

NAME: _____

Email: _____

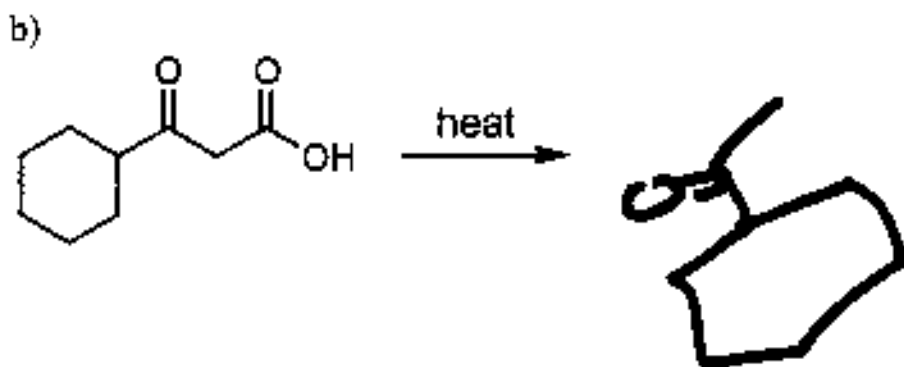
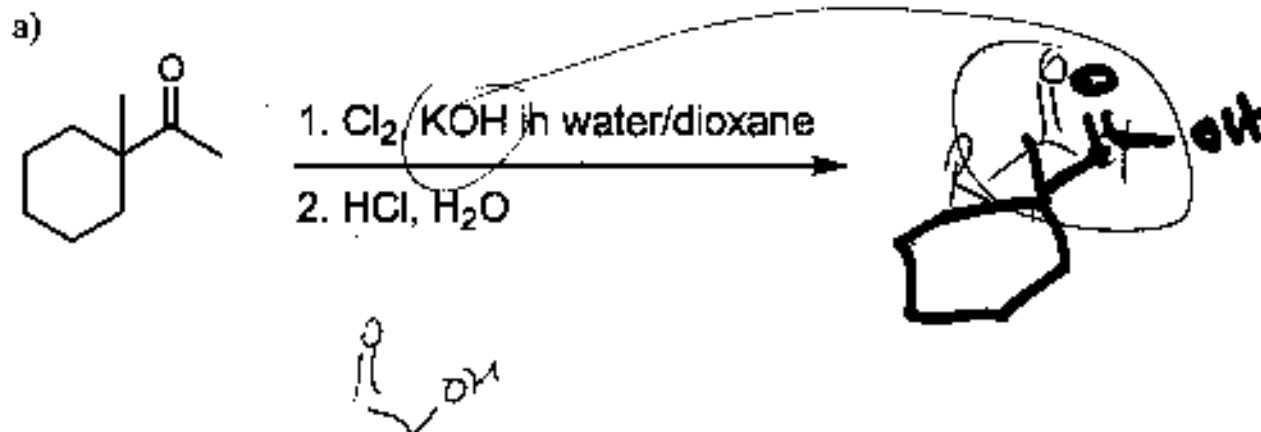
**The exam must be written in ink. No calculators of any sort allowed.
You have 2 hours to complete the exam.**

CHEM 610B
Exam 3
Spring 2002
Instructor: Dr. Brian Pagenkopf

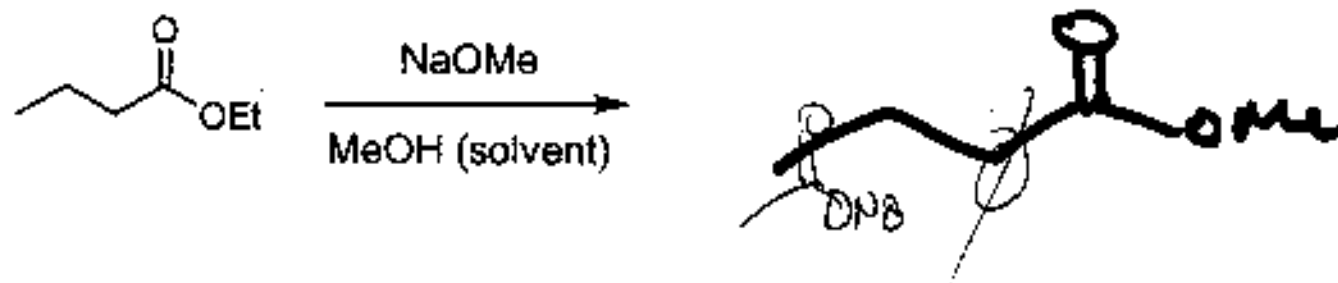
	Page	Points
	2	6
	3	7
	4	9
	5	8
	6	24
periodic table	7	0
	8	3
	9	16
	10	4
	11	9
	12	4
	13	4
	14	6
		100

NAME: _____

(7 points). Miscellaneous. Show the products expected to be isolated from each of the following reactions.

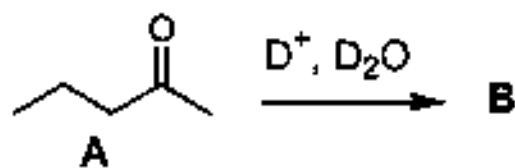


c) At temperatures lower than required for a Claisen reaction, one product would be expected to form under the following reaction conditions. (It's NOT the Claisen product).



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(7 points). NMR.



a) Assume complete deuterium exchange and draw the structure of B.



b) How many signals would you expect to see in the 1H NMR for A?

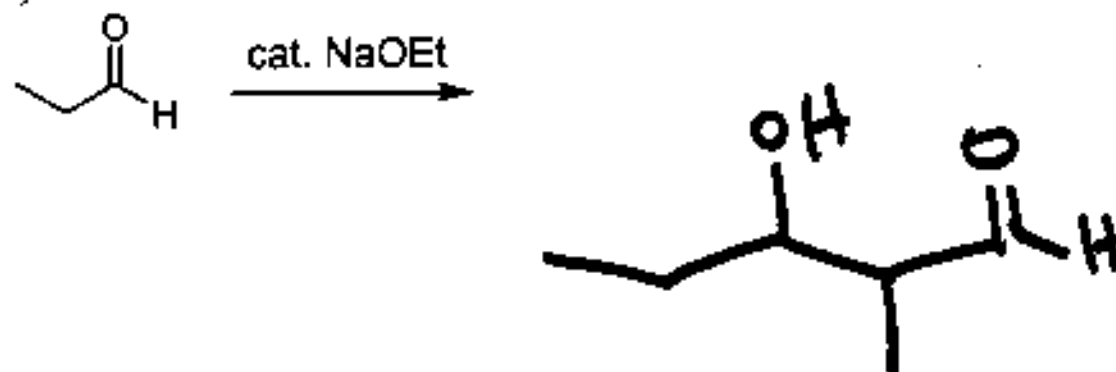
4

c) After complete deuterium exchange, how many signals would you expect to see in the 1H NMR of B?

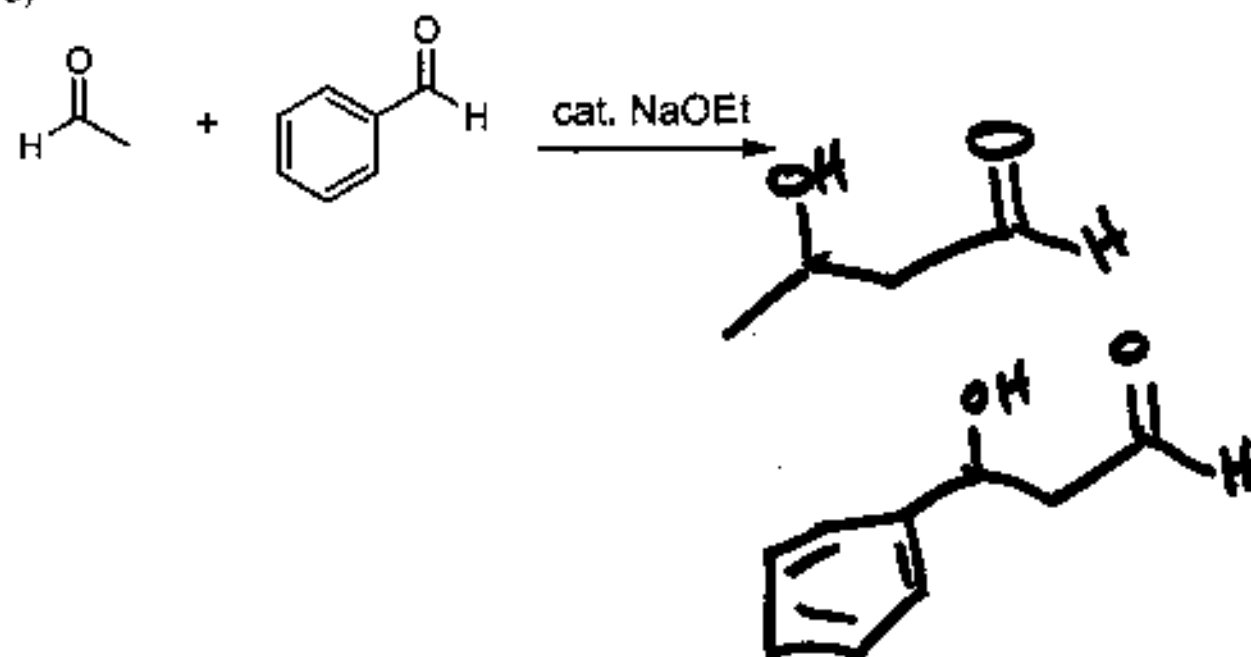
2

(9 points). Aldol Reactions. Show the products from the following aldol condensations. For each question where more than one product is possible, show all possible aldol condensation products even if expected to be minor. In each question show the β -hydroxy aldehyde(s) or β -hydroxy ketone(s). Do not eliminate or dehydrate to the α,β -unsaturated product. Do not show stereochemistry.

a)



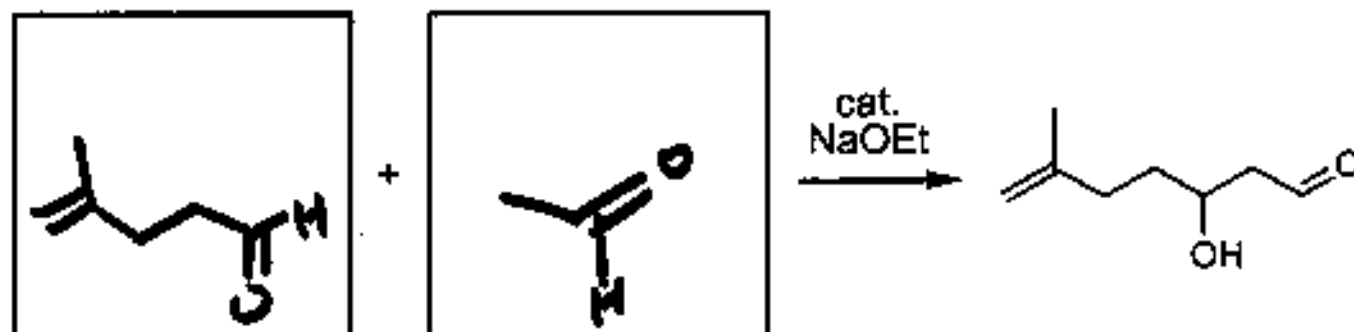
b)



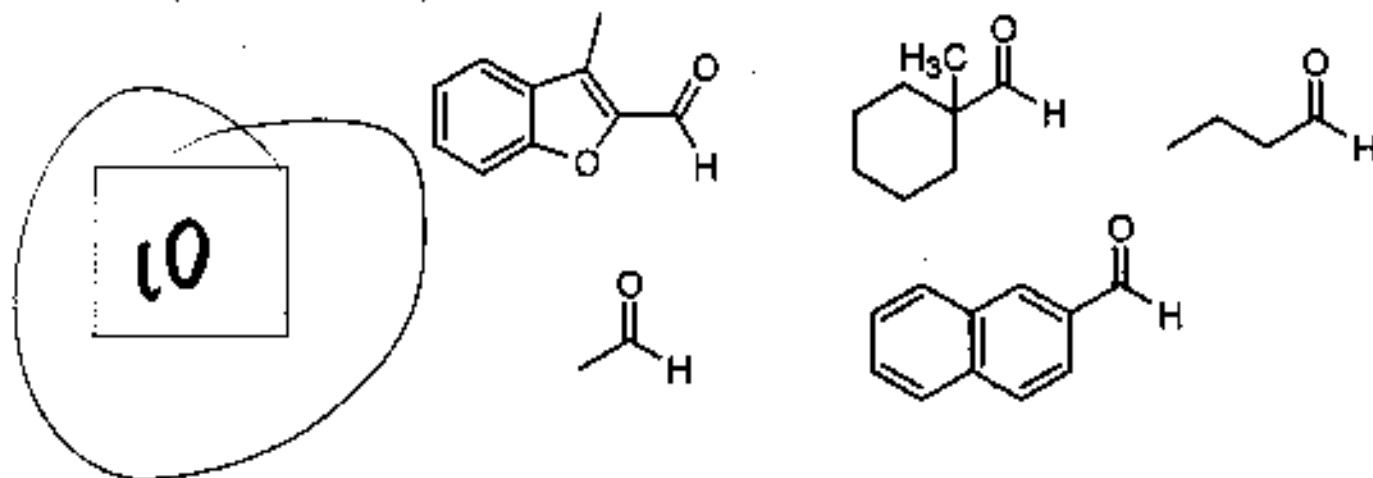
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(6 points) Aldol Reactions. The following molecule was one of several different structures isolated from an aldol condensation reaction. What were the starting materials?

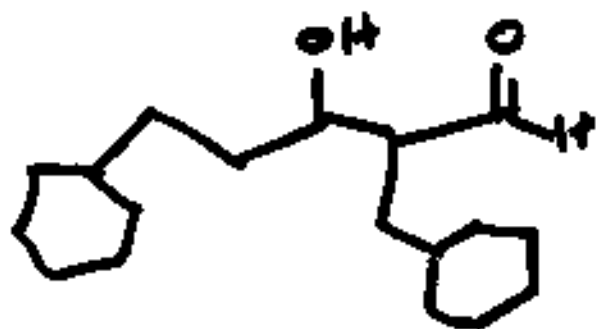
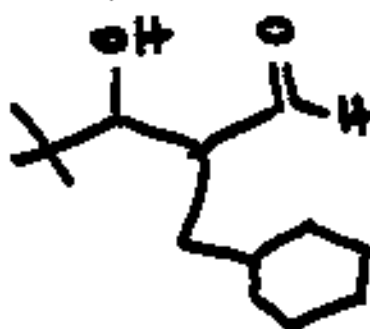
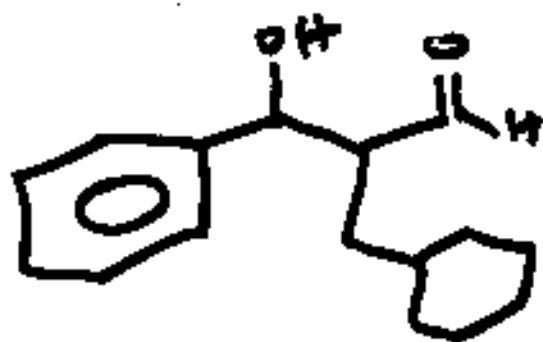
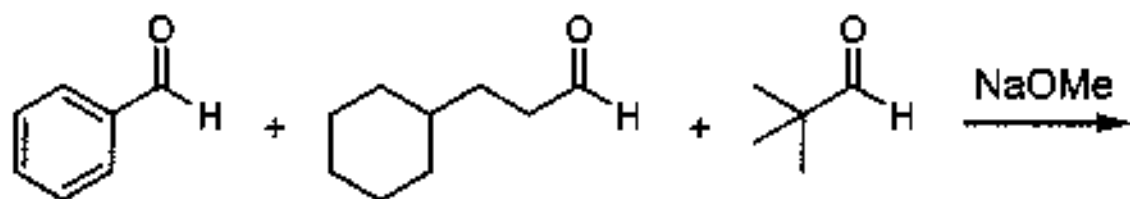


(2 points). How many different aldol condensation products (as β-hydroxy aldehydes) are possible from the following mix of aldehydes, even if expected to be a minor product? Put your answer (a whole number) in the box.



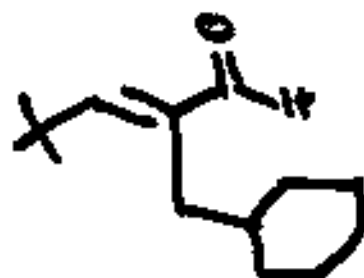
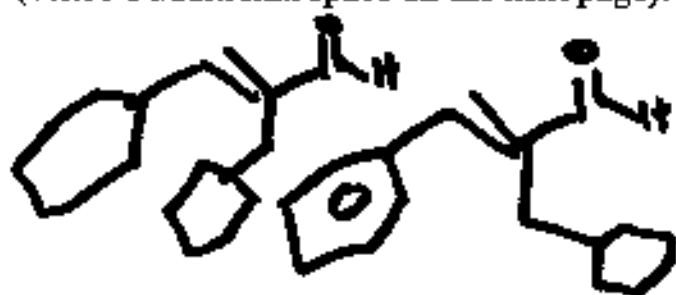
NAME: _____

(24 points). Aldol reactions. Show all the possible aldol products (as β -hydroxy carbonyl compounds) from the following reaction mixture:



directly
from in class
quiz

Dehydrate the above products and show the corresponding α,β -unsaturated compounds.
(There's additional space on the next page).



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No question this page.

PERIODIC TABLE OF THE ELEMENTS

Atomic masses are based on ^{12}C . Atomic masses in parentheses are for the most stable isotope.

Groups																		VIA
1A	2A											3A	4A	5A	6A	7A	VIA	
1	2											13	14	15	16	17	18	
Periods	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	H 1.00794																	He 4.002602
2	Li 6.941	Be 9.012182											B 10.811	C 12.011	N 14.003074	O 15.9994	F 18.9984032	Ne 20.1797
3	Na 22.98976928	Mg 24.304688	Al 26.9815385	Si 28.0855836	P 30.973761998	S 32.06	Cl 35.453	Ar 39.948										Kr 83.80
4	K 39.0983	Ca 40.078	Sc 44.955912	Ti 47.88	V 50.9415	Cr 51.9961	Mn 54.938044	Fe 55.845	Co 58.933195	Ni 58.6934	Cu 63.546	Zn 65.38	Ga 69.723	Ge 72.630	As 74.9216	Se 78.96	Br 79.904	Kr 83.80
5	Rb 85.4678	Sr 87.62	Y 88.90584	Zr 91.224	Nb 92.90638	Mo 95.94	Tc (98)	Ru 101.07	Rh 101.072	Pd 106.42	Ag 107.8682	Cd 112.411	In 114.818	Sn 118.710	Sb 121.757	Te 127.60	I 126.90447	Xe 131.29
6	Cs 132.90545196	Ba 137.327	La 138.90471	Hf 178.49	Ta 180.94788	W 183.84	Re 186.207	Os 190.23	Ir 192.222	Pt 195.084	Au 196.966569	Hg 200.59	Tl 204.377	Pb 207.2	Bi 208.9804	Po (209)	At (210)	Rn (222)
7	Fr (223)	Ra (226)	Ac (227)	U (238)	Np (237)	Pu (244)	Am (243)	Cm (247)	Bk (247)	Cf (251)	Es (252)	Fm (257)	Md (258)	No (259)	Lr (260)			

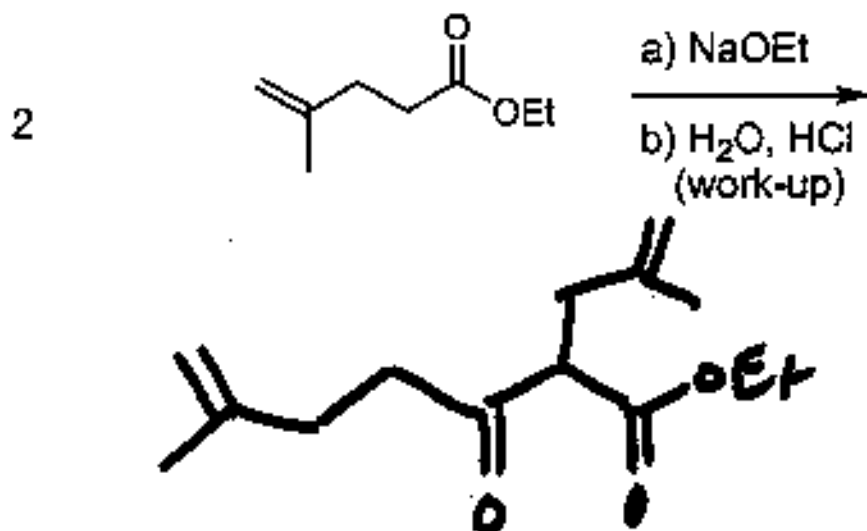
*Lanthanide series

58	59	60	61	62	63	64	65	66	67	68	69	70	71
Ce 140.12	Pr 140.90766	Nd 144.24	Pm (145)	Sm 150.4	Eu 151.96	Gd 157.25	Tb 158.92534	Dy 162.50	Ho 164.93032	Er 167.259	Tm 168.93047	Yb 173.054	Lu 174.967

*Actinide series

90	91	92	93	94	95	96	97	98	99	100	101	102	103
Th 232.0377	Pa 231.036888	U 238.02891	Np 237.048173	Pu (244)	Am (243)	Cm (247)	Bk (247)	Cf (251)	Es (252)	Fm (257)	Md (258)	No (259)	Lr (260)

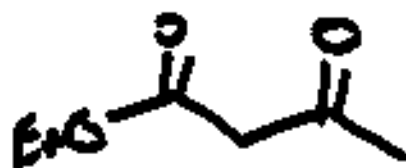
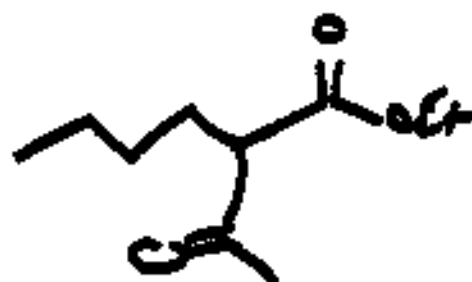
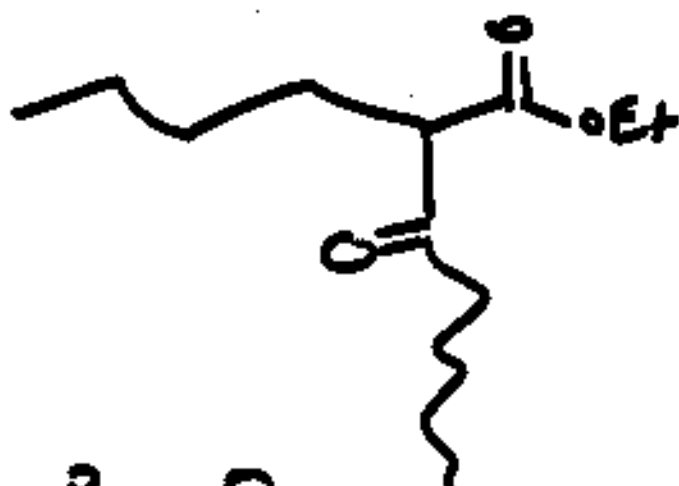
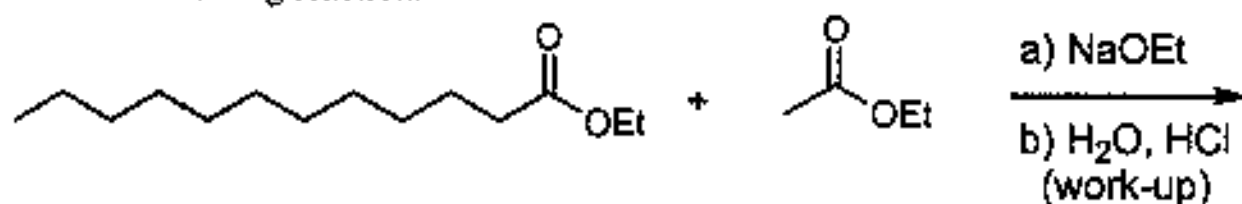
(3 points). Claisen and Dieckmann Reactions. Draw the major product(s) expected from the following reaction.



NAME: _____

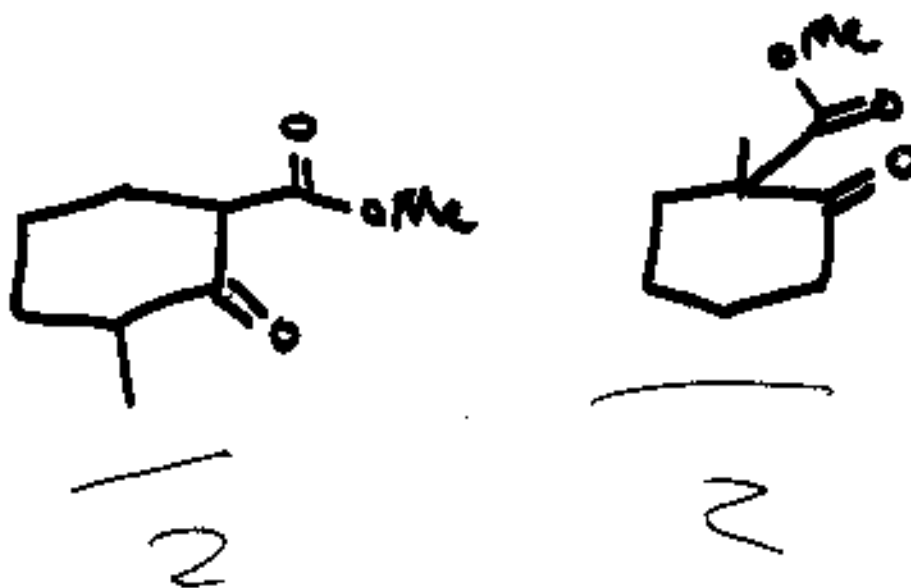
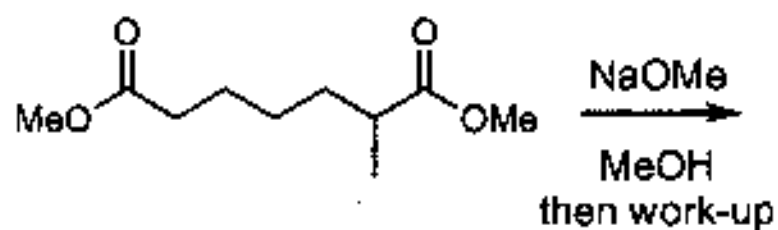
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(16 points). Claisen and Dieckmann Reactions. Draw the four major products(s) expected from the following reaction.



NAME: _____

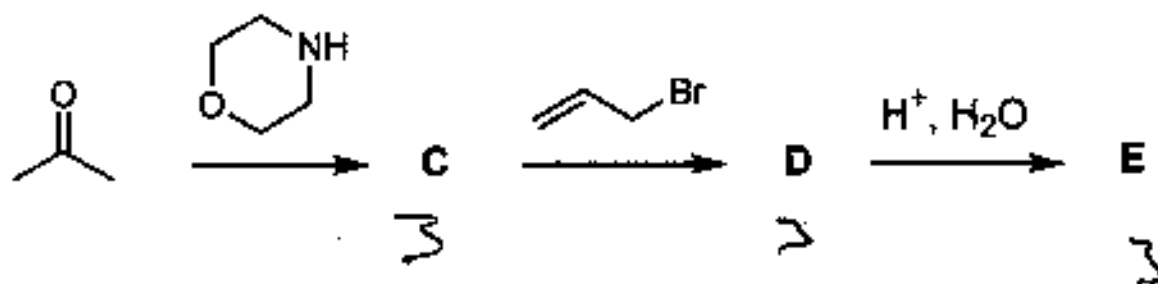
(4 points). Claisen and Diekmann Reactions. Draw both products expected from the following Diekmann reaction.



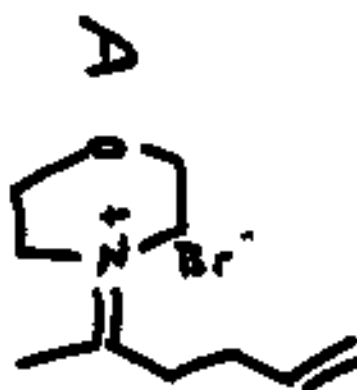
NAME: _____

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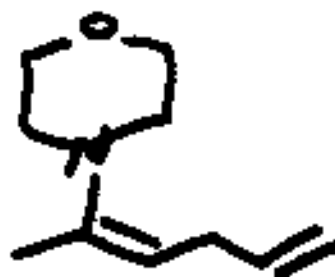
(9 points). The following Stork enamine synthesis was used to make compound **E**. Show the structure of **C**, the salt **D** and product **E**.



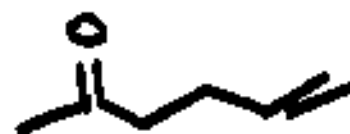
C



D



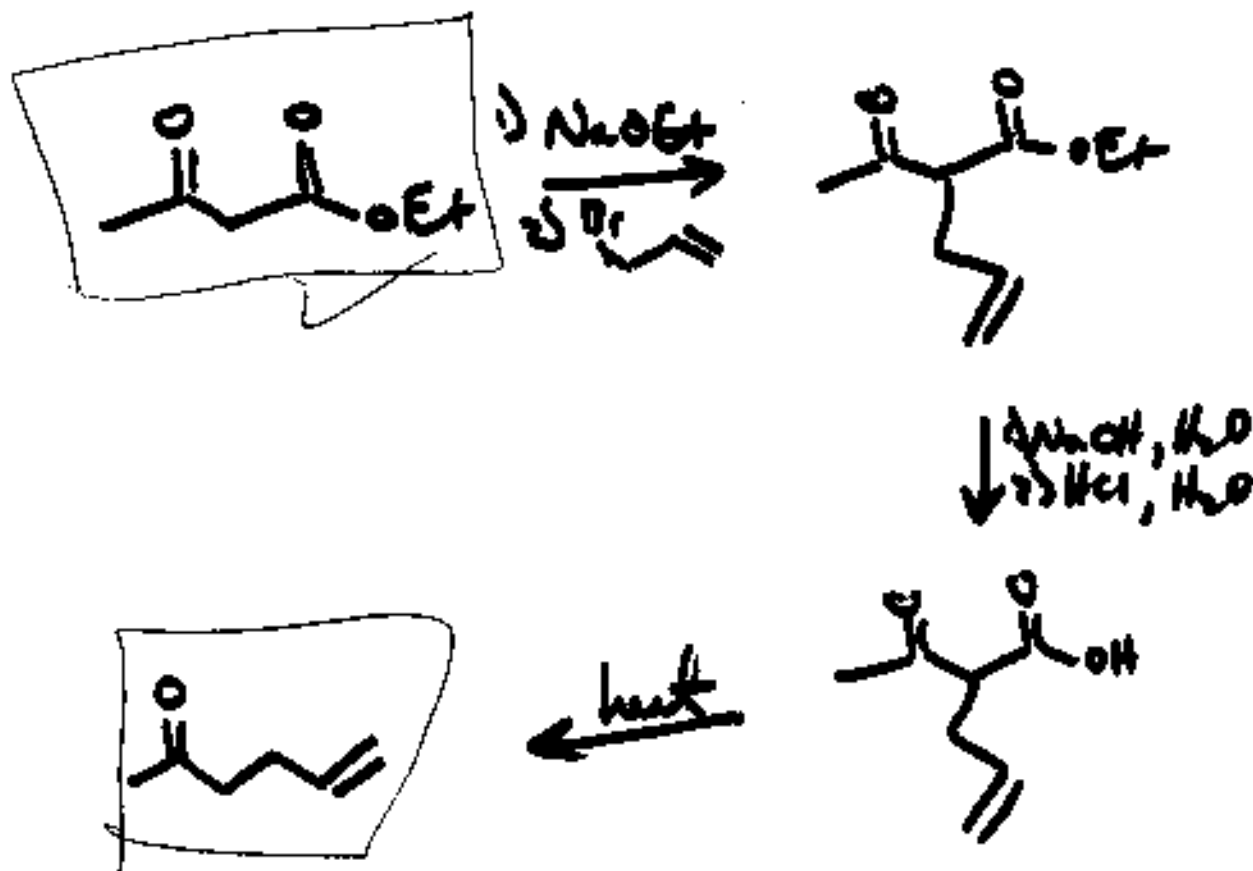
E



NAME: _____

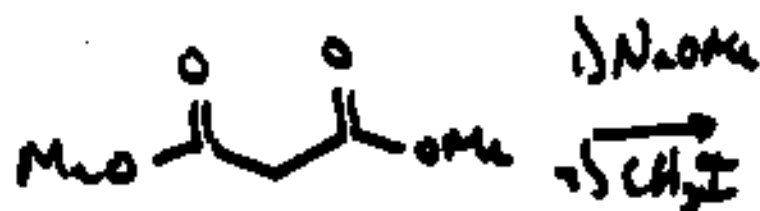
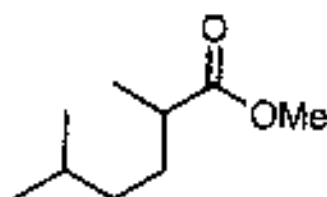
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(4 points). The product **E** on the preceding page can also be prepared by the acetoacetic ester synthesis. Show all the reagents and steps necessary for its synthesis.



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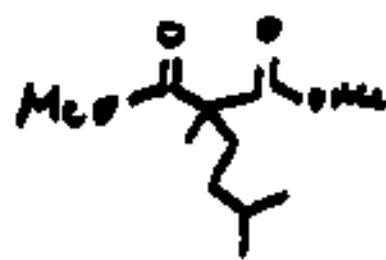
(4 points). Show how to synthesize the following compounds using either the malonic ester synthesis or the acetoacetic ester synthesis by providing the necessary reagents and conditions. Show all required steps.



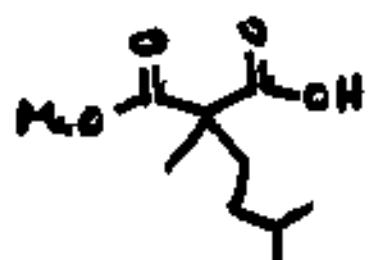
1) NaOMe
2) CH2I2



1) NaOMe
2) CH2I2



1) NaOH
2) HCl



heat



↓
product

(6 points). Synthesis. Propose a synthesis of the following compound using any reagents you like with the only restriction that they can only add four carbons or less to the target molecule.

