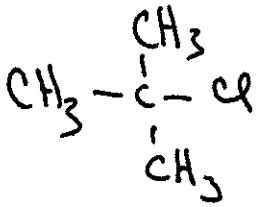
Chemistry 3331-100
Organic Chemistry / Dr. Barney Ellison
Thursday: Feb. 12th @ **7:00pm → 9:00** / 1st Exam / Chemistry Humanities 1B50)

Name: Key (please print)

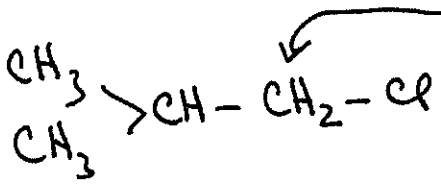
1. (10 pts) Consider the isomers of $C_4H_9C\ell$. Which species has an ^1H NMR spectrum that: choices are: $CH_3CH_2CH_2CH_2Cl$, $CH_3CH_2CH(Cl)CH_3$, $CH_3CH(CH_3)CH_2Cl$, $CH_3-C(Cl)(CH_3)_2$

a) Contains a single peak.

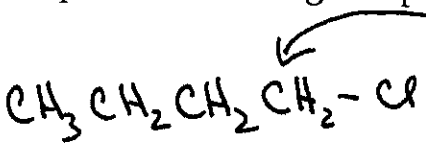


all protons are identical

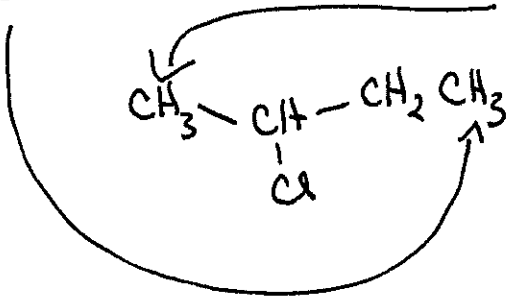
b) Has several peaks including a doublet at δ 3.4.



c) Has several peaks including a triplet at δ 3.5.

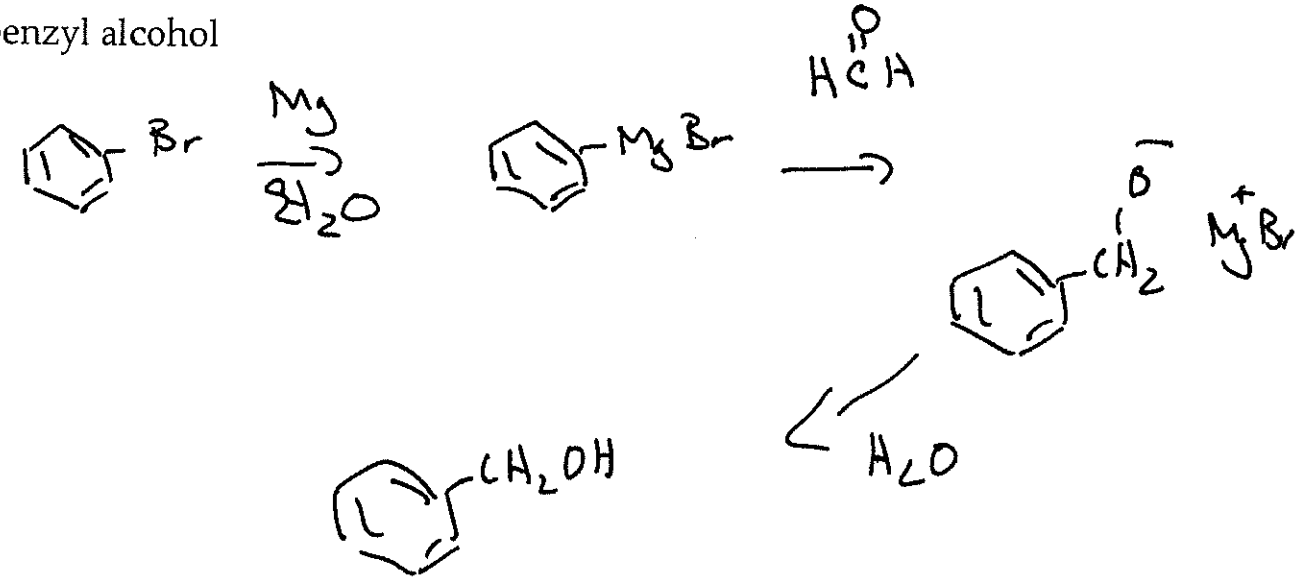


d) Has several peaks including two distinct 3-proton signals, one of them a triplet at δ 1.0 and the other a doublet at δ 1.5.

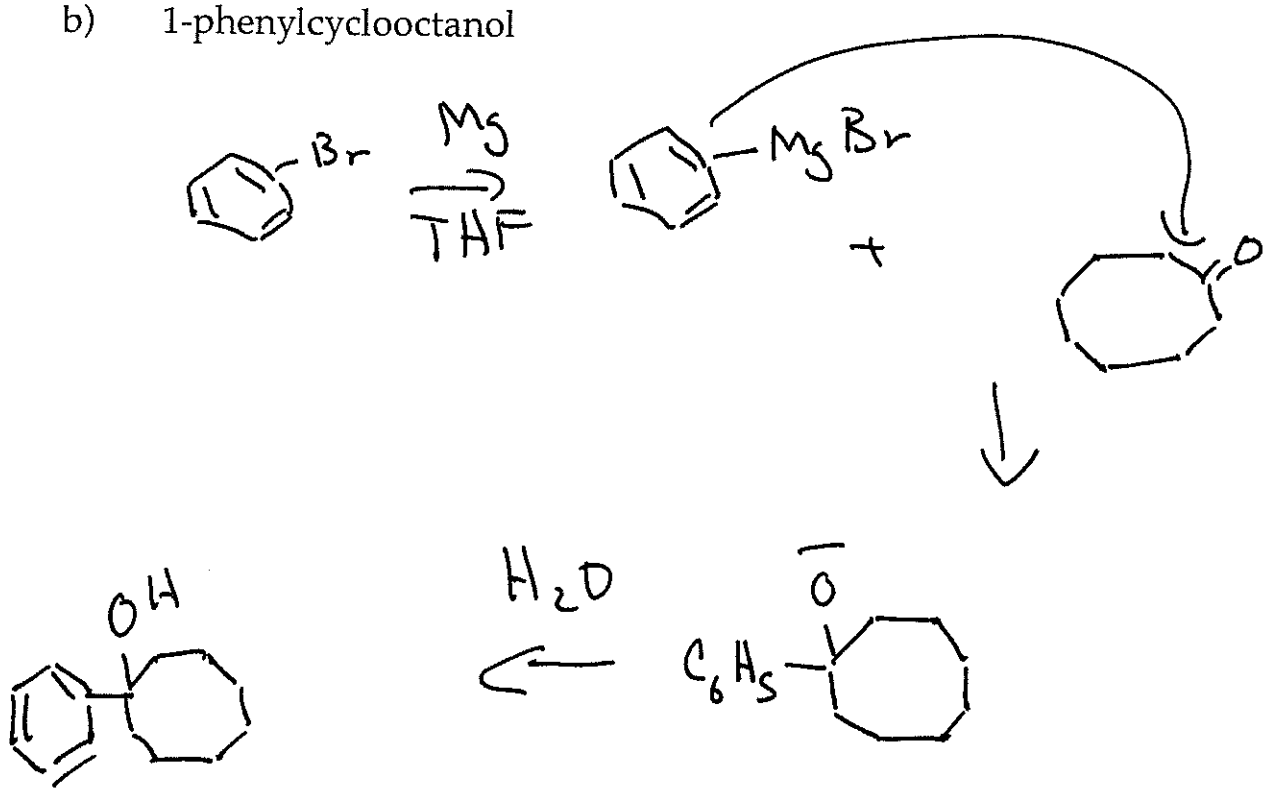


2. (10 pts) Using bromobenzene and any other reagents, propose a synthesis for:

a) benzyl alcohol



b) 1-phenylcyclooctanol



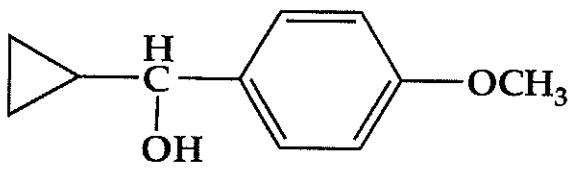
3. (10 pts) What combinations of Grignard reagent + carbonyl compounds produce:

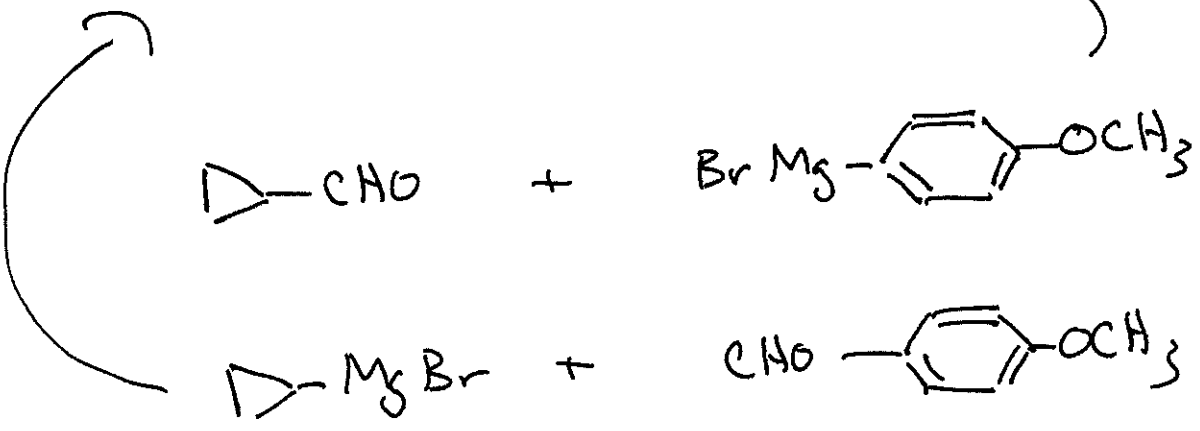
a) $CH_3CH_2CHCH_2CH(CH_3)_2$ (OH)

CH_3CH_2CHO + $CH_2(MgCl)CH(CH_3)_2$

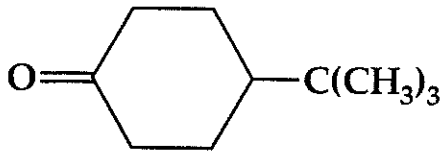
or

~~$CH_3CH_2CH_2MgCl$~~ CH_3CH_2MgCl + $CHO-CH_2-CH(CH_3)_2$

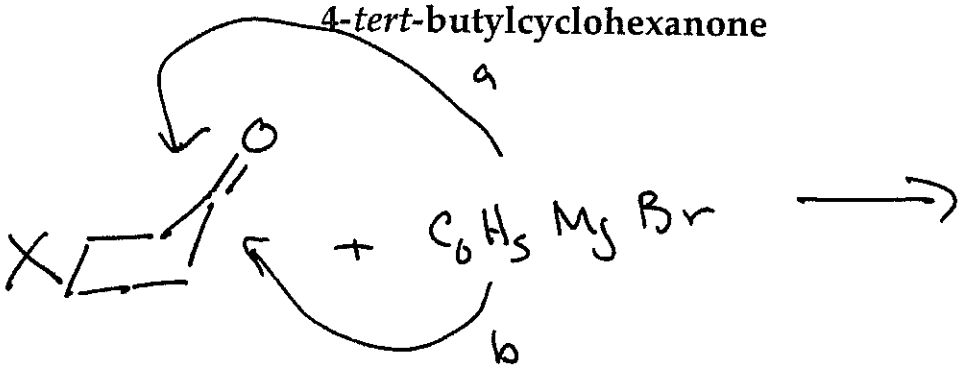
b) 

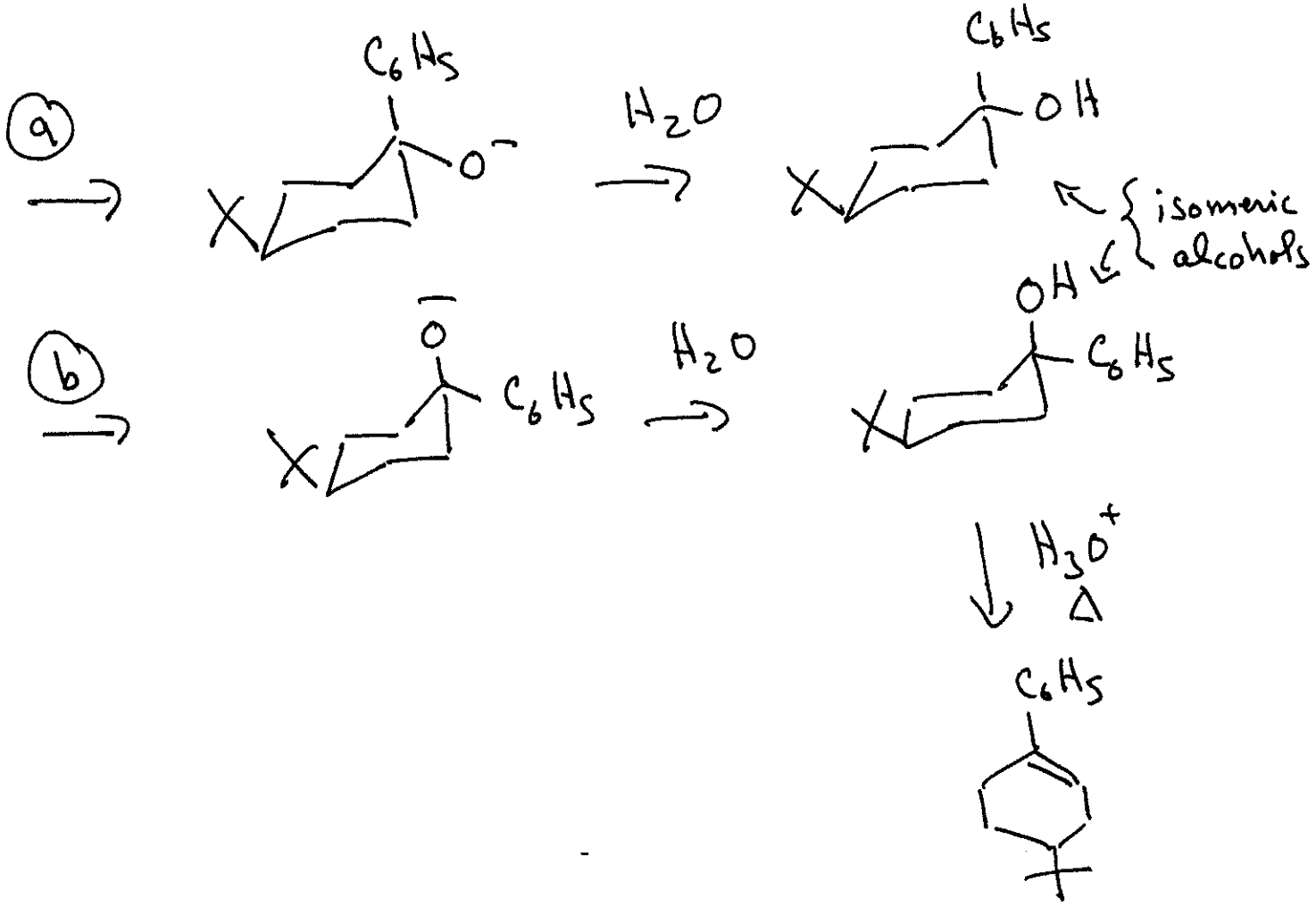


4. (10 pts) Addition of phenylmagnesium bromide to 4-*tert*-butylcyclohexanone gives two isomeric tertiary alcohols as products. Both alcohols yield the same alkene when subjected to acid catalyzed dehydration. Suggest reasonable structures for these two alcohols.



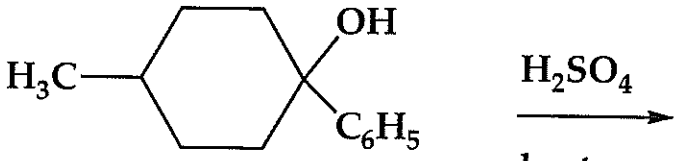
4-*tert*-butylcyclohexanone





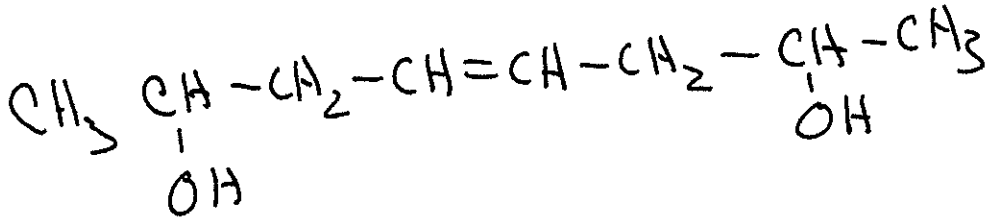
5. (20 pts) Predict the products of each reaction.

a)

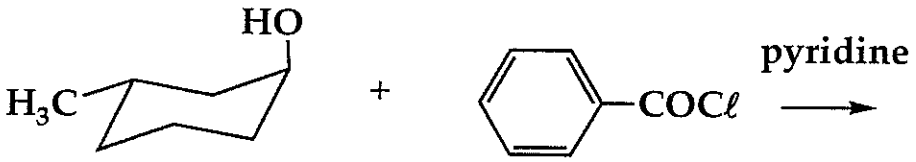


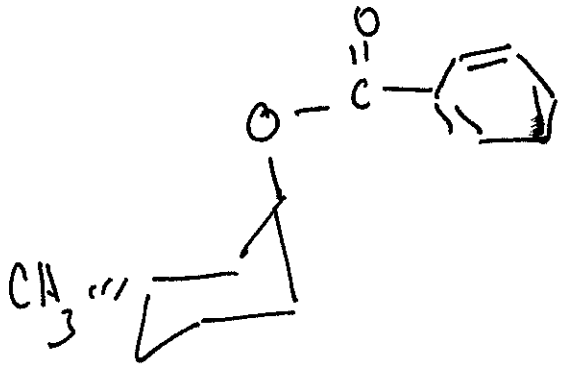
b)

c) $CH_3COCH_2CH{=}CHCH_2COCH_3 \xrightarrow[2.\ H_2O]{1.\ LiA\ell H_4}$

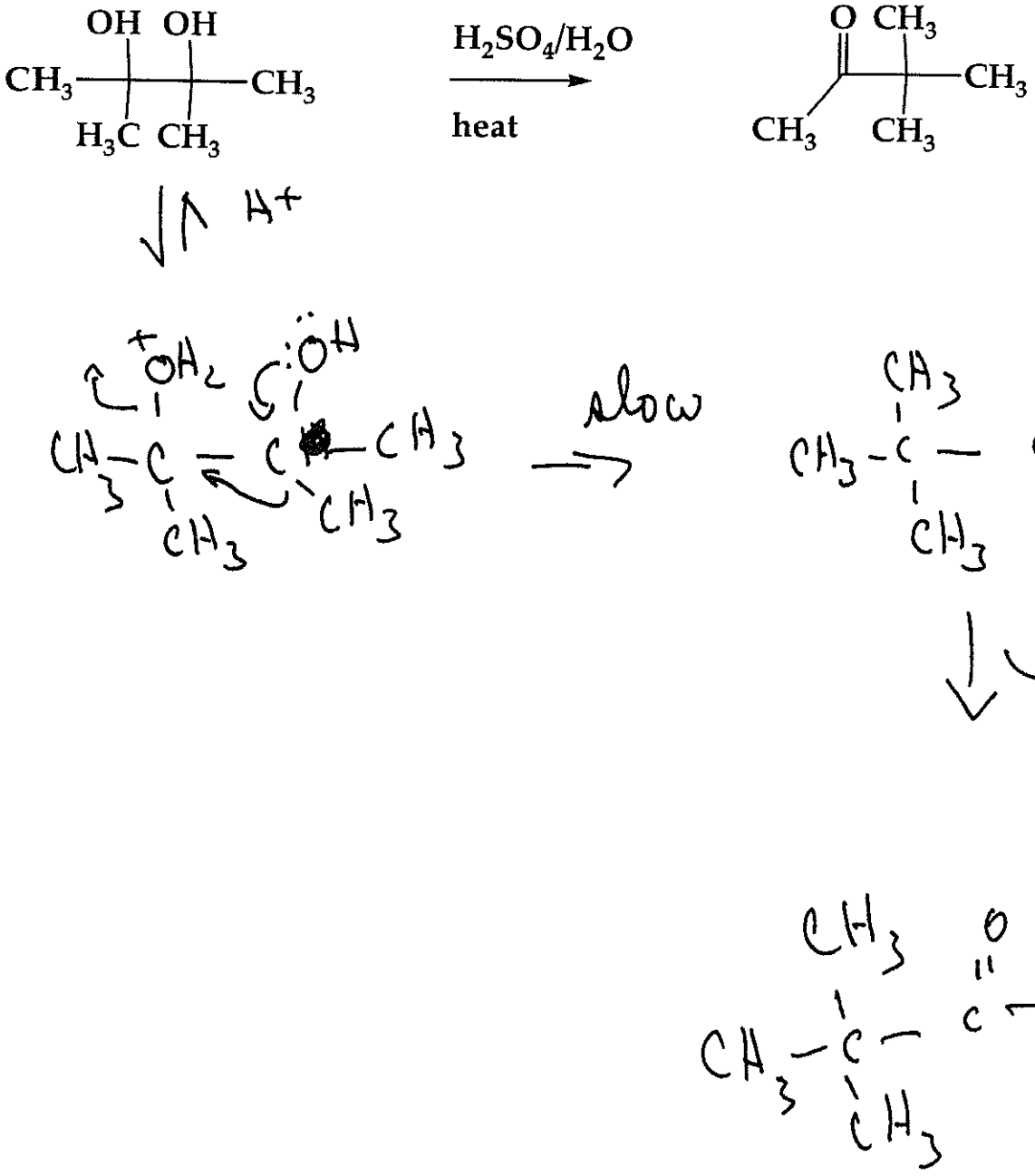


d)

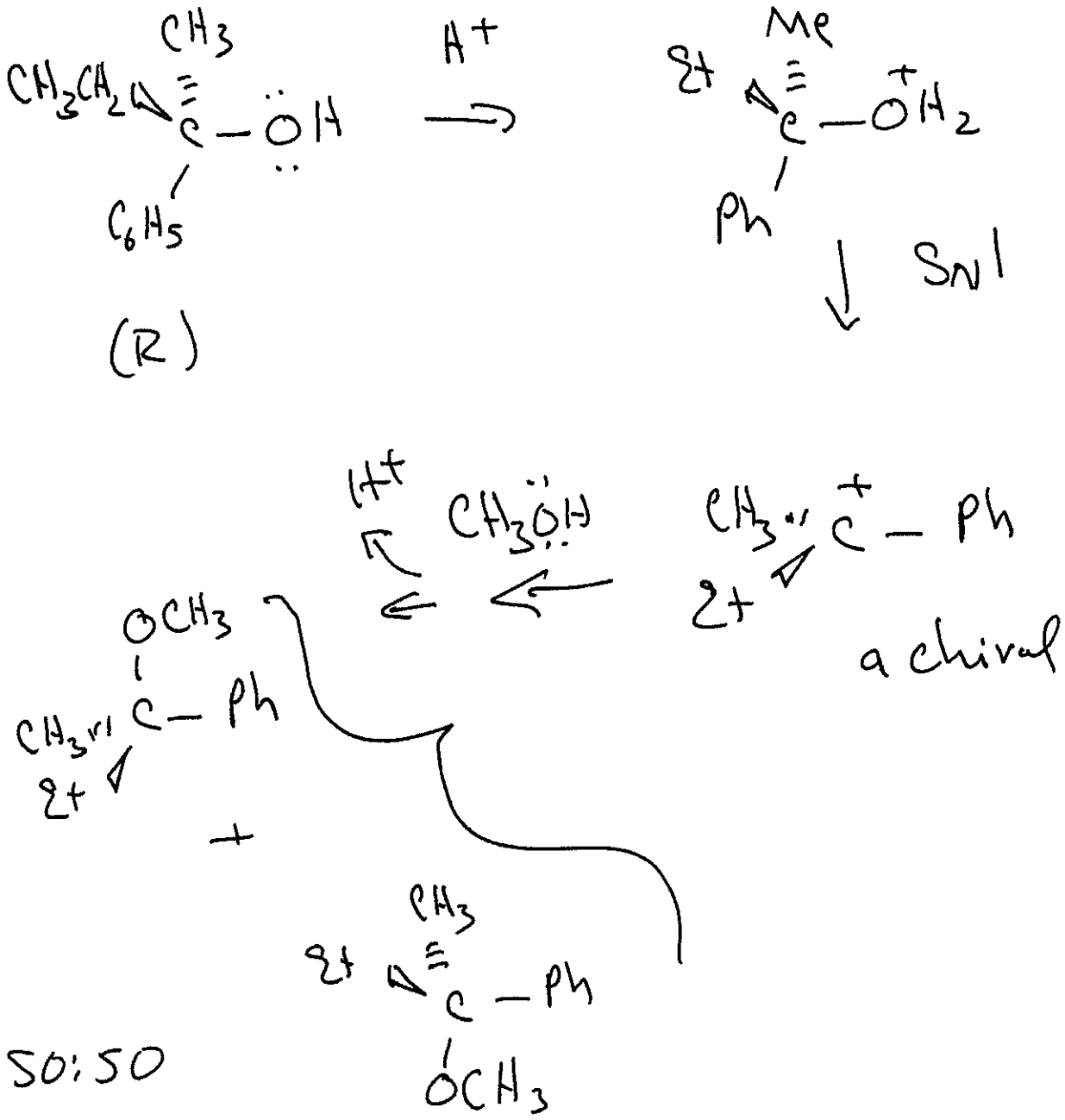




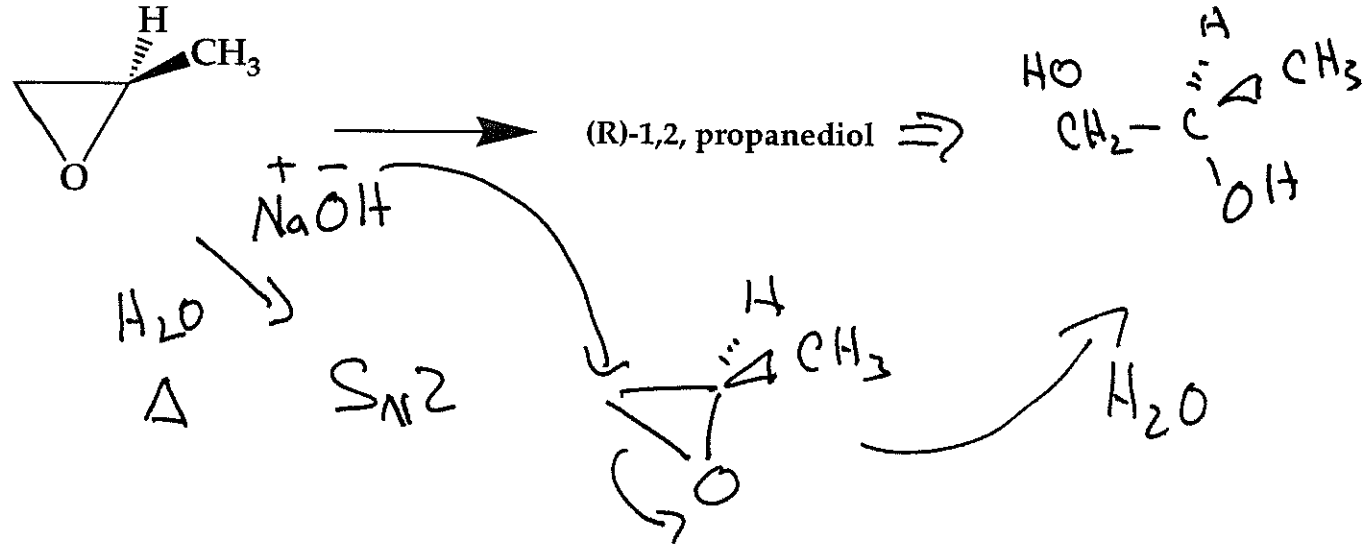
6. (10 pts) Suggest a mechanism for the pinacol rearrangement.

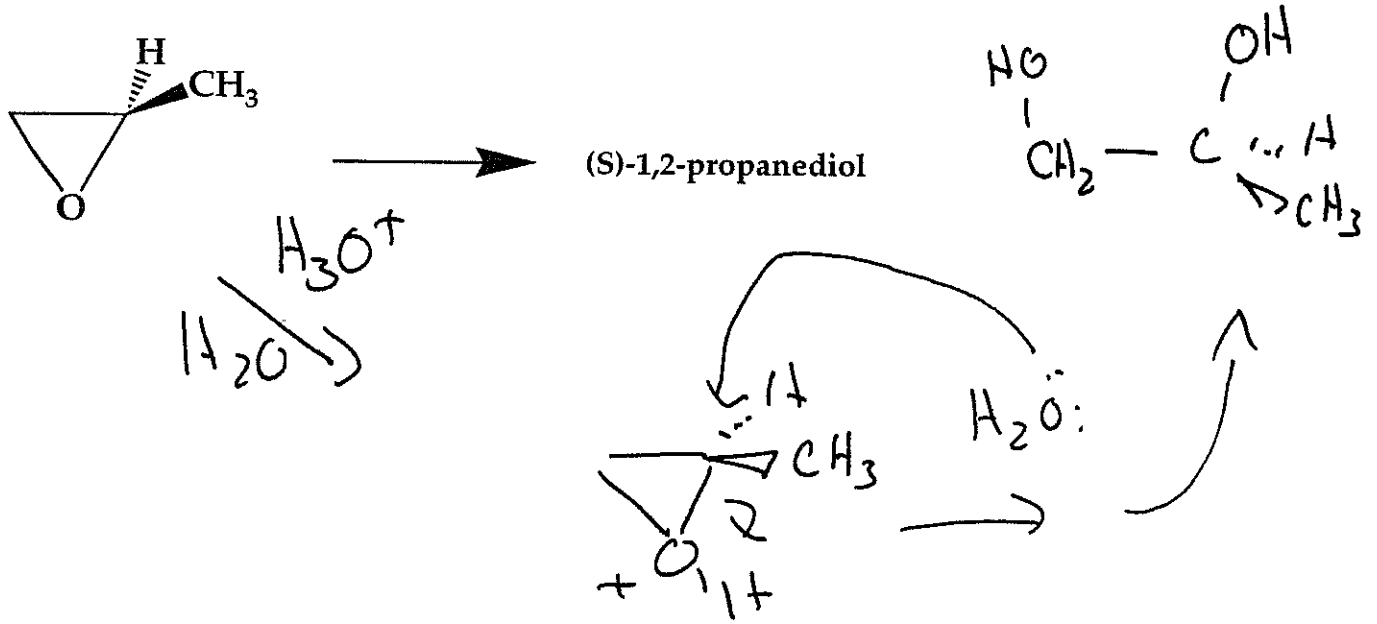


7. (10 pts) When (*R*)-(+)-2-phenyl-2-butanol is allowed to stand in CH_3OH/H^+, racemic 2-methoxy-2-phenylbutane is formed. Show a mechanism.



8. (10 pts) Select reaction conditions to carry out the following:





9. (10 pts) Suggest a mechanism for the following reaction.