

Exam 3

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	Ashley
121	Tuesday	8 am	Noel
131	Tuesday	12 pm	Jin
132	Tuesday	12 pm	Ashley
161	Thursday	8 am	Morin
171	Thursday	12 pm	Jin

SCORE:

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TOTAL _____/100

Extra Credit (5 pts)

How are reactions between aldehydes and nucleophiles fundamentally different than reactions between acyl chlorides and nucleophiles?

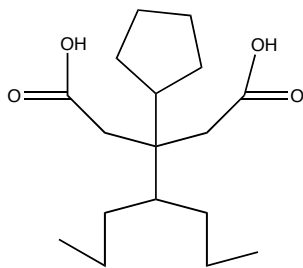
- A. Aldehydes are readily oxidized by nucleophiles to carboxylic acids.
- B. Acyl chlorides have a leaving group, Cl^- , whereas aldehydes do not.
- C. Aldehydes do not form tetrahedral intermediates with nucleophiles.
- D. Acyl chlorides readily form enol tautomers.

1. (6 pts) One or more of the following names do not follow the IUPAC rules. Circle the incorrect name(s) and provide a correct IUPAC name.

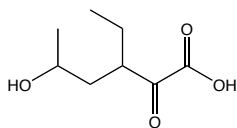
A. 2-(2-isopropoxy-2-oxoethyl)cyclopentanone

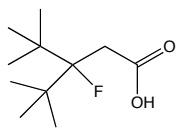
B. 5-formyl-3-hydroxy-2-methylpentanoic acid

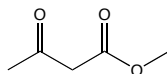
C. Edward Scissorhands

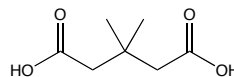


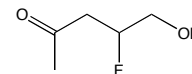
2. (5 pts) Rank the following in terms of increasing acidity (1 = most acidic, 5 = least acidic)



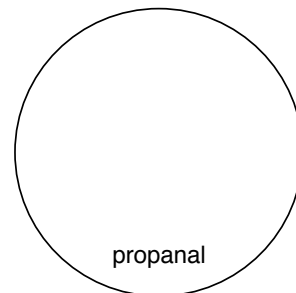
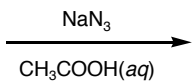
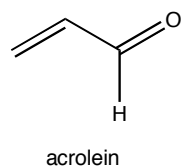




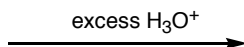
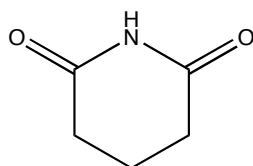




3. (9 pts) Acrolein reacts with sodium azide in aqueous acetic acid to form a compound ($C_3H_5N_3O$) in 71% yield. Propanal, when subjected to the same reaction conditions, is recovered unchanged. In the box below, suggest a structure for the product formed from acrolein. In the circle below, draw propanal. Give a brief explanation for the difference in reactivity between acrolein and propanal.

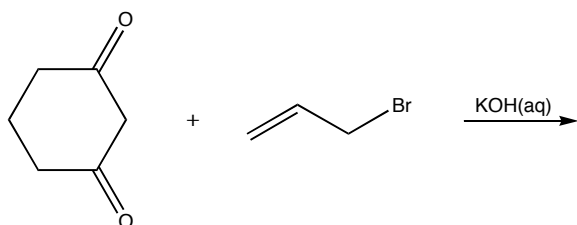


4. (10 pts) Fill in the product(s) of the following reaction and, using arrows to show the flow of electrons, propose a mechanism for the transformation.

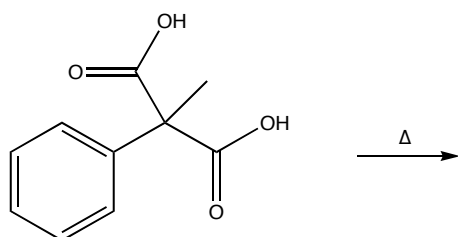


5. (21 pts) Draw the major organic product(s) of the following reactions. Write NR if no reaction occurs. (3 points each)

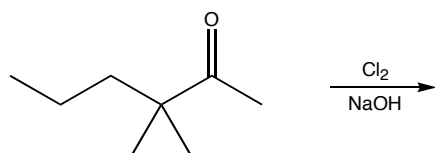
A.



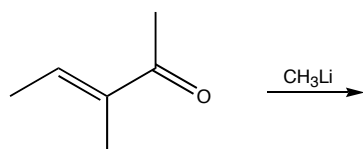
B.



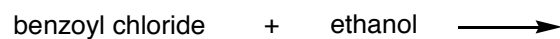
C.



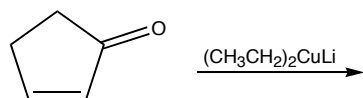
D.



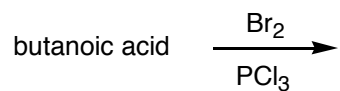
E.



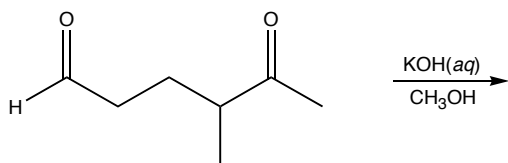
F.



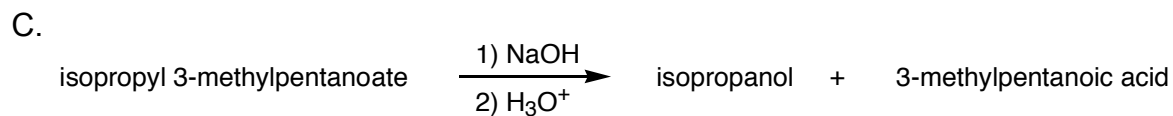
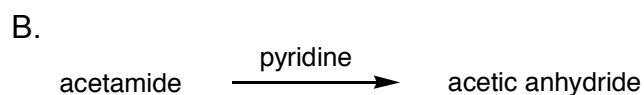
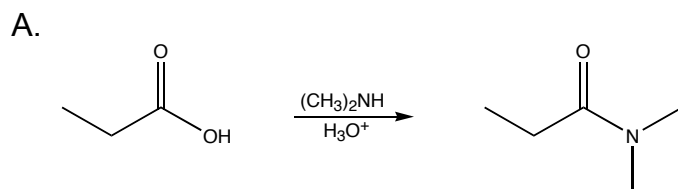
G.



6. (10 pts) Fill in the product of the following reaction and, using arrows to show the flow of electrons, propose a mechanism for the transformation.



7. (9 pts) Some (or possibly all) of the reactions below will not produce the desired product. For each reaction that will not “work” propose a viable synthesis from the starting organic reactant to produce the desired product.



8. (30 pts) Propose an efficient synthesis for the following transformations. You may use any reagents you like, but must use the given starting material. (10 points each)

A. butanoic acid *starting from* acetaldehyde

B. heptanedioic acid *starting from* pentanedioic acid

C. 4-bromo-2,2,5-trimethyl-3-hexanone *starting from* 3-methylbutanamide