

Chemistry 30B

Winter 2013

First Hour Exam

February 1, 2013

J. J. Chang

Name Zhaoyuan Xi

Student ID Number 204-011-051

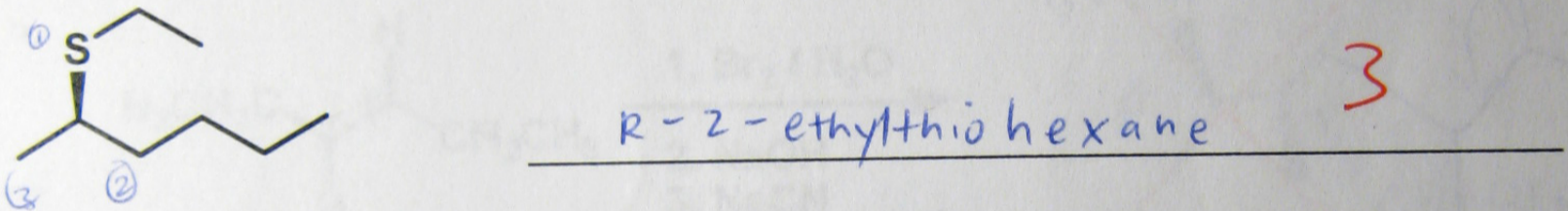
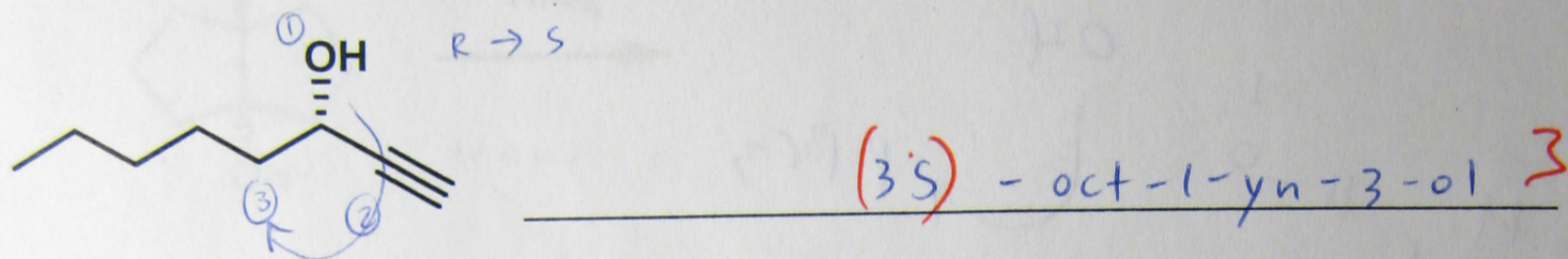
TA Name Chris Day

Hand in answers written only on this paper, using the reverse side if necessary. No exams will be graded that do not contain your signature and student ID number! Read each question carefully before you answer it. Answer the easy questions first. Good luck!

Problem	Points	Score
1	12	12
2	20	12
3	16	16 16
4	10	8
5	10	10
6	16	8
7	16	12
Total	100	77

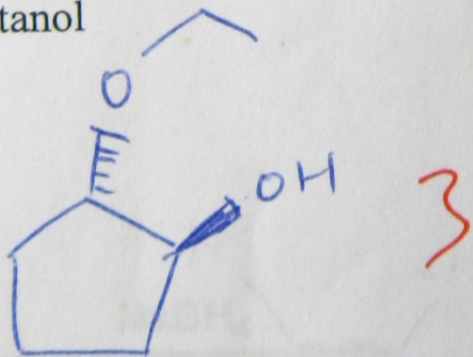
1. (12 points, 3 points each)

a) Name the following compounds by the IUPAC, *Chem. Abstracts*, or common nomenclature system, unambiguously specifying any stereochemistry.

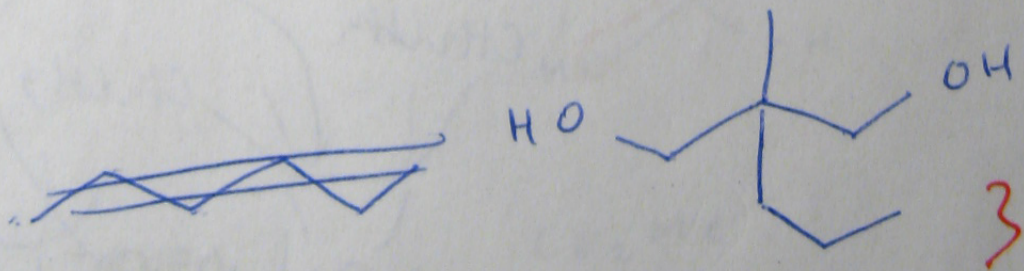


b) Draw clear, unambiguous structural formulas (of the kind drawn above) for each of the following two compounds.

trans-2-ethoxycyclopentanol

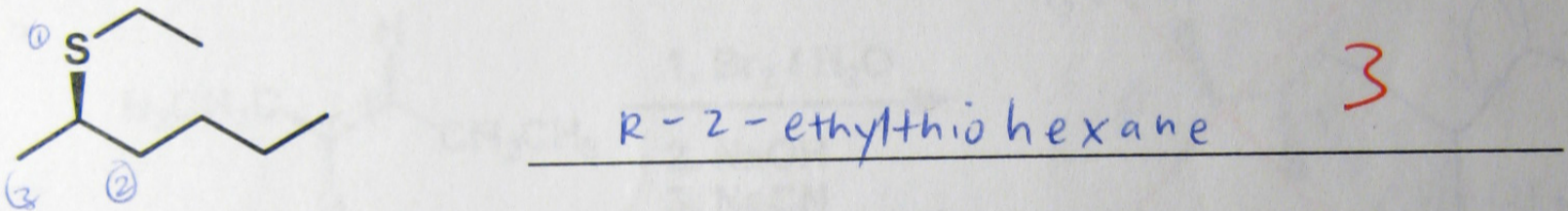
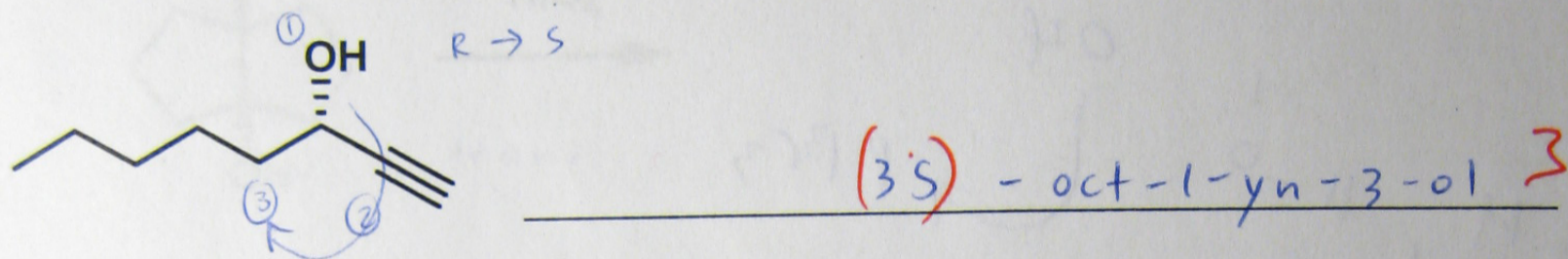


2-methyl-2-propyl-1,3-propanediol



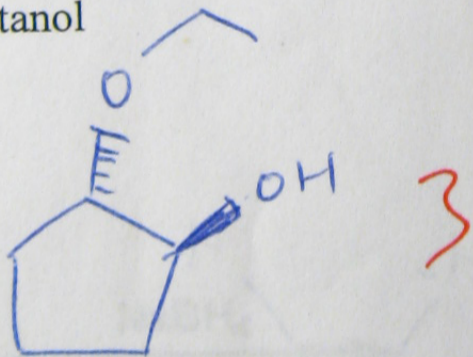
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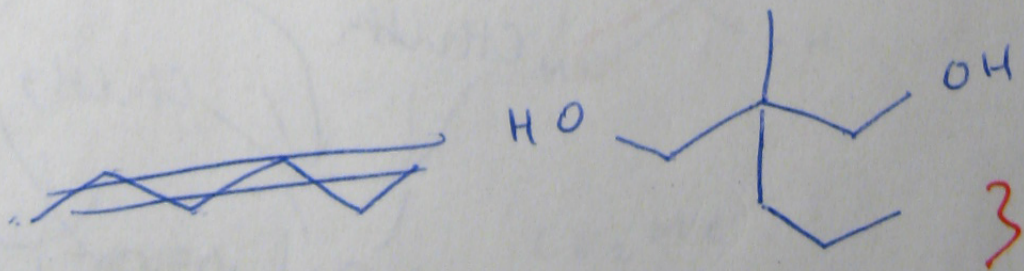


b) Draw clear, unambiguous structural formulas (of the kind drawn above) for each of the following two compounds.

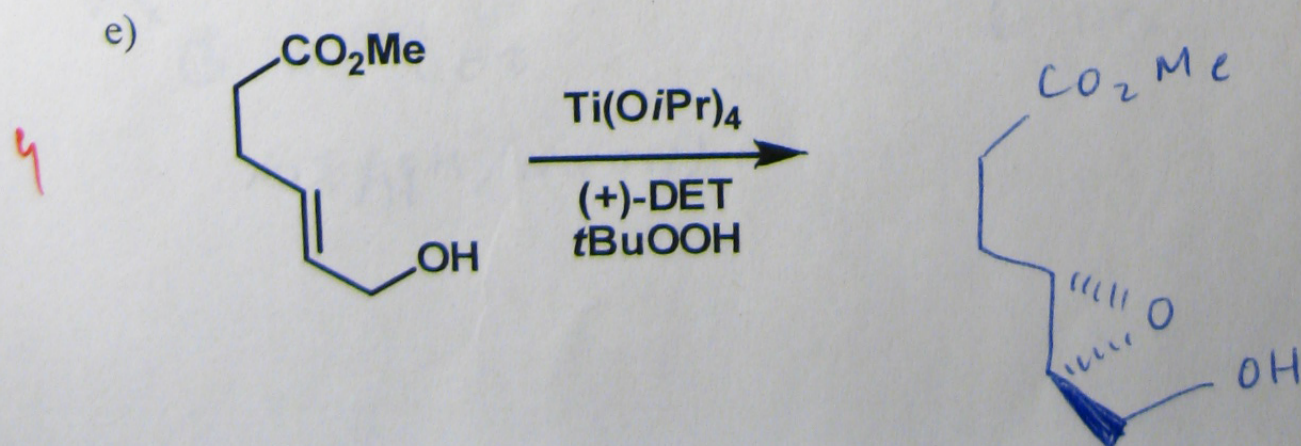
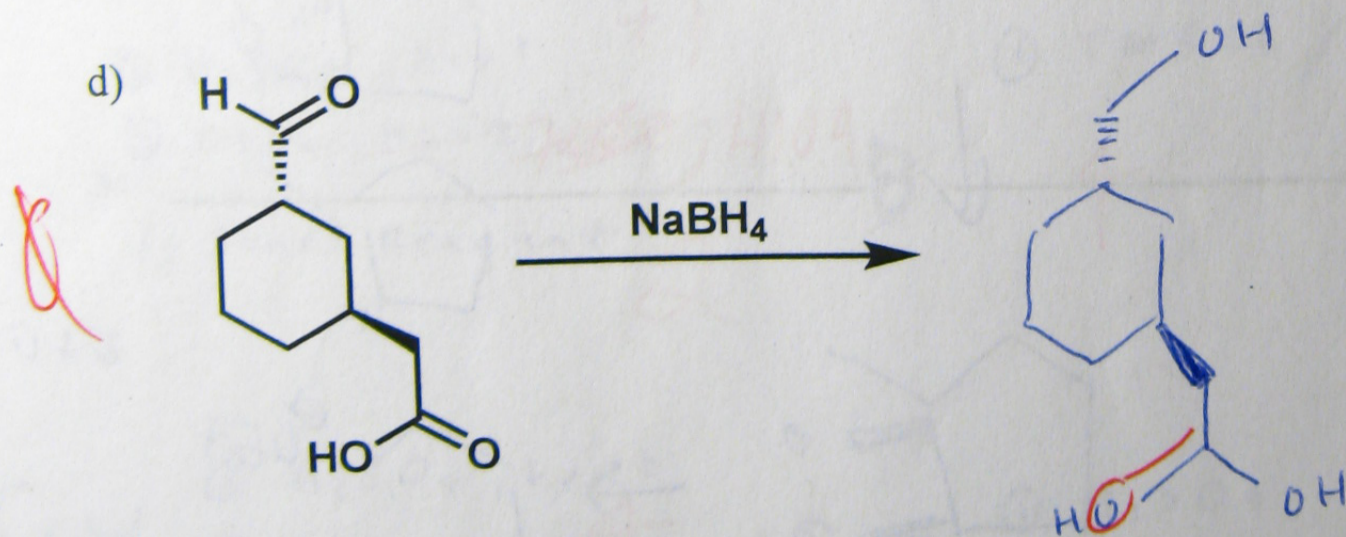
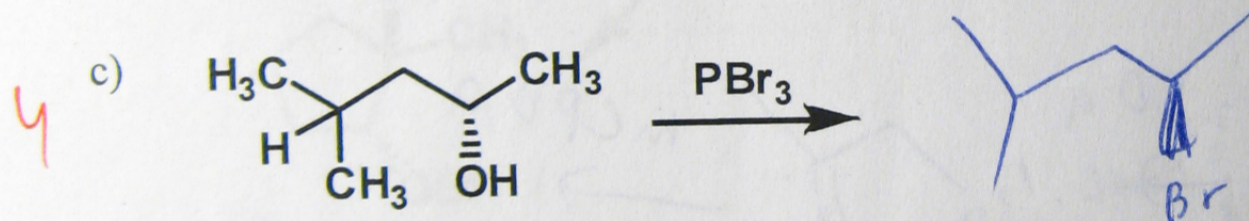
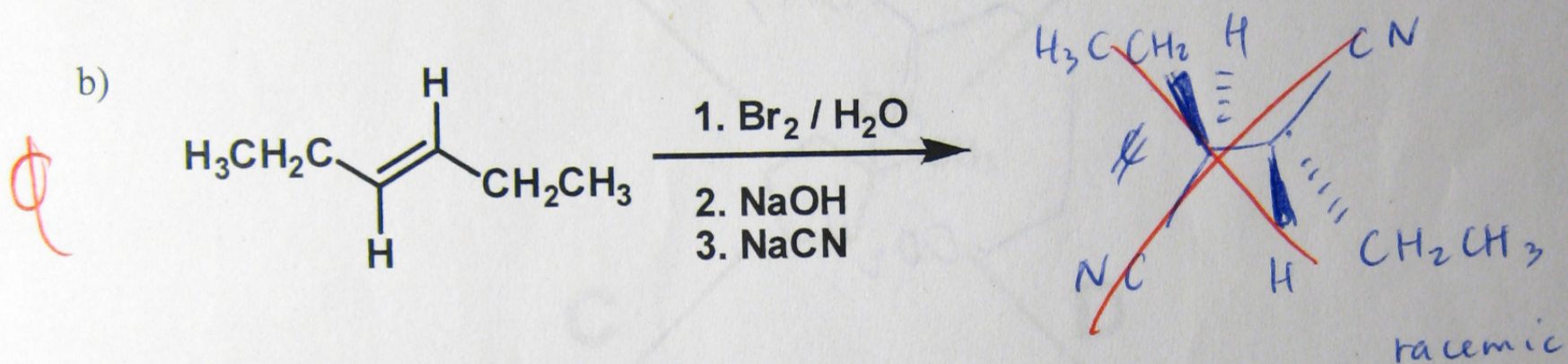
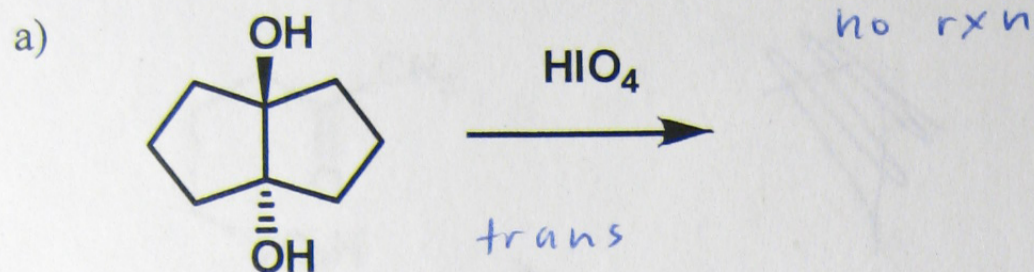
trans-2-ethoxycyclopentanol



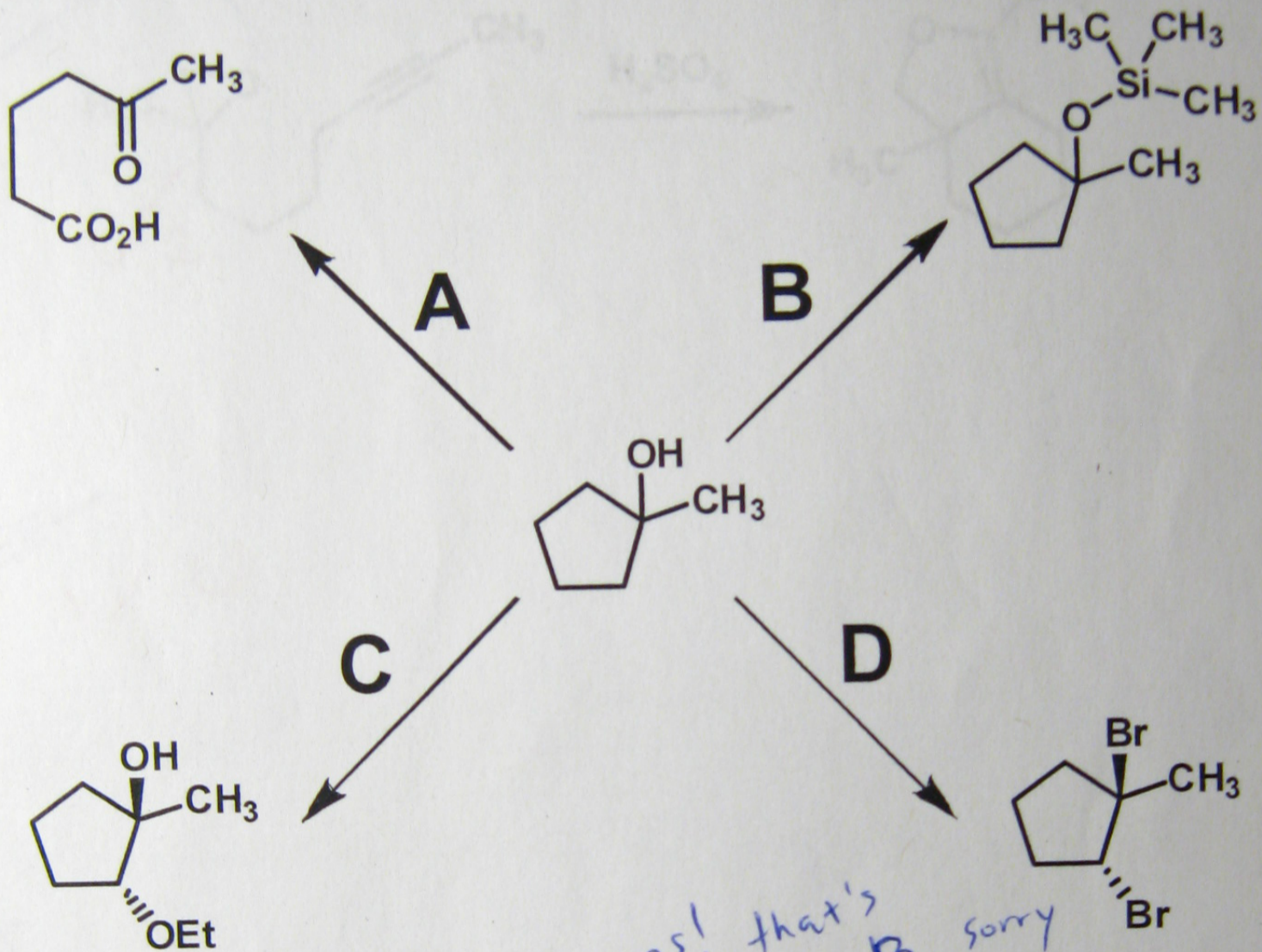
2-methyl-2-propyl-1,3-propanediol



2. (20 points, 4 points each) Predict the major product(s) of each of the following reactions, showing stereochemistry whenever appropriate. If no reaction is expected, state No Reaction.



3. (16 points, 4 points each) Indicate the reagents (or series of reagents) **A** through **D** necessary to effect each of the following transformations. Each letter **A** through **D** may represent more than one reagent. Note that any chiral products are racemic!



A: ① H_2SO_4 , heat +1
 ② OsO_4 , H_2O_2 ~~NaOH~~; HIO_4
 ③ Jones Reagent 2

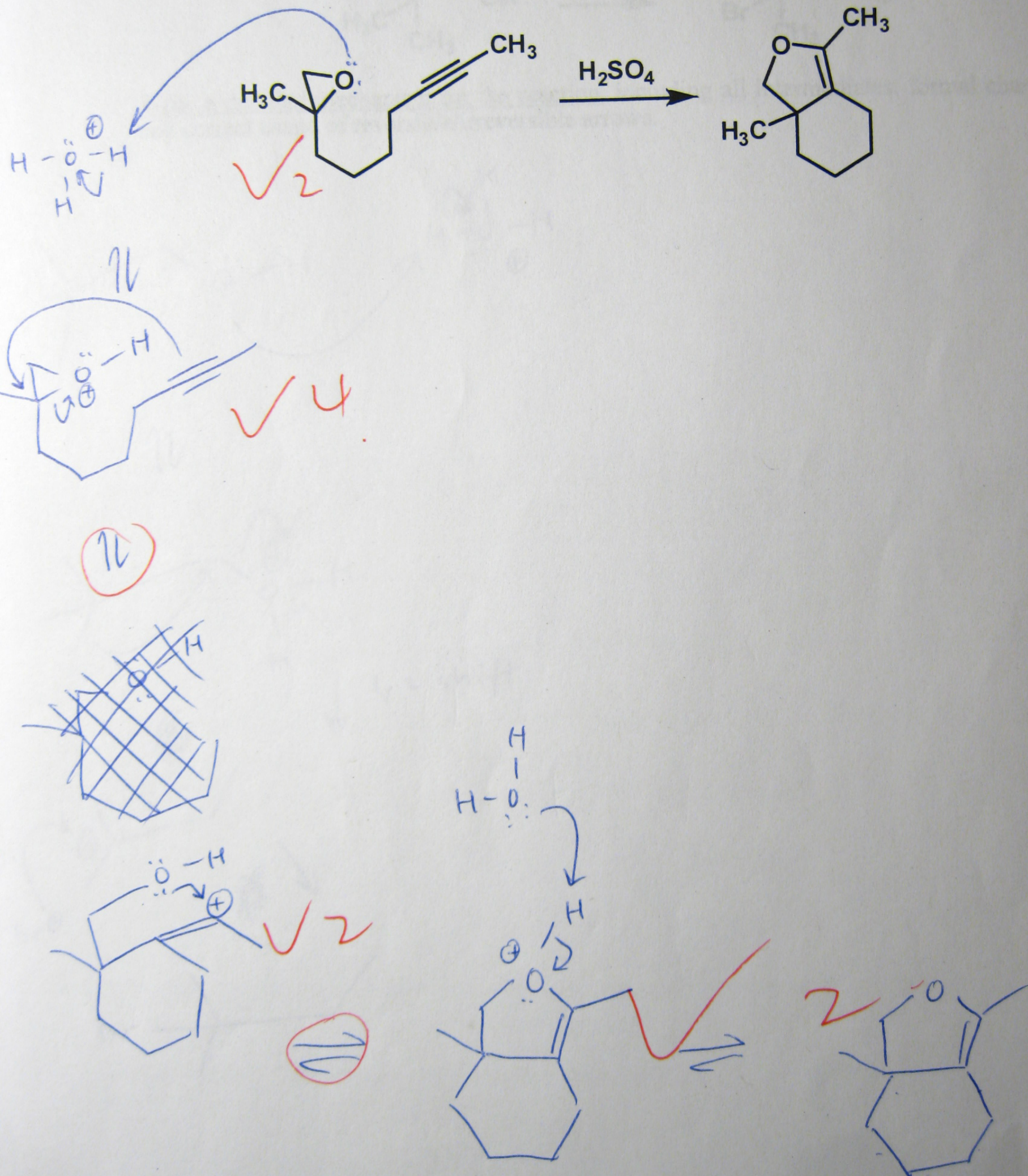
① TMSCl / pyr.

oops! that's B sorry

C: ① H_2SO_4 , heat
 ② mCPBA 4
 ③ $Na^+ OEt^-$
 (EtOH/NaOH)

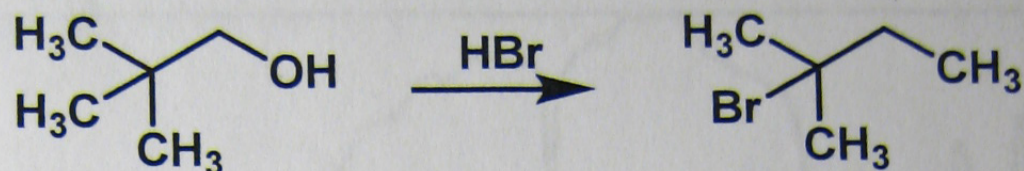
D: ① H_2SO_4 , heat
 ② Br_2 4

4. (10 points) Propose a mechanism to account for this rearrangement including all intermediates, formal charges, and correct usage of reversible/irreversible arrows.

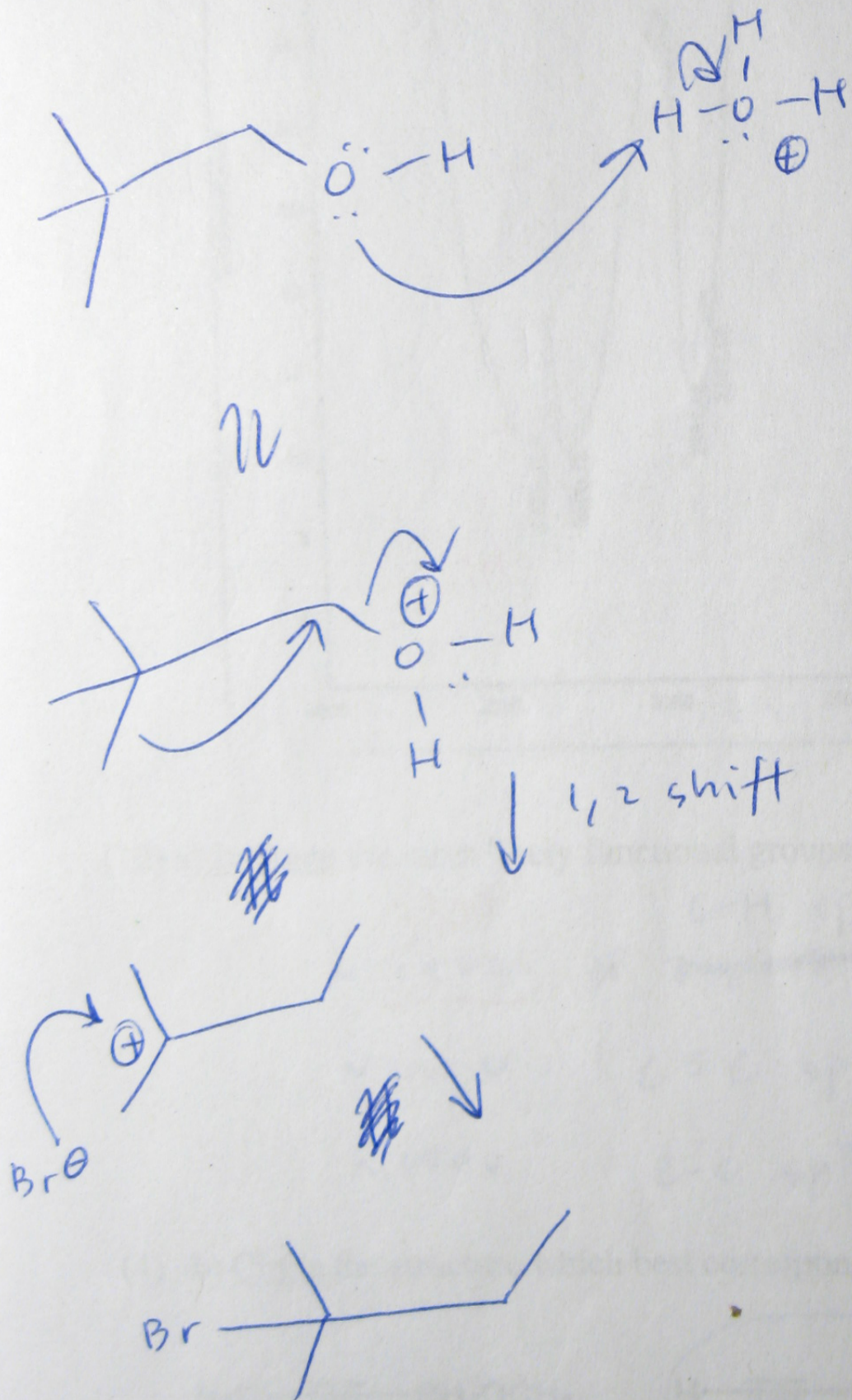


-2 for wrong arrows

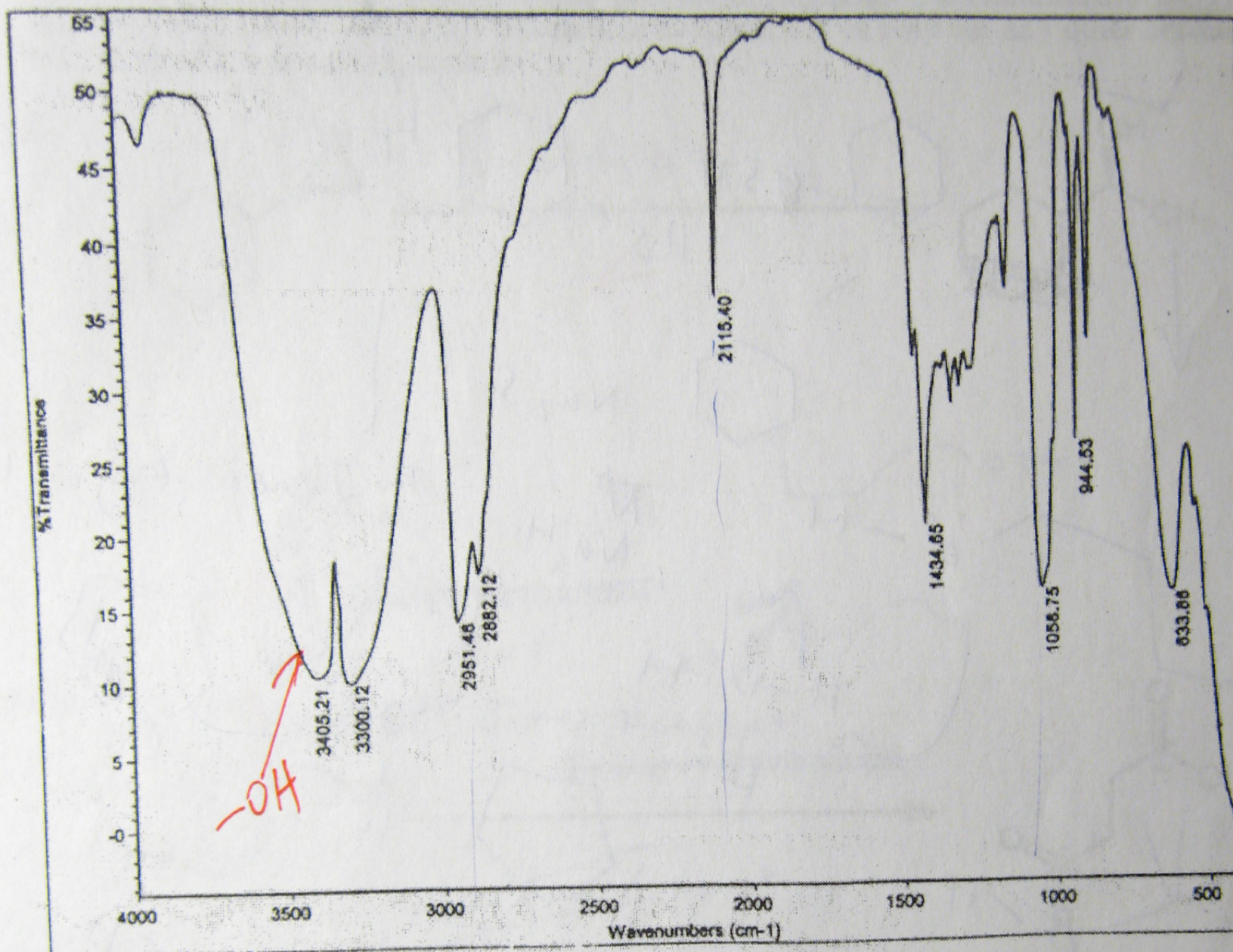
5. (10 points) Treatment of neopentylalcohol with HBr affords 2-bromo-2-methylbutane.



Write a detailed mechanism for the reaction, including all intermediates, formal charges, and correct usage of reversible/irreversible arrows.



6. (16 points) A common organic molecule (C_5H_8O) has this infrared spectrum:

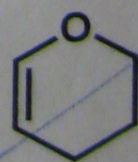
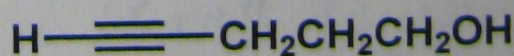
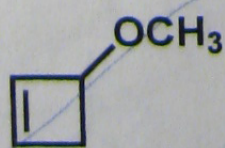
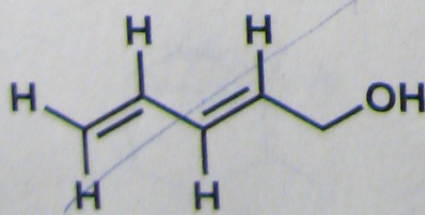
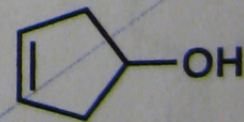
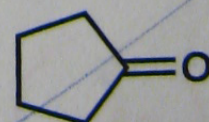
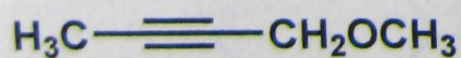


12) a) Indicate the most likely functional groups which give rise to each of the peaks above 1500 cm^{-1} .

~ 3300
 ~ 3400 ~~peaks~~ \Rightarrow ~~alkyne~~ **2**
 ~ 2100 $C \equiv C$ sp \Rightarrow alkyne **3**
 ~ 2900 $C-C$ sp^3 \Rightarrow alkane **3**

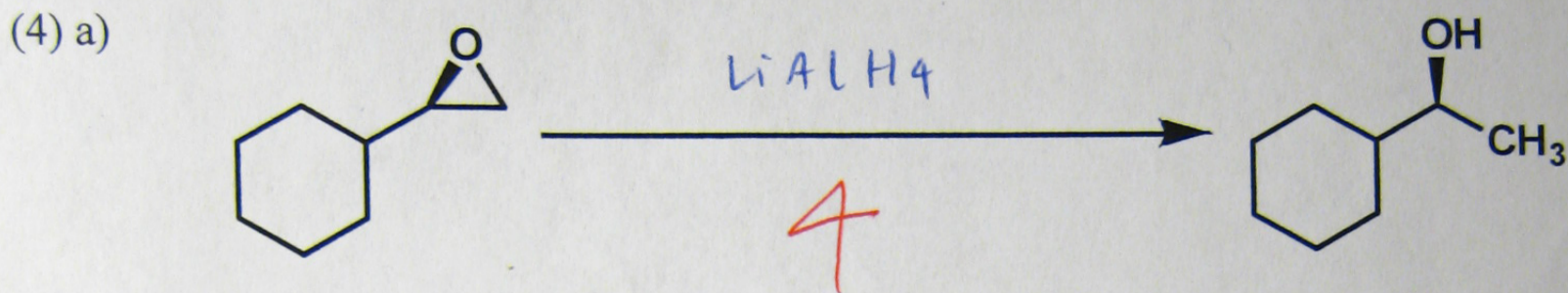
possible O-H?

(4) b) Circle the structure which best corresponds to the spectrum above (all are C_5H_8O):

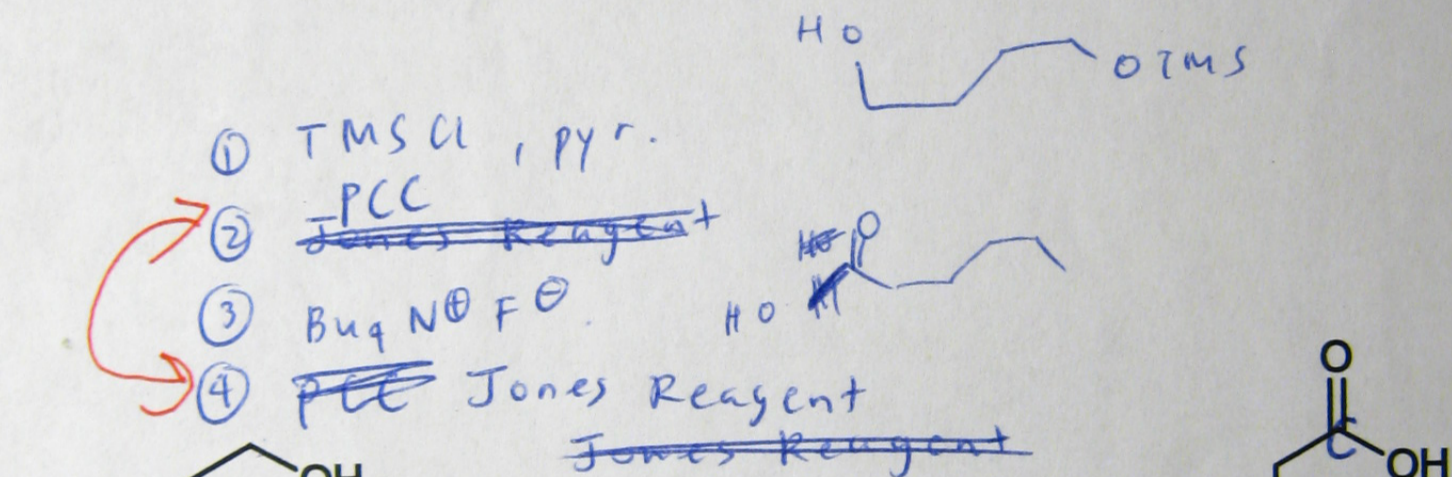


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7. (16 points, as indicated) Transform each of the given starting materials into the desired products by a reasonable route, namely provide the reagents and conditions. (NOTE: More than one step may be necessary for each conversion.) You may use any other normal organic and inorganic reagents as needed.



(6) b)



(6) c)

