High = 98

Low = 18

Average = 63

CHEM 3331-100 Spring 2007

Exam 2

Professor R. Hoenigman

I pledge to uphold the CU Honor Code:

Signature_____

Name (printed)_____

Last four digits of your student ID number_____

Recitation TA_____

Recitation number, day, and time_____

You have 1 hour and 30 minutes to complete this exam.
No model kits or calculators allowed.
Periodic table and scratch paper are attached.

DO NOT TURN THIS PAGE UNTIL INSTRUCTED TO DO SO.

Recitation Sections:

#	Day	Time	TA
122	Monday	5 pm	Tom
121	Tuesday	8 am	Tom
131	Tuesday	12 pm	Tom
132	Tuesday	12 pm	Lee
161	Thursday	8 am	Tom
171	Thursday	12 pm	Lee

SCORE:

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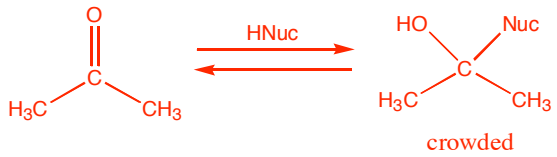
TOTAL_____/100

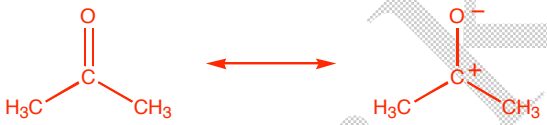
1. (5 pts) Explain why aldehydes are more reactive than ketones towards nucleophilic attack. Draw structures to support your argument.

Aldehydes are more electrophilic than ketones for two reasons – the steric effect and the electronic effect.

Steric effect – the product of nucleophilic addition to an aldehyde is less crowded than the product of addition to a ketone. Also, the carbonyl carbon of the aldehyde is less hindered than the ketone carbonyl carbon.

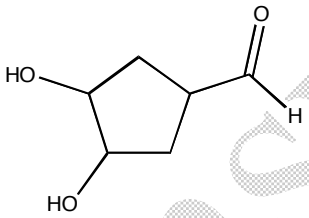


Electronic effect – by adding alkyl groups to a carbonyl carbon the partial positive character of the carbonyl carbon is stabilized. (Alkyl groups are electron releasing and stabilize carbocations through hyperconjugation and the inductive effect.)



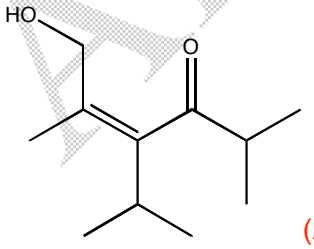
2. (6 pts) Give the IUPAC name for each of the following compounds. (2 pts each)

A.



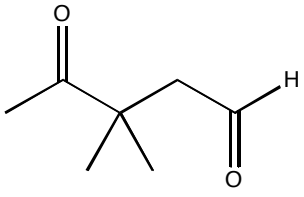
3,4-dihydroxycyclopentanecarbaldehyde

B.



(*Z*)-6-hydroxy-4-isopropyl-2,5-dimethyl-4-hexen-3-one

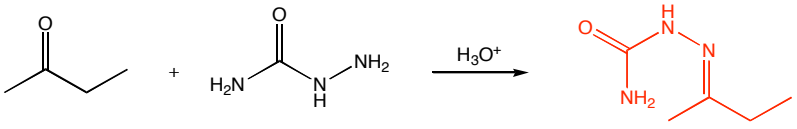
C.



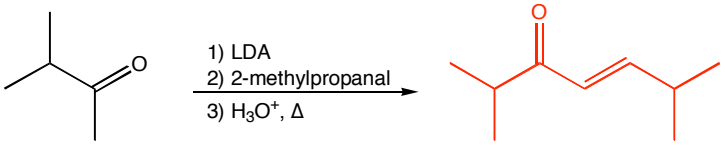
3,3-dimethyl-4-oxopentanal

3. (24 pts) Fill in the missing reagents (more than one step may be required) or give the major organic product(s) of the following reactions. Write NR if no reaction occurs. Be sure to show stereochemistry if necessary.
(3 pts each)

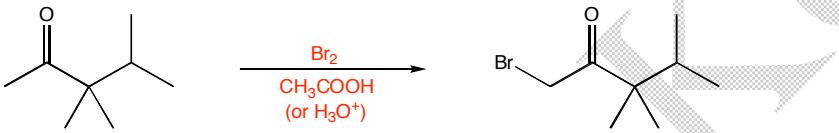
A.



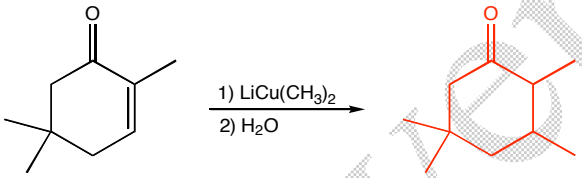
B.



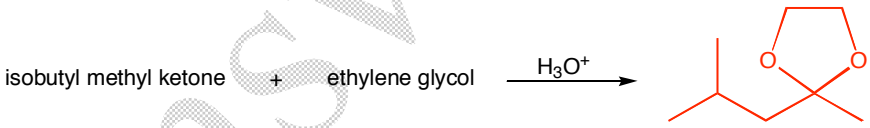
C.



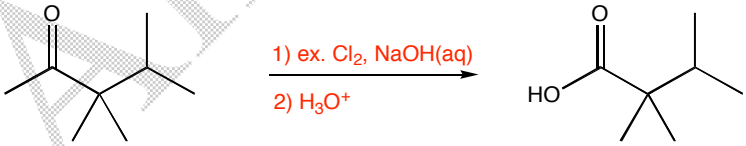
D. Book Problem 18.27f



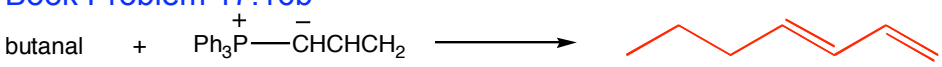
E. Book Problem 17.10c



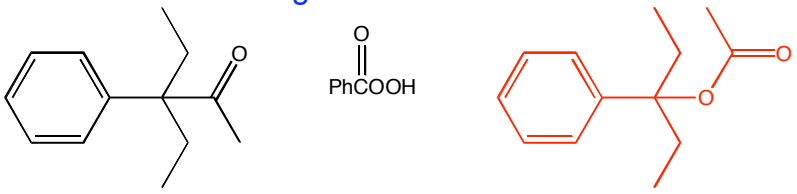
F.



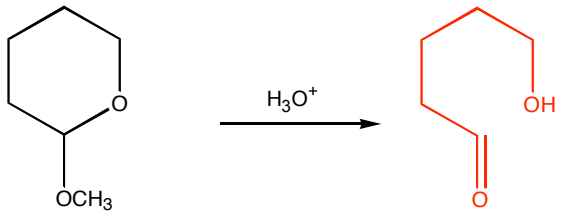
G. Book Problem 17.16b



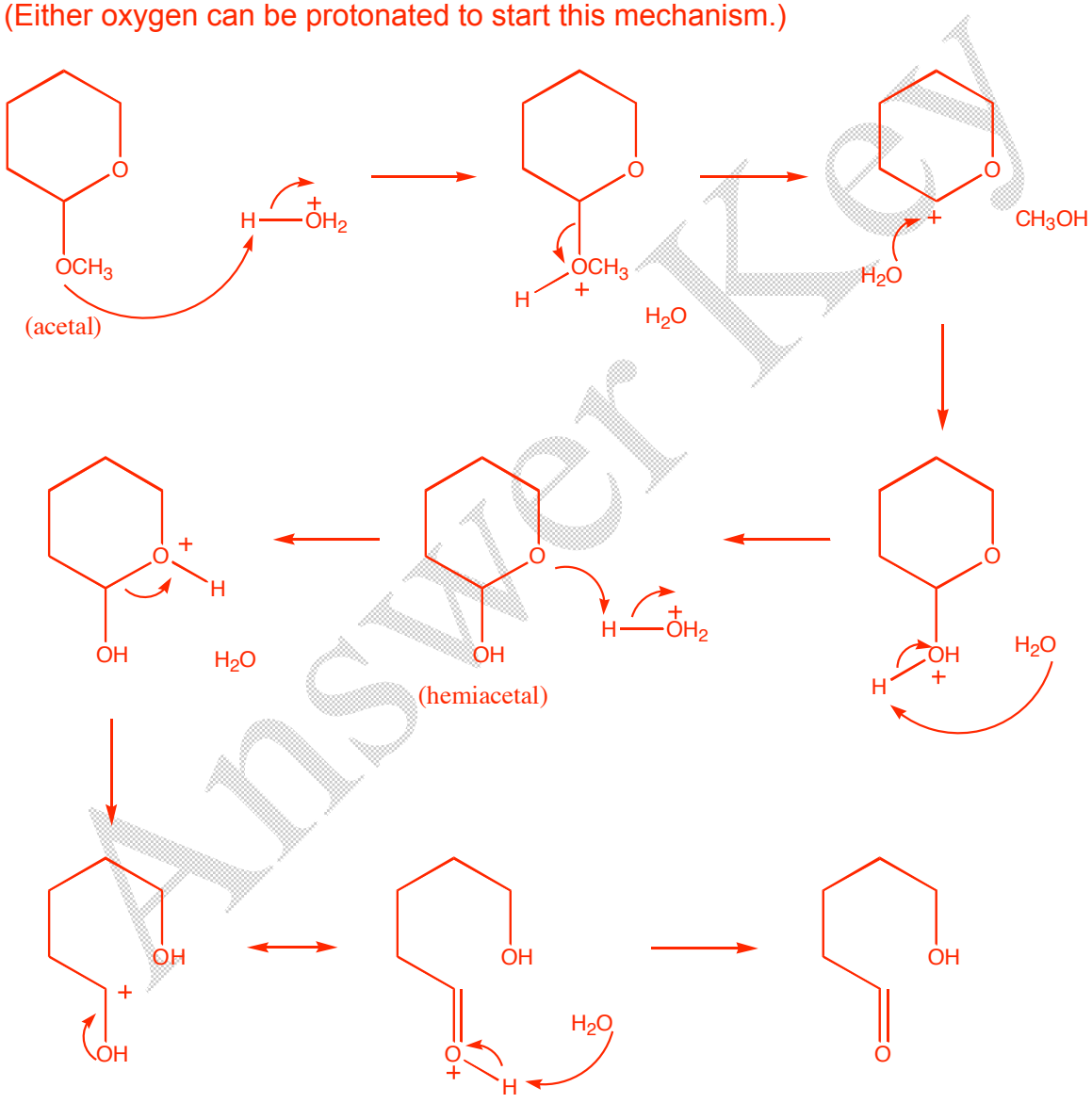
H. Book Problem 17.30g



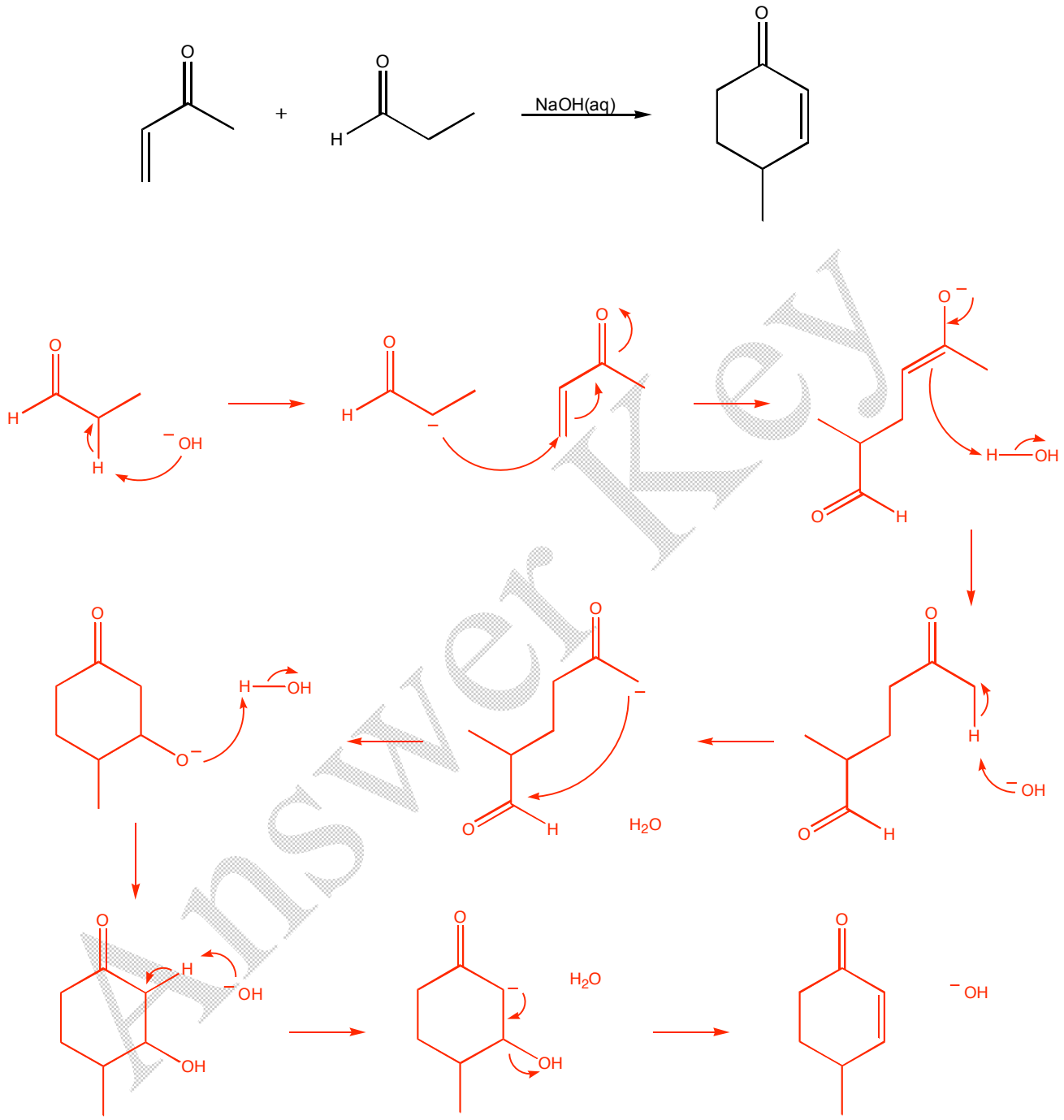
4. (20 pts) Fill in the organic product(s) of the acid catalyzed hydrolysis of the compound shown below and draw a mechanism to account for its formation. In your mechanism be sure to show all inorganic products.



(Either oxygen can be protonated to start this mechanism.)

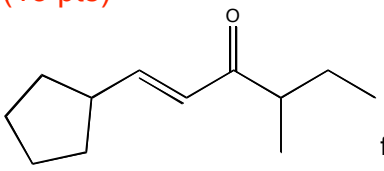


5. (20 pts) Using arrows to show the flow of electrons, draw a mechanism for the following reaction.

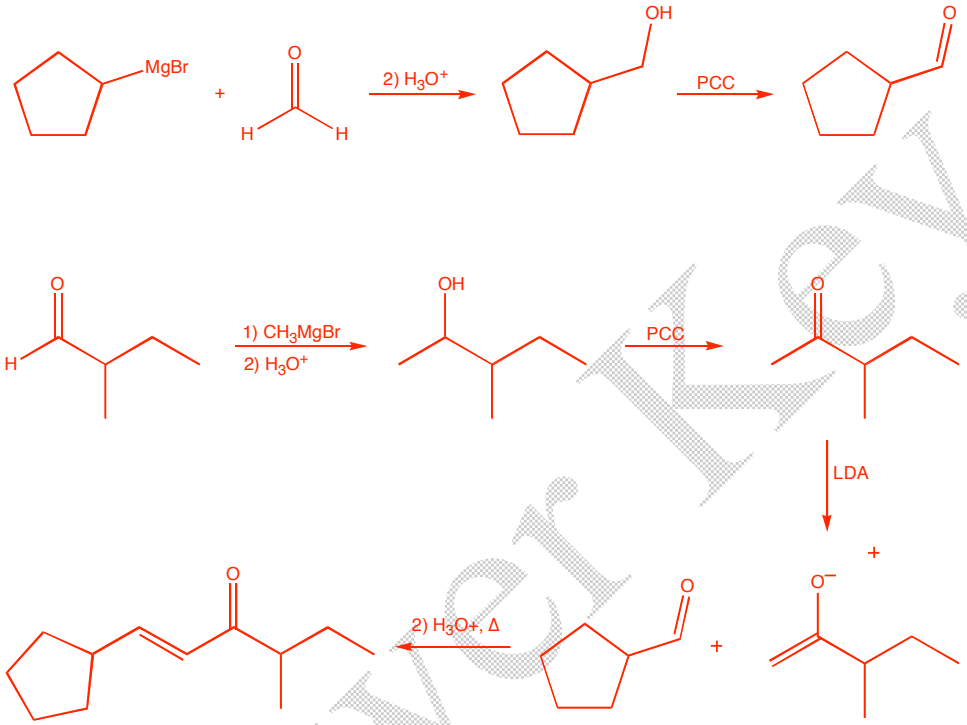


6. (25 pts) Propose an efficient synthesis for the following transformations. (There is more than one way to do each of the following syntheses).

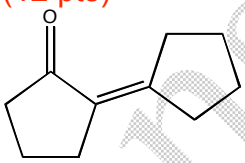
A. (13 pts)



from any reagents containing 5 or fewer carbons



B. (12 pts)



from cyclopentanone and any necessary alcohols or inorganic reagents (Hint: this is not a self-condensation.)