

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	SCORE:	
121	Tuesday	8 am	Kelly	Page 1 _____/10	Page 4 _____/15
131	Tuesday	1 pm	Kelly	Page 2 _____/18	Page 5 _____/10
141	Wednesday	8 am	Greg	Page 3 _____/24	Page 6 _____/23
151	Wednesday	12 pm	Greg		
153	Wednesday	12 pm	Kelly		
152	Wednesday	5 pm	Kelly		
171	Thursday	12 pm	Greg		
				TOTAL _____/100	

1. (4 pts) Penicillin is one of the most widely prescribed drugs. Circle **all** of the terms below that describe one or more structural feature of penicillin G.

Alcohol

Aldehyde

Alkene

Amide

Amine

Aromatic ring

Carboxylic acid

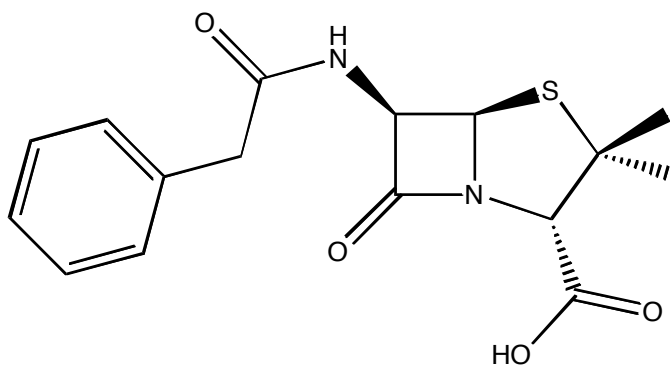
Ester

Ether

Ketone

Sulfide

Thiol

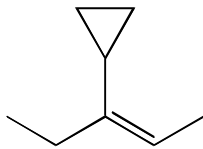


penicillin G

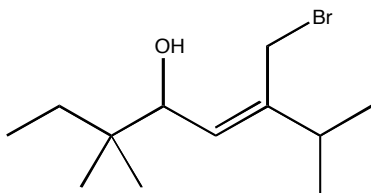
2. (6 pts) Explain why 1-chloropentane (b.p. = 108 °C) has a lower boiling point than 1-iodopentane (b.p. = 157 °C). Please be specific in your answer.

3. (6 pts) Give the IUPAC name for each of the following compounds.

A.

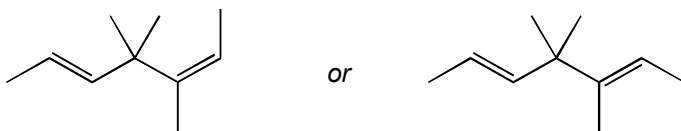


B.

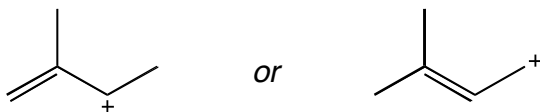


4. (12 pts) For each of the following pairs, circle the species with the lower heat of combustion. In the box, give a brief reason for your choice.

A.



B.



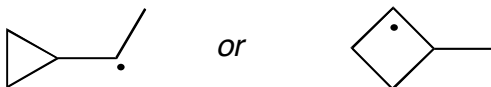
C.

2,3-dimethyl-2-pentene

or

3,4-dimethyl-1-pentene

D.

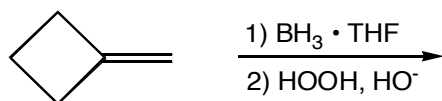


5. (24 pts) Give the major organic product(s) of each of the following reactions. If necessary, clearly show the stereochemistry of the products. If no reaction occurs, write NR.

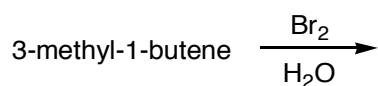
A.



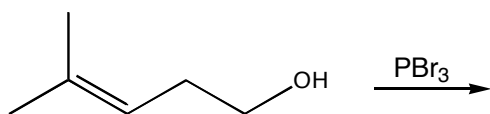
B.



C.



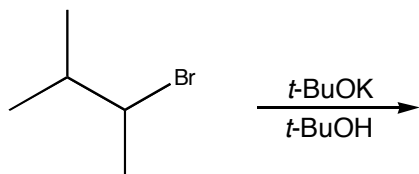
D.



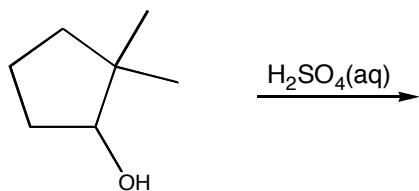
E.



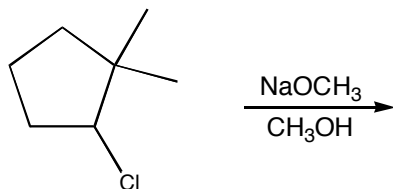
F.



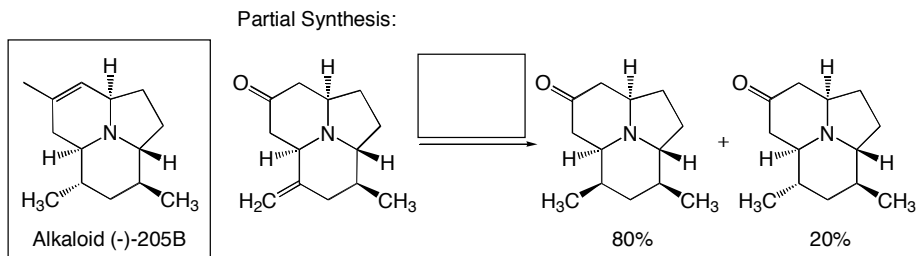
G.



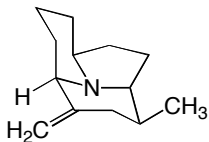
H.



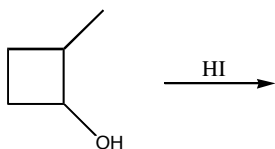
6. (5 pts) Many organic chemists are involved in the synthesis of natural products (naturally occurring organic compounds). Alkaloid (-)-205B (shown below) has been isolated from a frog found in Panama. One step (of many steps) in a recent synthesis of this natural product attempted to introduce the *trans* methyl substituents into the six-membered ring.



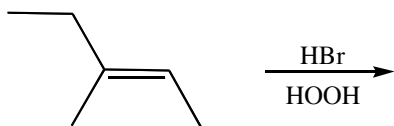
- A. What kind of reaction is occurring?
- B. In the box above, propose reagents for this reaction.
- C. Why did this particular attempt fail? Why isn't the major product of this reaction the desired compound with the *trans* methyl substituents? Hint: the starting material can also be drawn as:



7. (10 pts) Fill in the organic product of the following reaction and, using arrows to show the flow of electrons, draw a mechanism to account for its formation.

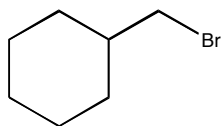


8. (10 pts) Fill in the organic product of the following reaction and, using fishhook arrows to show the flow of electrons, draw a mechanism to account for its formation. Be sure to label any initiation, propagation, or termination steps.



9. (23 pts) Propose an efficient synthesis for each of the following transformations. You may use any reagents you like.

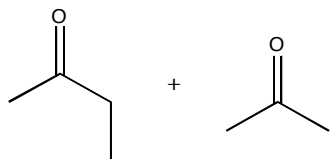
A.



starting from 2-methylcyclohexanol

B. *cis*-1,2-cyclopentanediol starting from cyclopentane

C.



starting from 3,3-dimethyl-1-pentene