

Chem 14D Exam #1

Oct 18, 2021

I hereby state that I have neither given nor received aid to or from other students during this exam. I vouch for the honesty and integrity of each and every answer given.

Lin Huttering
Signature



Claire Hamaway
Name

TA (circle one):

Jason Williams

Jason Wang

Jacqueline Bustamante

Carlos Cruz

Score:

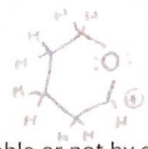
Question 1	_____	10.5/12
Question 2	_____	12/12
Question 3	_____	22/22
Question 4	_____	13/14
Question 5	_____	20/24
Question 6	_____	14/14
Student ID on every page	_____	2/2
Total	_____	93.5/100
Extra credit	_____	0/8
Total with extra credit	<u>93.5</u>	

1. Write your student ID on every page.
2. Answers written on the back of the exam will not be graded.
3. Where applicable, provide answers with a clear indication of stereochemistry. Answers without a clear indication of stereochemistry will be given partial or no credit. Similarly ambiguous and/or unnecessary stereochemical information will be penalized as well.
5. This exam is designed to challenge you to think rationally and critically so that you arrive at the most logical answers.
6. You have two hours for this exam. Good luck!

THINK LIKE
A PROTON

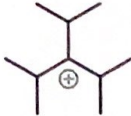

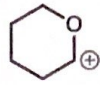
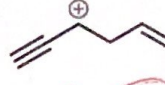
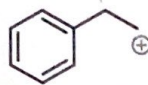
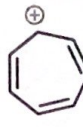
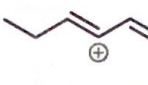
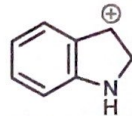
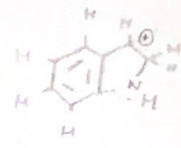


ALWAYS
POSITIVE



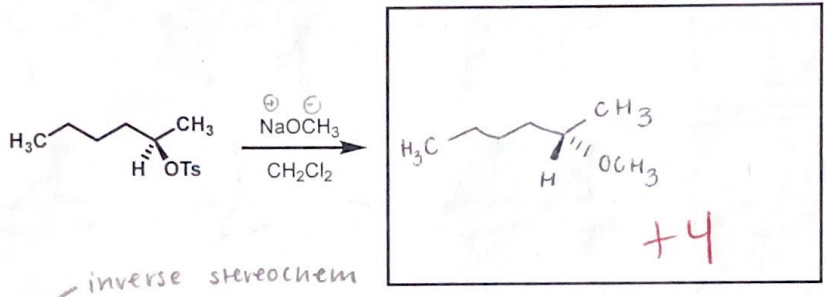
1. Indicate whether each of the following carbocations is stable or not by circling either "stable" or "unstable" (12 pts):

resonance?

 stable unstable	 stable unstable	 stable unstable	 stable unstable	-1.5
can't participate in resonance  stable unstable	 stable unstable	 stable unstable	 stable unstable	

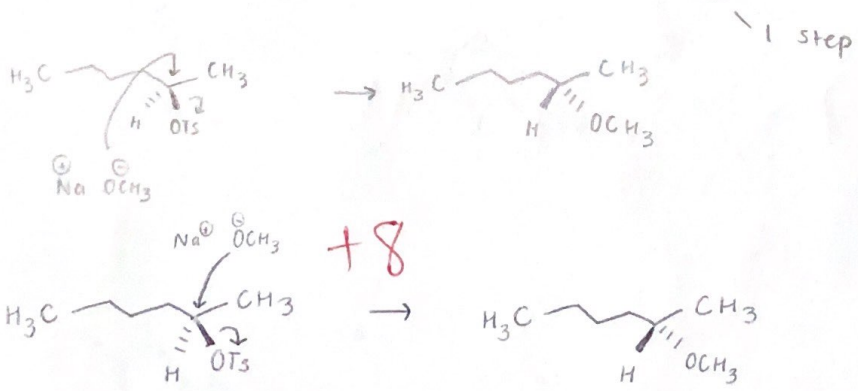
resonance?

2.



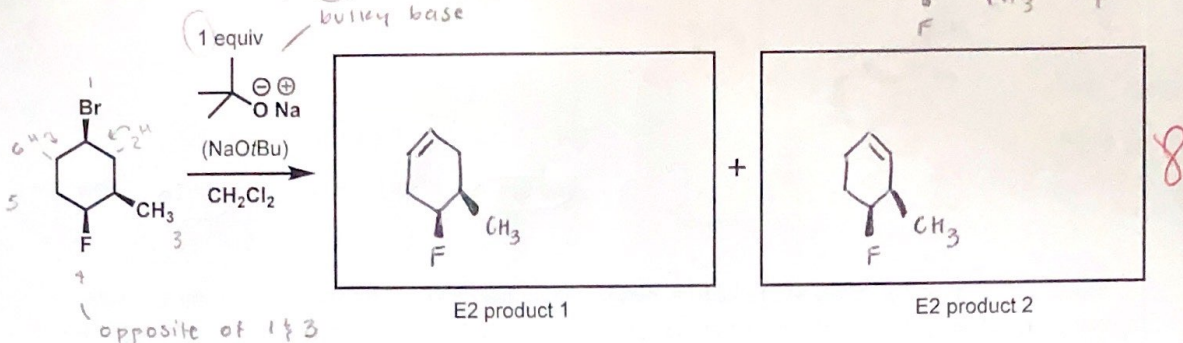
a. Draw the S_N2 product of the reaction in the box above (4 pts).

b. Draw the arrow-pushing reaction mechanism leading to the S_N2 product (8 pts):

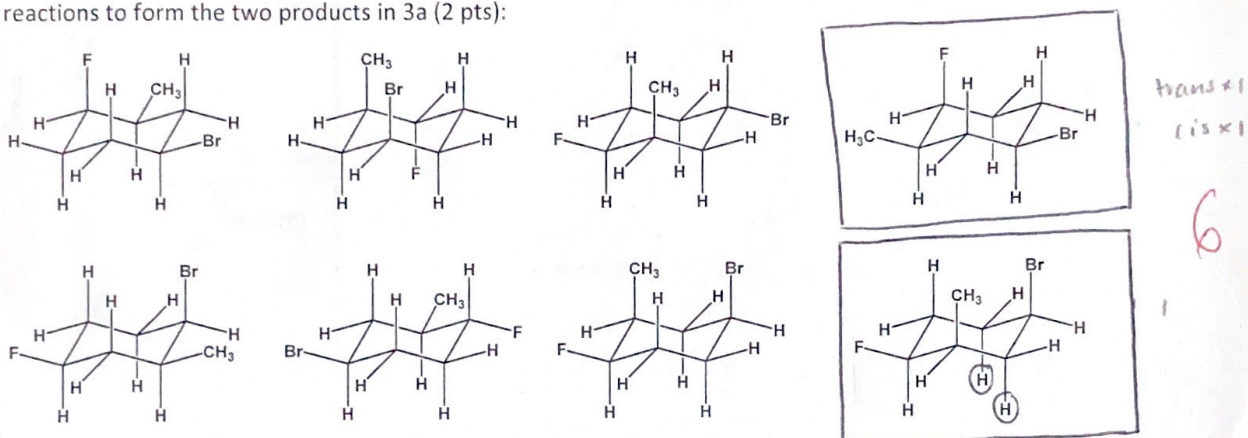


+22.5

3. a. Draw the two major E2 products of the reaction below (8 pts):

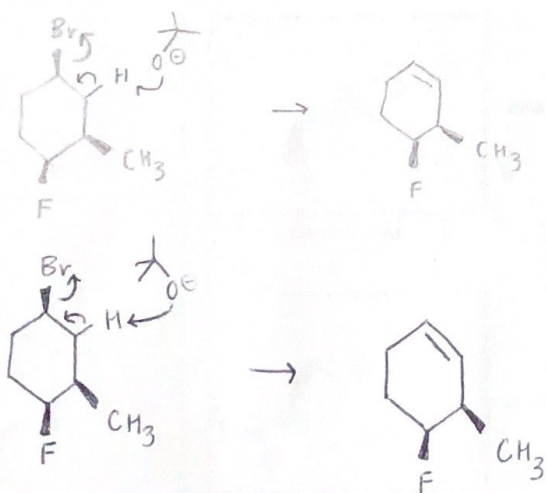


b. Box two valid interconverting chair conformations of the starting material of 3a (above) (4 pts). On the more reactive chair conformation, circle the hydrogens that are deprotonated in the elimination reactions to form the two products in 3a (2 pts):

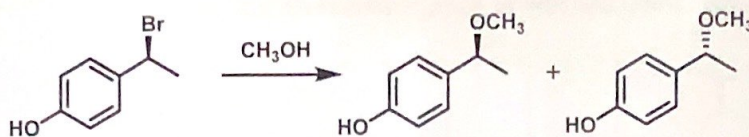


c. Draw the arrow-pushing reaction mechanism leading to **ONE** (you may choose either one) of the E2 products you depicted in 3a (8 pts). You may draw either the chair structure or the flat structure.

Mechanism:



4. The questions below refer to the reaction shown here:

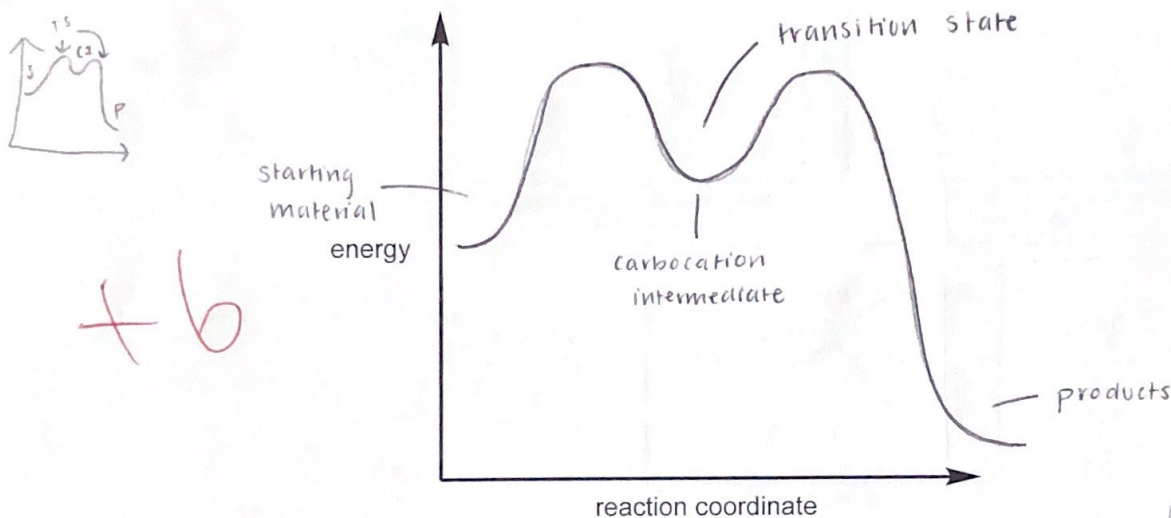


a. What type of reaction is this (circle one)? (2 pts)

S_N1 S_N2 E1 E2

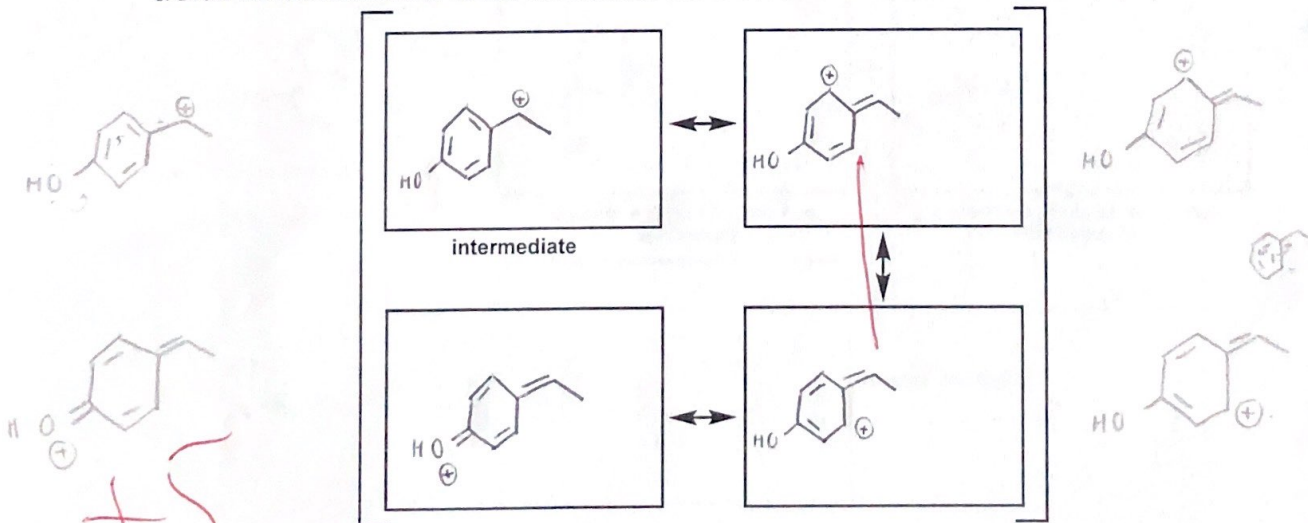
+2

b. Draw the energy diagram for the reaction shown above, and label the starting material, transition state, carbocation intermediate(s) if any, and products. If there is a deprotonation that occurs, you do not need to draw this step. (6 pts):



+6

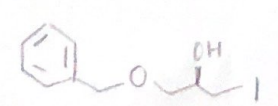
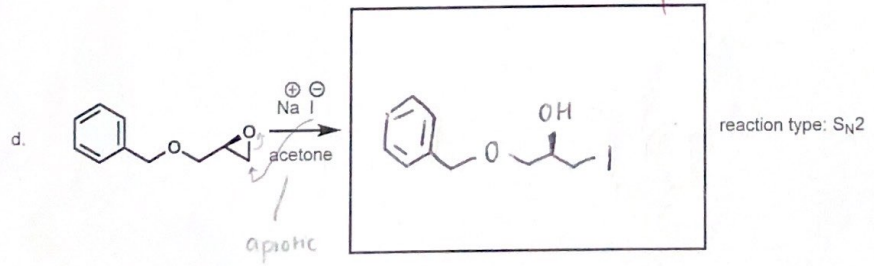
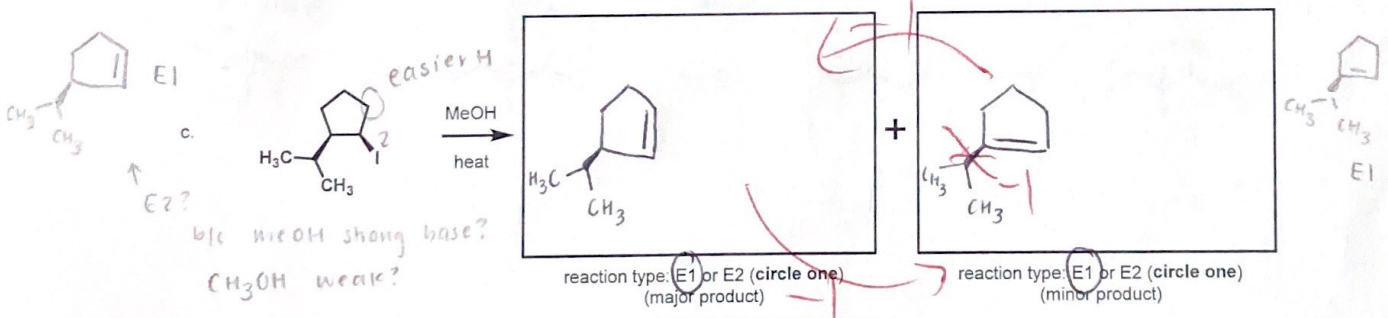
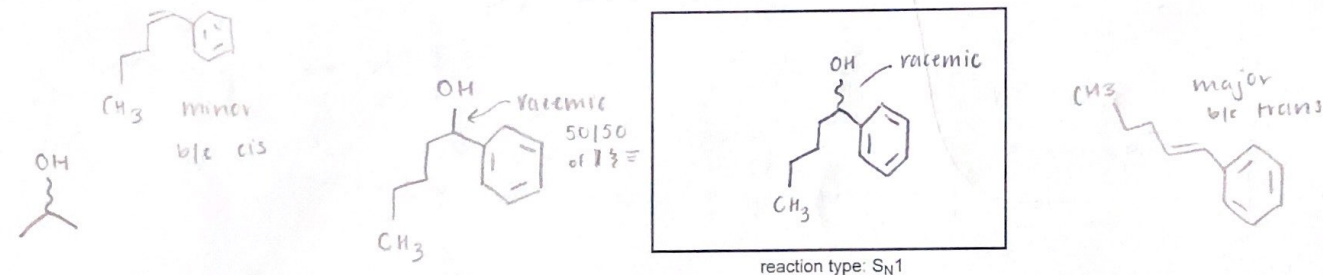
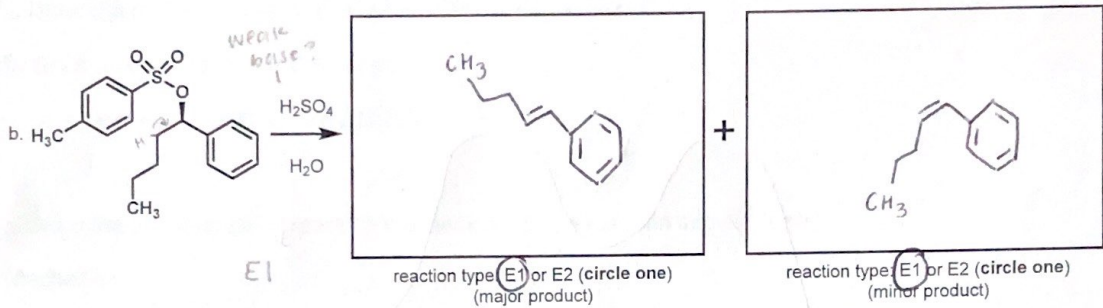
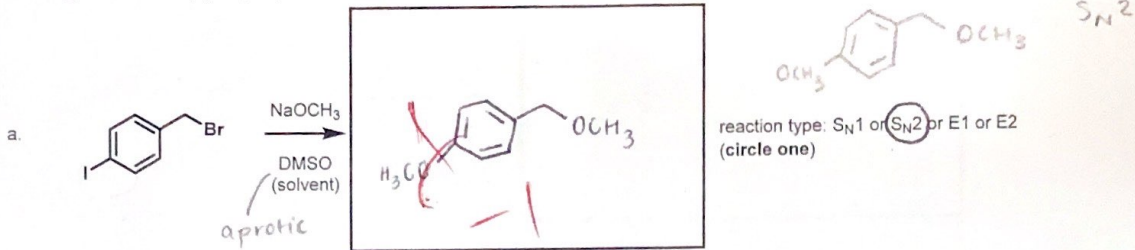
c. Draw the intermediate in 4b and three stable resonance structures of the intermediate (6 pts):



+5

+13

5. Draw the products of the following reactions and circle the correct reaction types when asked. Draw the major product if there is only one box. If a racemic mixture of products forms, indicate this (e.g., by writing "racemic") (24 pts):

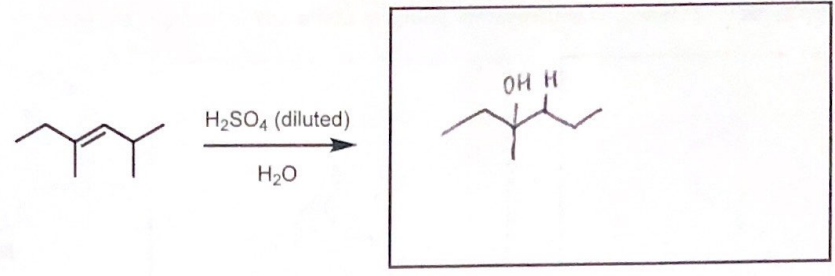


20



electrophilic addition?

6. The questions below refer to the reaction shown here:



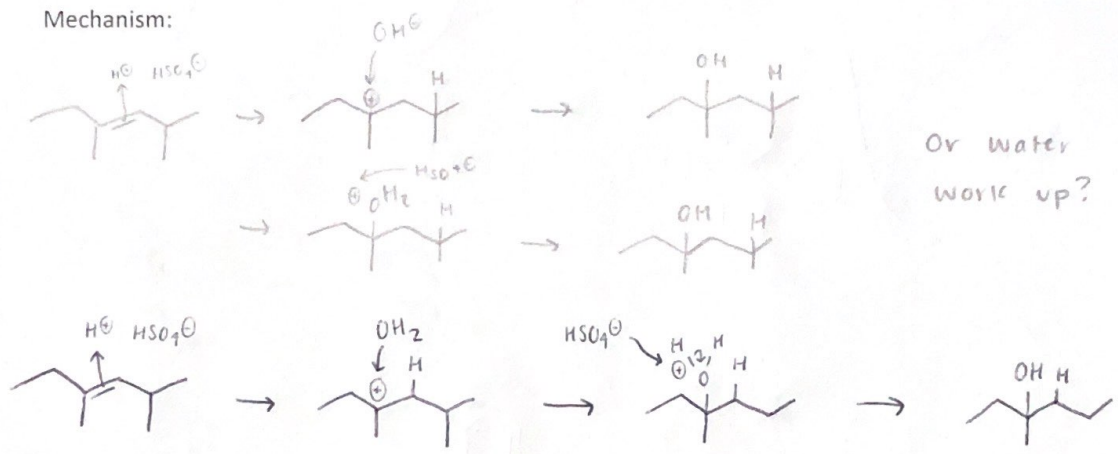
a. Draw the major product of the reaction in the box above (4 pts). **4**

b. What type of reaction is this? (2 pts) **2**

electrophilic addition

c. Draw the arrow-pushing reaction mechanism for the reaction above. (8 pts) **8**

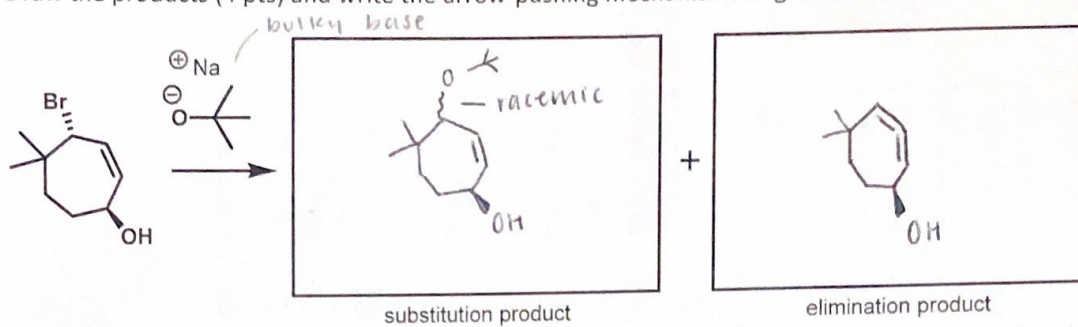
Mechanism:



14pts

Extra credit (8 pts):

Draw the products (4 pts) and write the arrow-pushing mechanisms to generate both products (4 pts).



S_N1 b/c bulky?

E2 b/c bulky base?

Mechanism:

