

1								
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1	0	0	0	0	0	0	0	0
	1	1	1	1	1	1	1	1
	2	2	2	2	2	2	2	2
	3	3	3	3	3	3	3	3
	4	4	4	4	4	4	4	4
	5	5	5	5	5	5	5	5
	6	6	6	6	6	6	6	6
	7	7	7	7	7	7	7	7
	8	8	8	8	8	8	8	8
	9	9	9	9	9	9	9	9

CEM 352 –Quiz 4	
Spring 2025	
NAME	Key

Score		

0	0	0
1	1	1
2	2	2
3	3	3
4	4	4
5	5	5
6	6	6
7	7	7
8	8	8
9	9	9

**READ THIS!**

*Bubble in your PID in the space above. Write your answer for each question in the space provided.*

**LEAVE THIS COVER SHEET ATTACHED TO THE Quiz!**

1. \_\_\_\_\_/14

2. \_\_\_\_\_/12

3. \_\_\_\_\_/10

4. \_\_\_\_\_/17

**TOTAL: \_\_\_\_\_ / 50**



1) Poll: The selection receiving the most votes will apply to the entire class. (1 pt Extra Credit)

Winner

Do you want to use a helper sheet during the Final Exam? Check one box: Yes ☒ No ☐

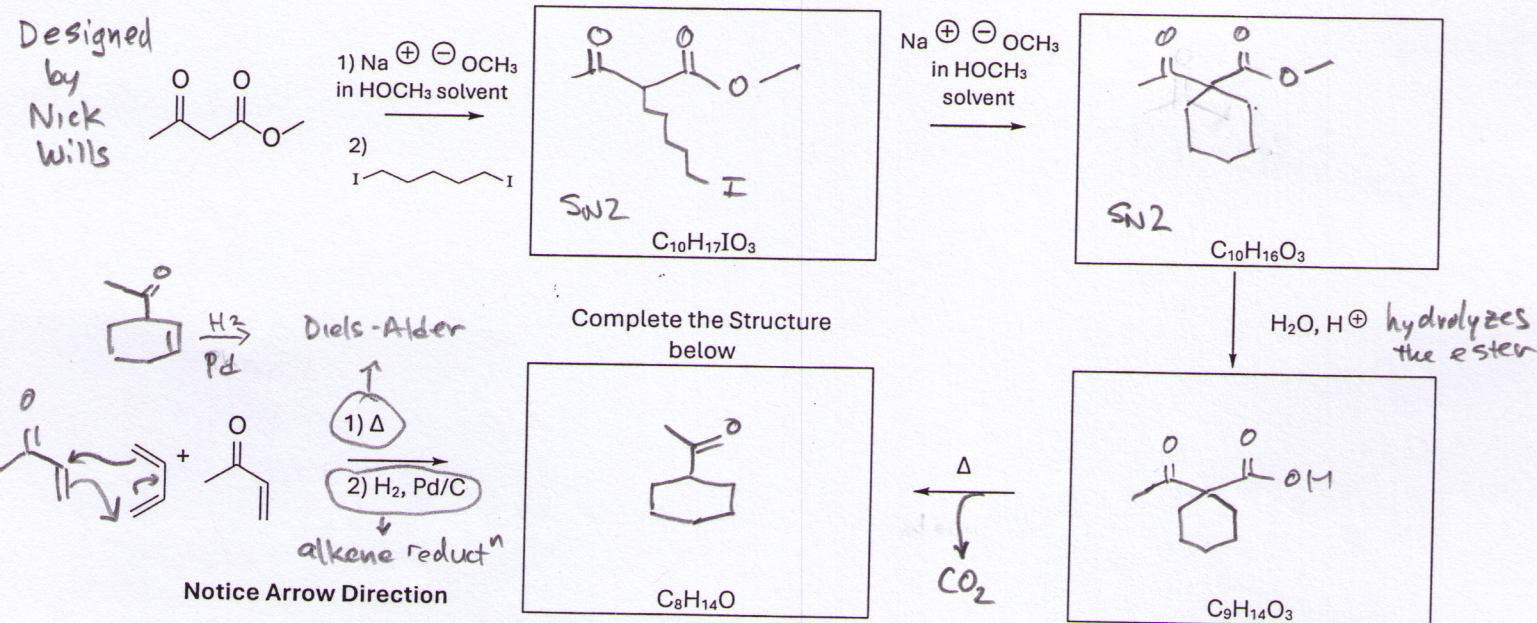
If the YES, performance metrics that could potentially boost your overall grade will be voided.

For example, the following will be voided: if you score >190/200 (95%) on the final WITHOUT CHEATING, you will receive a 4.0 in the class regardless of performance on the other CEM 352 material.

Also, for example, significant Quiz performance improvements (e.g.,  $\Delta 25$  pts between Quiz 1 or 2 and Quiz 4) will not be considered in calculating your grade.

However, the lowest quiz score will still be replaced by your final exam score divided by 4 if that calculated score is greater!

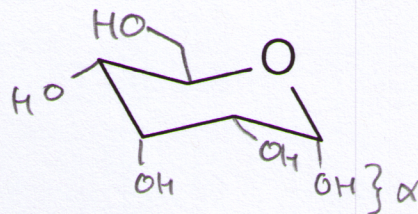
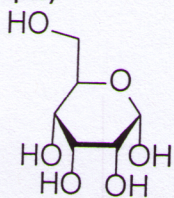
2) Show the reaction products or intermediates in the rectangles.  
(8 pts)



3) Consider the sugar named Allopyranose, and answer the following questions accordingly

a) Convert the Haworth configuration to a more conventional chair conformation (Use the scaffold provided)

(5 pts)

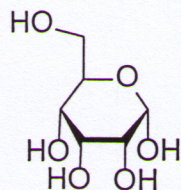


The bond angles of the axial and equatorial bonds must be at their correct, conventional angles!!!

4) Is this the Allopyranose (above) the  $\alpha$ - or  $\beta$ -anomer? ☒ (Write  $\alpha$  or  $\beta$  in the box) (1 pt)

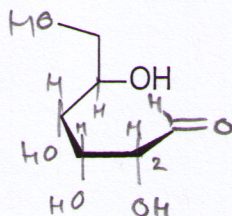


5) Draw the Fischer projection of this sugar. (6 pt)

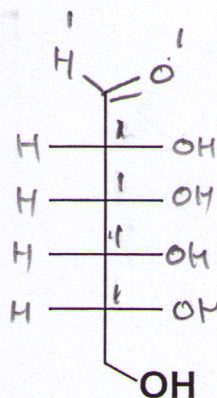


Haworth

Hint: draw the retroaldol intermediate here.  
This will help immensely. Complete the intermediate below. **2 Extra Credit Points.**

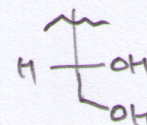
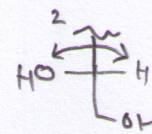
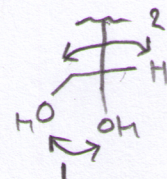


2pts

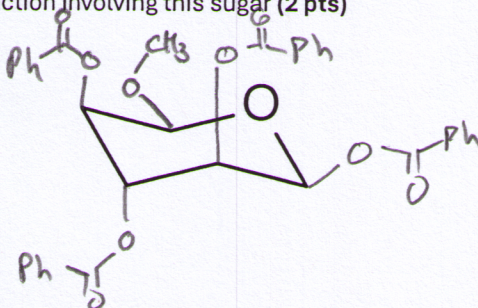
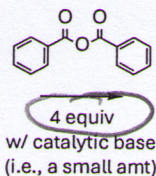
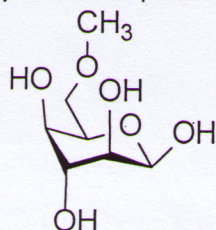


6pts

Here, you must draw the "hidden" Hydrogens from the Haworth to the Fischer Projection



6) Predict the product of the following reaction involving this sugar (2 pts)



2pts

7) Compare the provided Fischer Projection of Glucose against Fischer Projections 1 to 4.  
For each sugar (1 to 4), determine its stereoisomeric relationships compared to D-Glucose. (4 pts)

Use the letter codes:

D (Diastereoisomers)

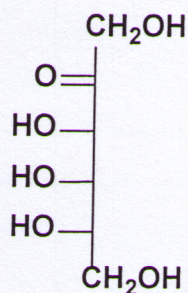
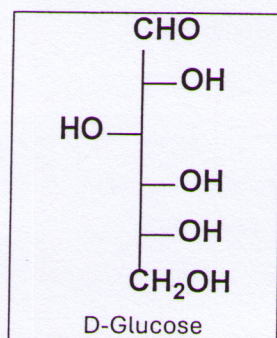
I (Identical)

CS (Constitutional/Structural Isomers)

E (Enantiomers)

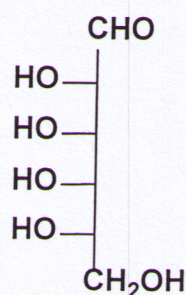
NR (Not Related Isomerically)

The H atoms on the cross bars are removed for clarity and displayed in a more recently conventional format.



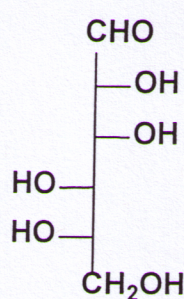
1

CS



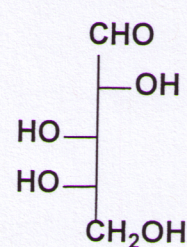
2

D



3

D



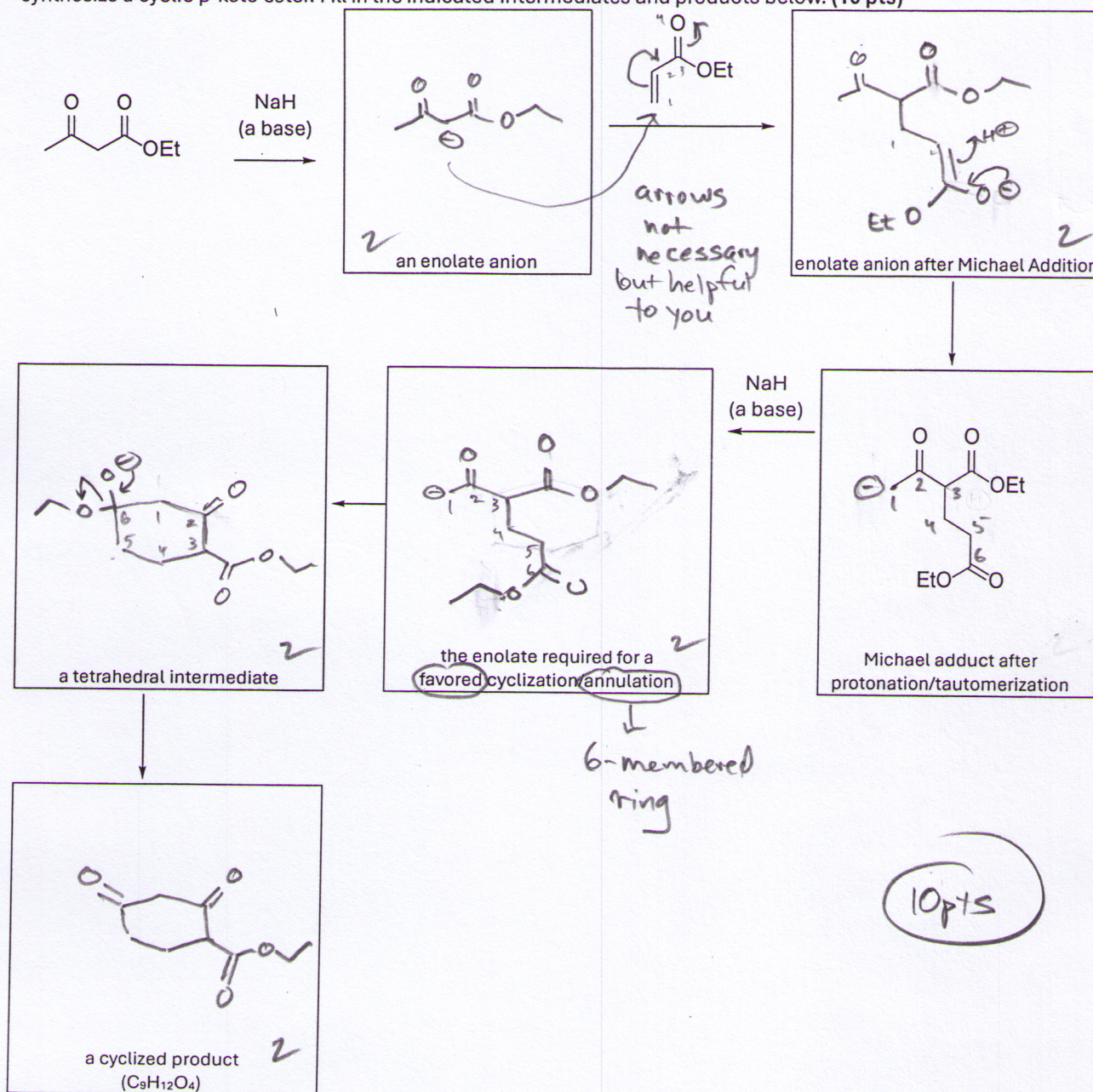
4

NR

Letter Code this Row

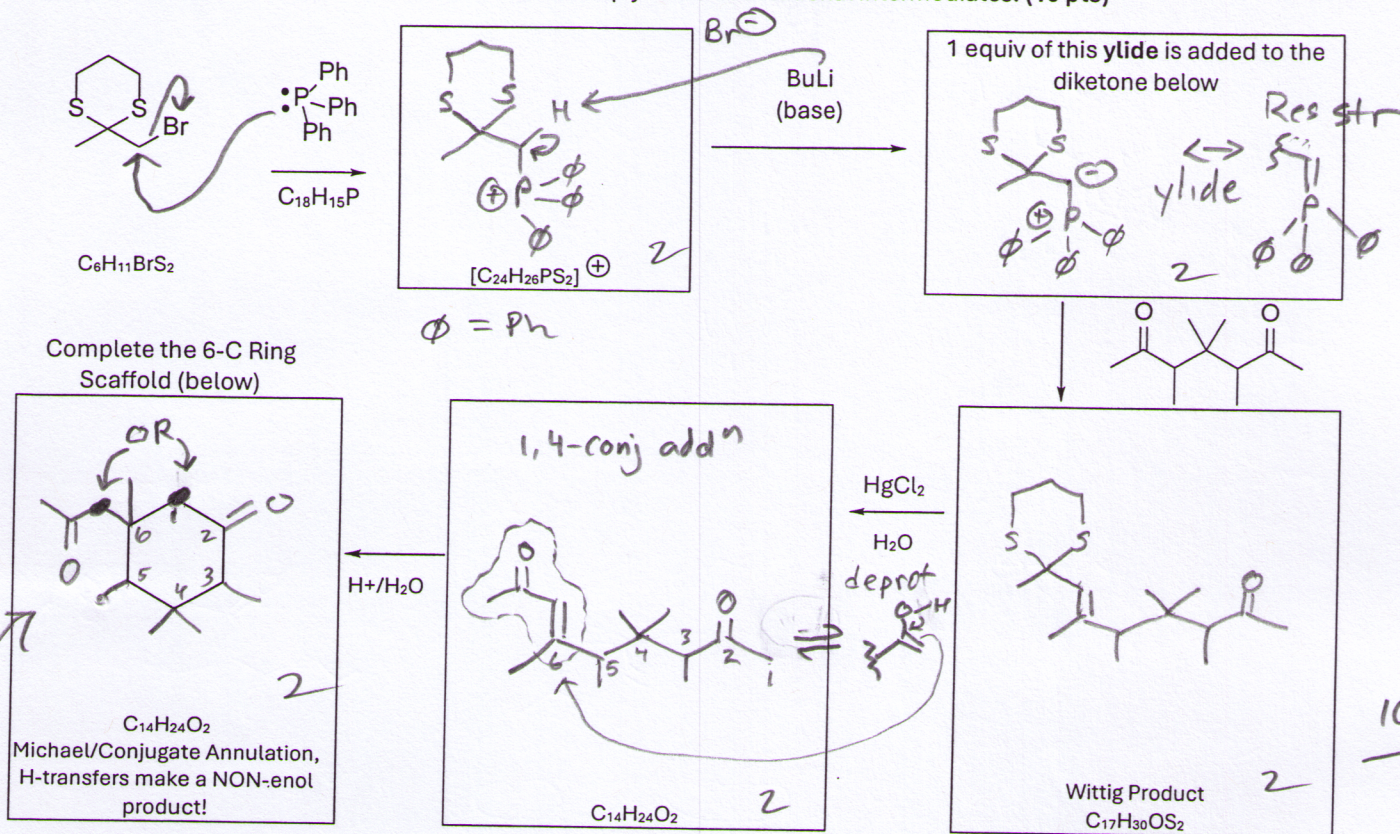


8) Some organic chemistry reactions involve multiple simple reactions that occur sequentially to form a complicated product. One example (Synlett, 2012, 23, 1199-1204) uses a Michael reaction followed by an intramolecular Claisen to synthesize a cyclic  $\beta$ -keto ester. Fill in the indicated intermediates and products below. (10 pts)

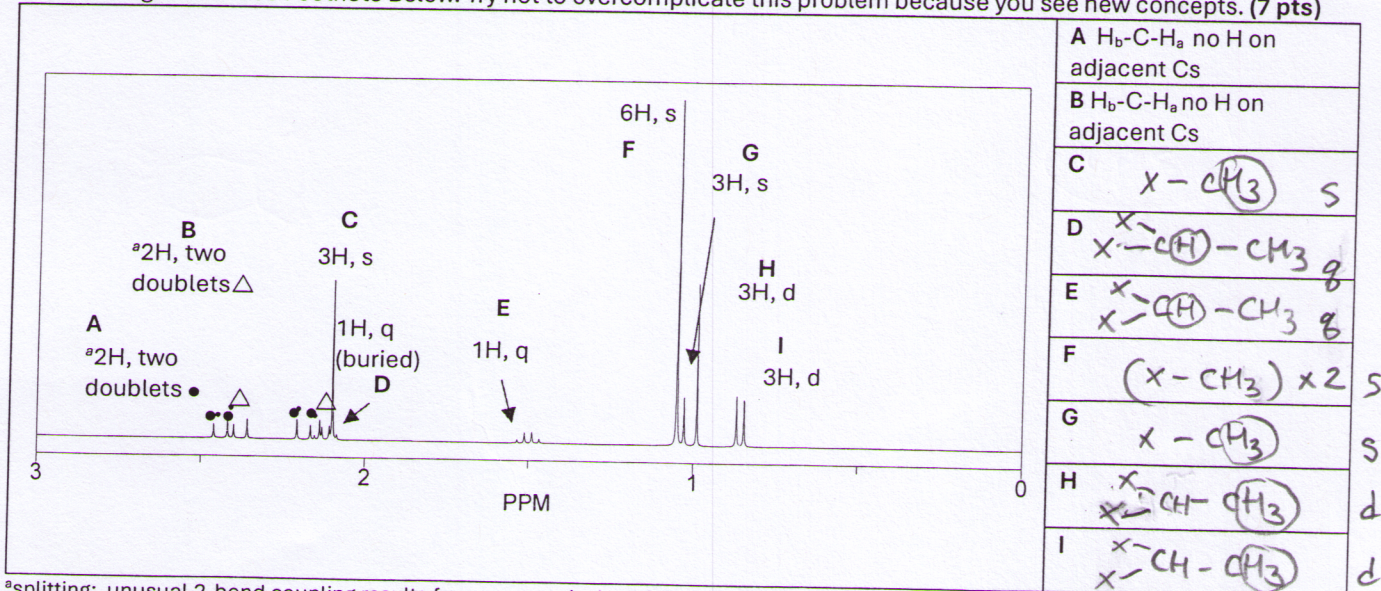




9) The theme continues: As we progressed through CEM 352, we continued to understand that the chemical transformations examined in earlier chapters were translational and continued to be applied in later chapters. Complete the following transformation. Hints are included to help you arrive at rational intermediates. (10 pts)



The product above corresponds to the following spectroscopic data. As we have practiced in class, fill in the identity of the  $^1\text{H}$ -NMR fragments. See Footnote Below. Try not to overcomplicate this problem because you see new concepts. (7 pts)



\*splitting: unusual 2-bond coupling results from non-equivalent  $\text{CH}_2$  hydrogens ( $\text{H}_b\text{-C-H}_a$ ) because they are diastereotopic. Here,  $\text{H}_b$  and  $\text{H}_a$  split each other into a doublet.

1 PT EXTRA CREDIT: Place a good-sized DOT (●) on the Carbon atom of the  $\text{C}_{14}\text{H}_{24}\text{O}_2$  product you drew above the 1H NMR spectrum that is attached to the protons identified as B