ 212 TWITE, AMY AFTON

___ 301 MCDONALD, THOMAS

___ 302 GRIBBLE, MICHAEL

___ 303 THOI, VAN SARA

___ 311 MAHER, CYRUS

___ 312 COYLE, MICHAEL

___ 401 COHEN, ALLISON

___ 402 COHEN, JESSICA

___ 403 GRAY, DANIEL

___ 411 ANTONUK, CATHERINE

___ 412 WANG, YIMING

___ 501 MARTIN, RHIA M.

___ 502 PURDHAM, MICHAEL

___ 503 RANDAZZO, JOHN

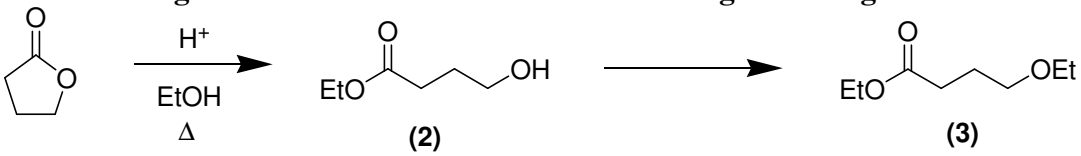
___ 511 OBERMEYER, ALLIE

___ 512 PACILLI, MASSIMO

Do not write in this box
1) _____ (6)
2) _____ (10)
3) _____ (8)
4) _____ (6)
5) _____ (8)
Total: _____ (38)

1) (6 pts)

The following reaction was conducted in lab. Prolonged heating converted the initial product (2) to (3).



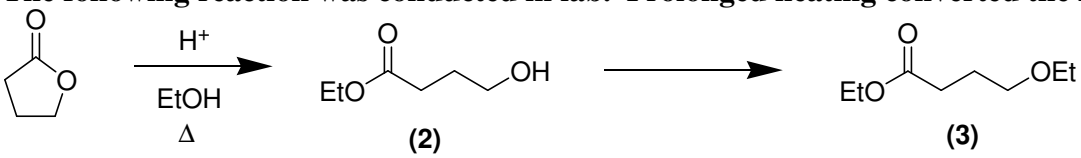
If 0.50 g of the starting material was used and was completely converted to product 2. How many grams of 2 should be recovered.

The % yield of the overall transformation to compound 3 is 83%. How many mmols of 3 is recovered?

What is the molecular weight of compound 3

2) (10 pts)

The following reaction was conducted in lab. Prolonged heating converted the initial product (2) to (3).



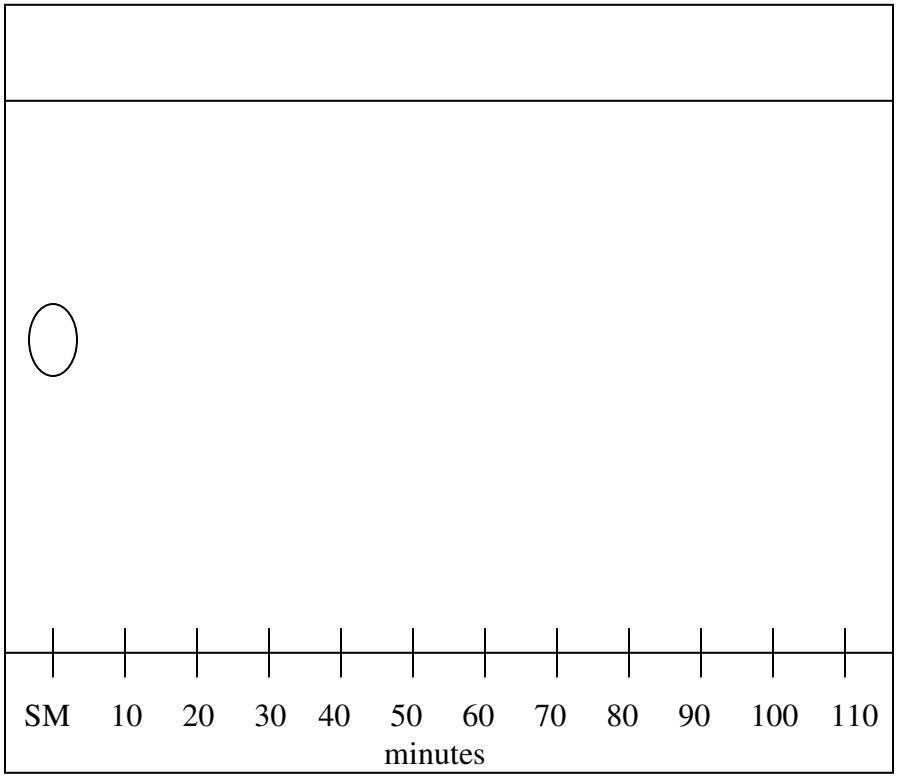
The reaction was monitored by TLC (SiO_2 solid phase).
What would the R_f of the product 2 be relative to the starting material?

What would the R_f of the product 3 be relative to product 2?

Complete the following TLC plate for the reaction with the following additional information:

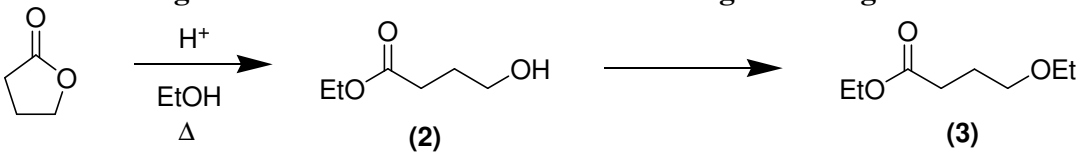
1) **The starting material is not observed after 45 minutes**
2) **The product 2 is observed after 5 minutes**
3) **The product 3 is observed after 35 minutes**
4) **The product 2 is not observed after 85 minutes**

The starting material is identified on the TLC plate as SM.



3) (8 pts)

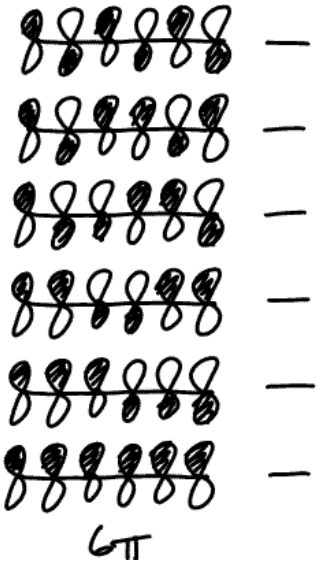
The following reaction was conducted in lab. Prolonged heating converted the initial product (2) to (3).

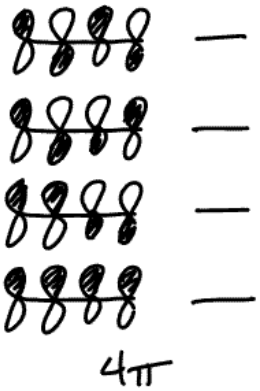


^{1}H NMR spectra for both of the compounds (2) and (3). Determine how you would differentiate between the proton spectra for compounds (2) and (3).

Draw the splitting tree for a doublet-quartet with a coupling constant of 6 and 2 respectively. Also provide the expected ratios for each peak.

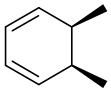
4) (6 pts)





Draw the molecular orbitals involved in the *heat-driven* ring closing of the compound below. Determine the direction of ring closing (con- or disrotary). Some key molecular orbitals are provided above.

Draw the molecular orbitals involved in the *heat-driven* ring opening of the compound below. Determine the direction of ring opening (con- or disrotary). Some key molecular orbitals are provided above.

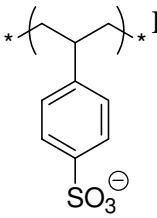


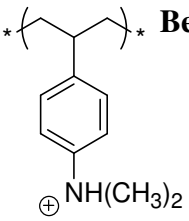
5) (8 pts)

Identify the best technique to purify the product boxed from each mixture.

A = SiO_2 Column Chromatography

B = C_8 Column Chromatography

C = Ion Exchange Chromatography with  **Beads**

D = Ion Exchange Chromatography with  **Beads**

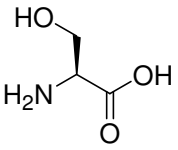
E = Size Exclusion Chromatography

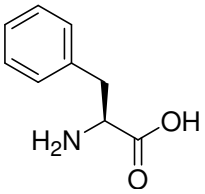
F = Affinity Chromatography

Polyacrylamide
Mw = 3500

Polyacrylamide
Mw = 100,000

_____





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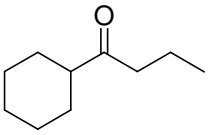
Provide the structure of the fragments detected by mass spectrometry for the following ketone.



α-cleavage

McLafferty Rearrangement