Hour Exam #3
Chemistry 343
Professor Gellman
2 December 2015

Last Name Answer

First Name Key

General Instructions:

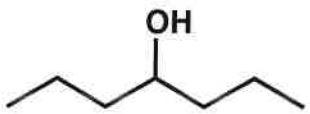
(i) Use scratch paper at the back of the exam to work out answers; final answers must be recorded at the proper place on the exam itself for credit. Models are allowed.

(ii) Print your name on each page.

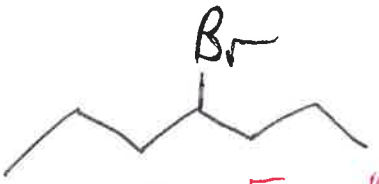
(iii) Please keep your paper covered and your eyes on your own work. Misconduct will lead to failure in the course.

-3 for multiple mistakes on the same question

1. (17 points) Show the major product(s) expected from the reactions below.

(a) 

Ph_3PBr_2



+5

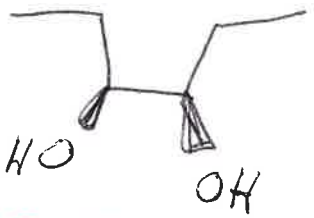
-2 For "Racemic" or two identical compounds.

(b) 

cat. OsO_4

NMMO

acetone/H_2O

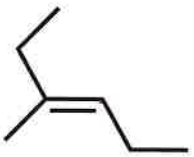


+5

(-2 for no stereochem or "racemic", etc.)

-3 For Anti-add'n

same

(c) 

1) Cl_2, H_2O

2) NaOH, H_2O

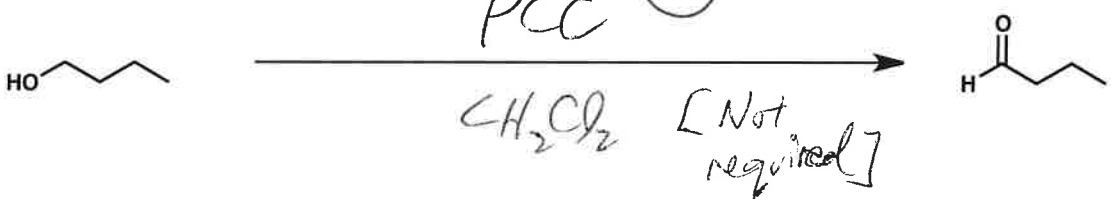
+5

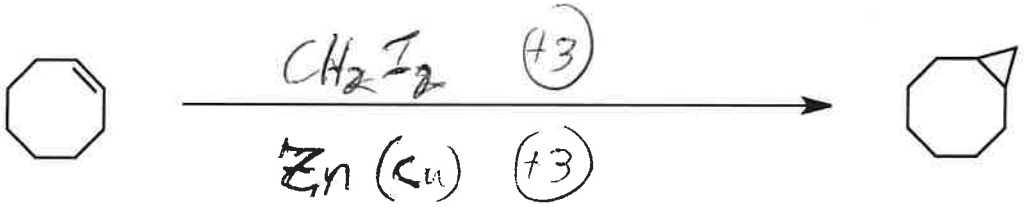
(+3 for epoxide w/o stereochem)

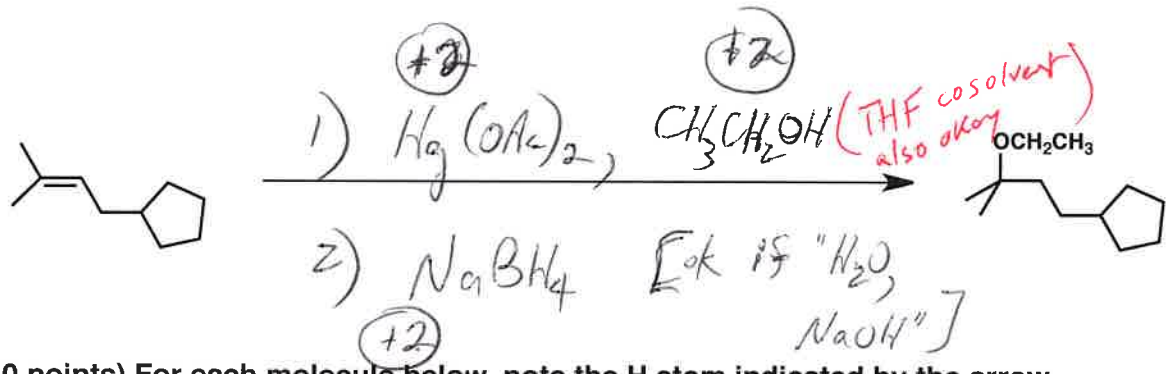
+2 --> (±) (or "racemic")

Name _____

2. (16 points) Show the reagents required to convert the starting molecule to the indicated product. If necessary, be sure to differentiate clearly between distinct steps, by using "1)", "2)", etc. over the arrow.

(a) 

(b) 

(c) 

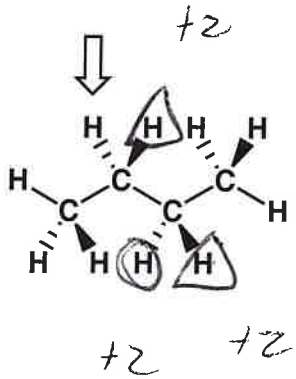
3. (10 points) For each molecule below, note the H atom indicated by the arrow. Relative to this H, indicate all appropriate other H's as described below.

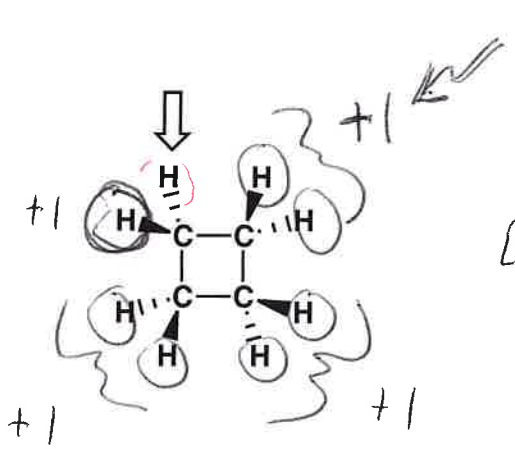
Indicate each HOMOTOPIC H with a CIRCLE.

Indicate each ENANTIOTOPIC H with a TRIANGLE.

Indicate each DIASTEREOTOPIC H with a SQUARE.

-1 per wrong



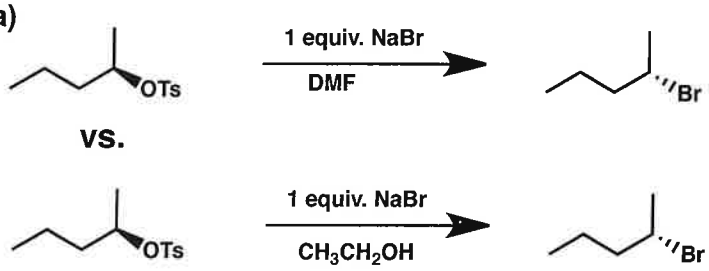


Must circle both for +1 [Each case]

Name _____

4. (9 points) For each pair of reactions shown below, write on the line whether the UPPER reaction is expected to be faster, slower or the same rate relative to the lower.

(a)

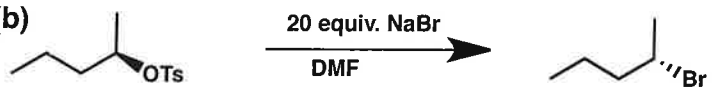


vs.

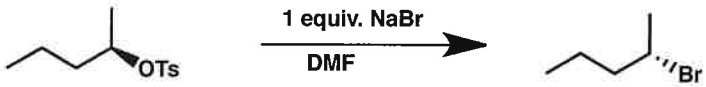
Faster or "upper" +3

[Note: Starting material and product are single enantiomers.]

(b)



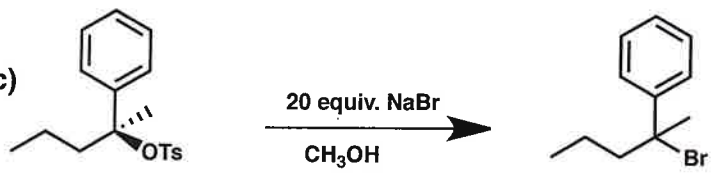
vs.



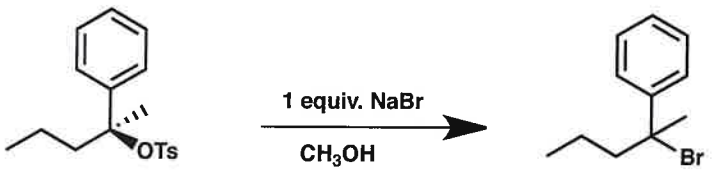
Faster +3

[Note: Starting material and product are single enantiomers.]

(c)



vs.



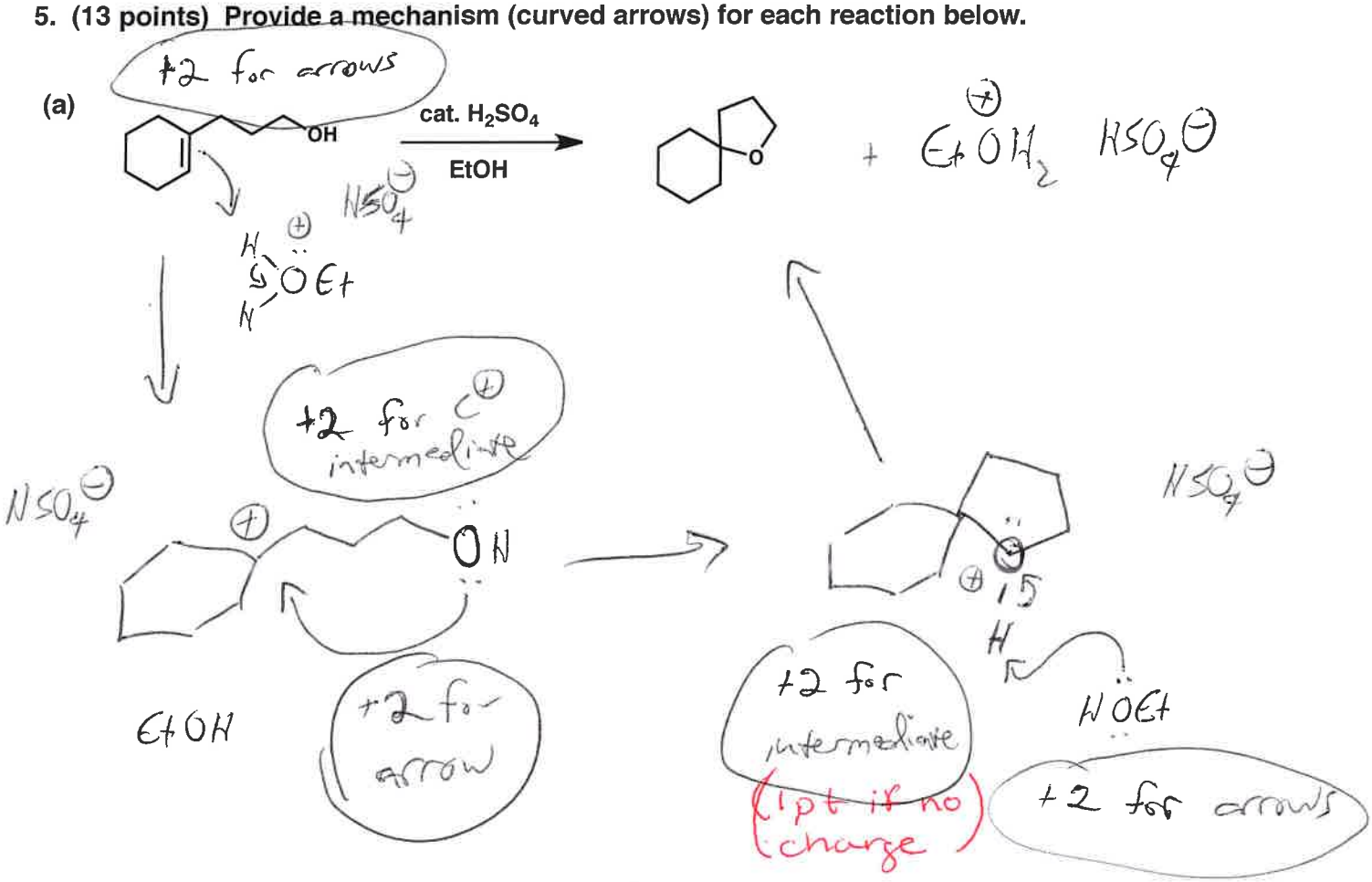
Same +3

[Note: Starting material is a single enantiomer, product is racemic.]

Name _____

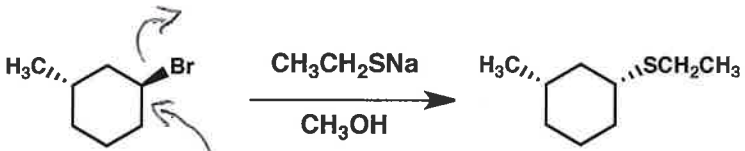
5. (13 points) Provide a mechanism (curved arrows) for each reaction below.

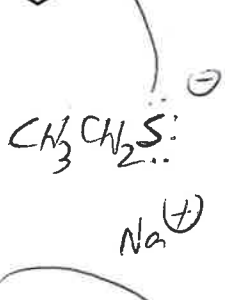
(a)



[Notes: Ok to show how $EtOH_2$ HSO_4^- is formed, but not required. +1 for protonation of alkene w/ H_2SO_4.]

(b)



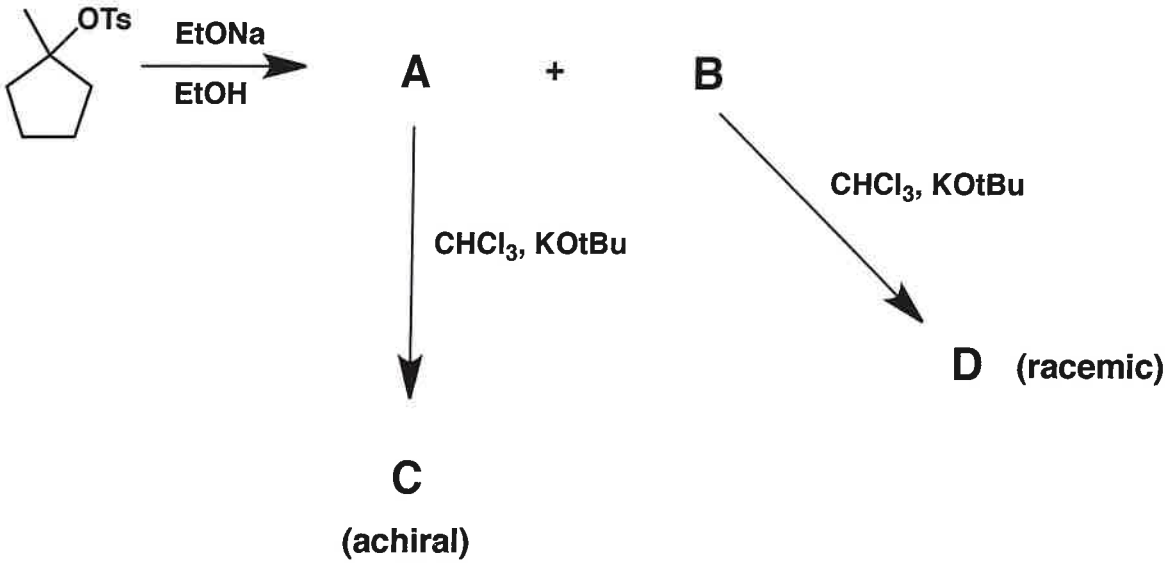


+3 for arrows

-1 if Na^+ and no charge drawn on S

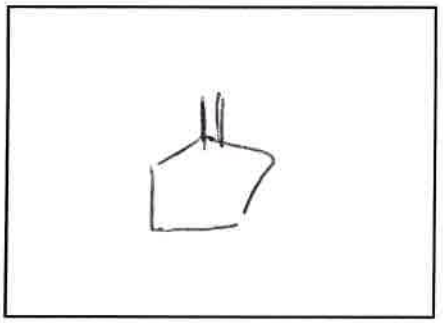
Name _____

6. (20 points) Based on the information provided below, propose structures for molecules A, B, C and D (draw the structures in the appropriate boxes).

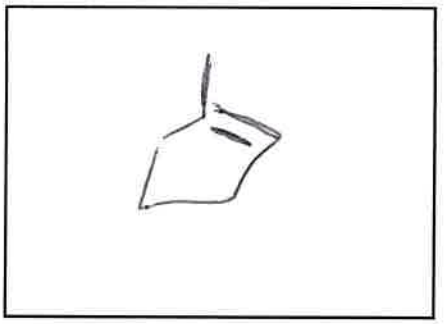


correct alkenes but switched, 2 each

A =



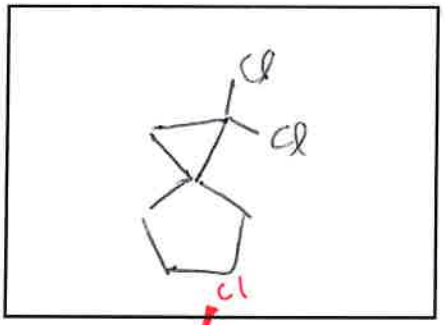
B =



+3

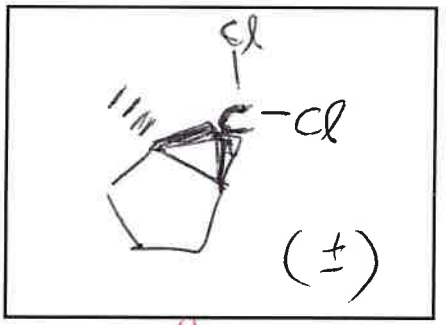
+5 each

C =



+3

D =



+3 if no stereochem

this is okay

Name _____

7. (15 points) Suggest a synthetic route (i.e., a specific sequence of reactions) that would be expected to produce the "target" molecule from the indicated starting material. You may use any reagents in your proposed route. Try to reach the target with the fewest possible reactions, and try to choose reactions that are as selective as possible for one target (rather than a mixture of targets).