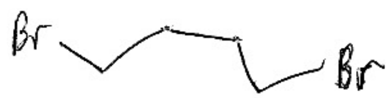
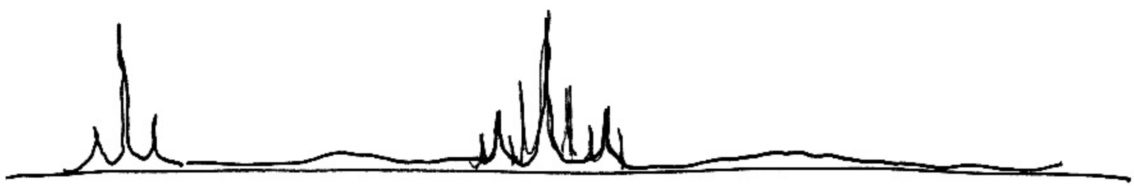
Chemistry 3351-100
Organic Chemistry / Dr. Barney Ellison
Thursday: Nov. 15th @ **7:00pm → 9:00** / 3rd Exam / Hellems 252

Name: Key (please print)

1. (15 pts) Sketch the NMR spectrum for each of the following. Be sure to note approximate δ, relative areas, and splittings of each of the peaks.

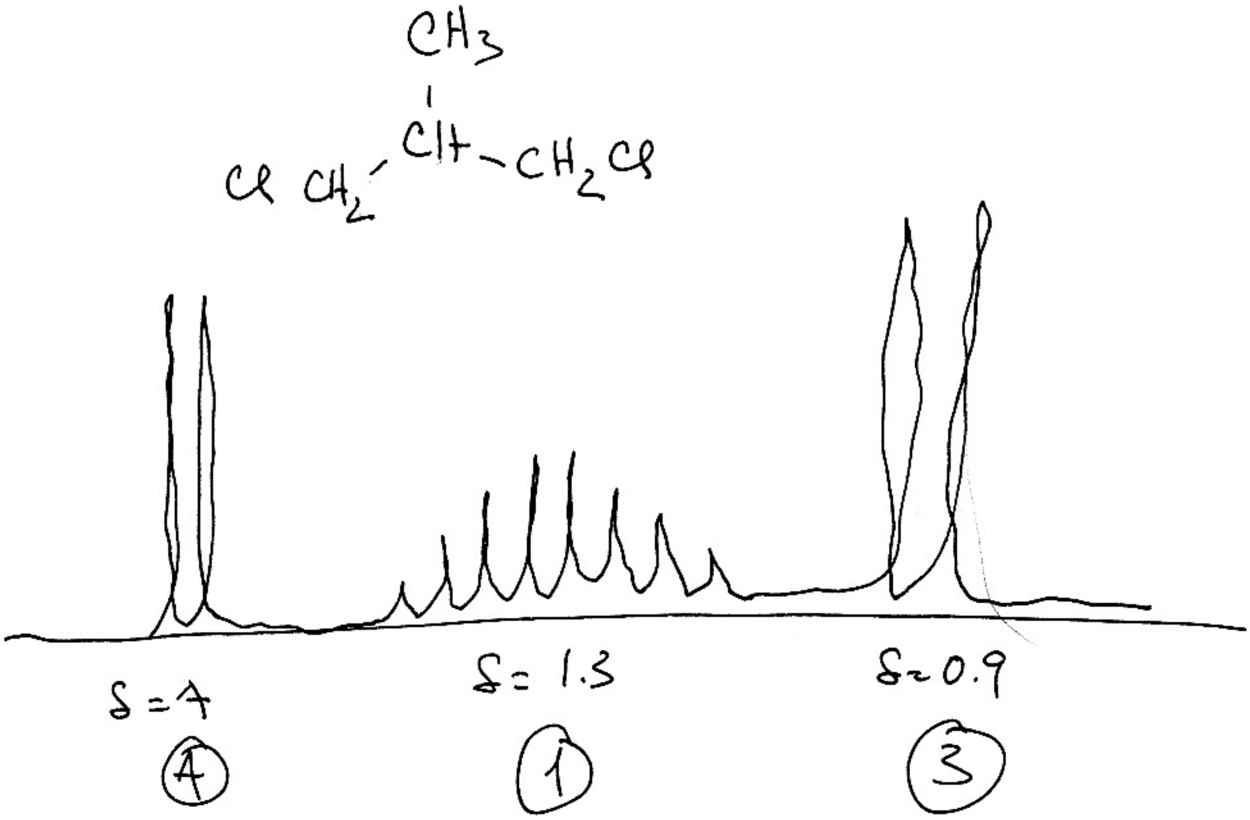
a) $BrCH_2CH_2CH_2CH_2Br$



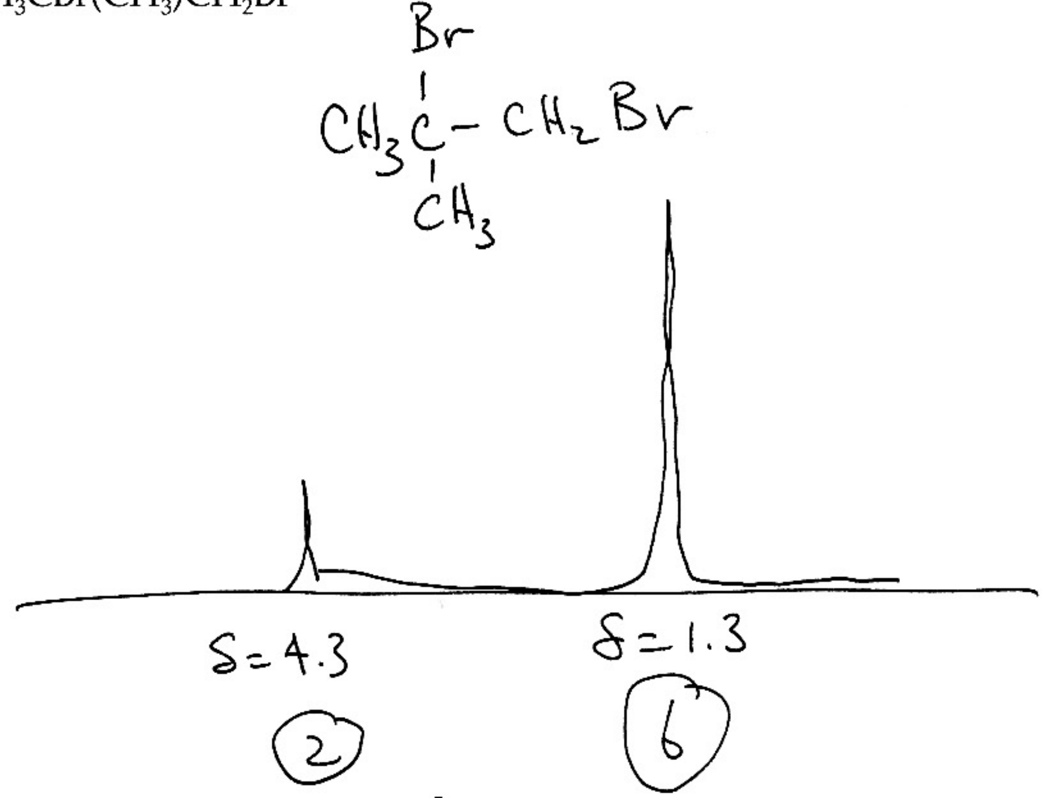


$\delta = 3.7$ (4) $\delta = 1.3$ (4)

b) $C\ell CH_2CH(CH_3)CH_2C\ell$



c) $CH_3CBr(CH_3)CH_2Br$



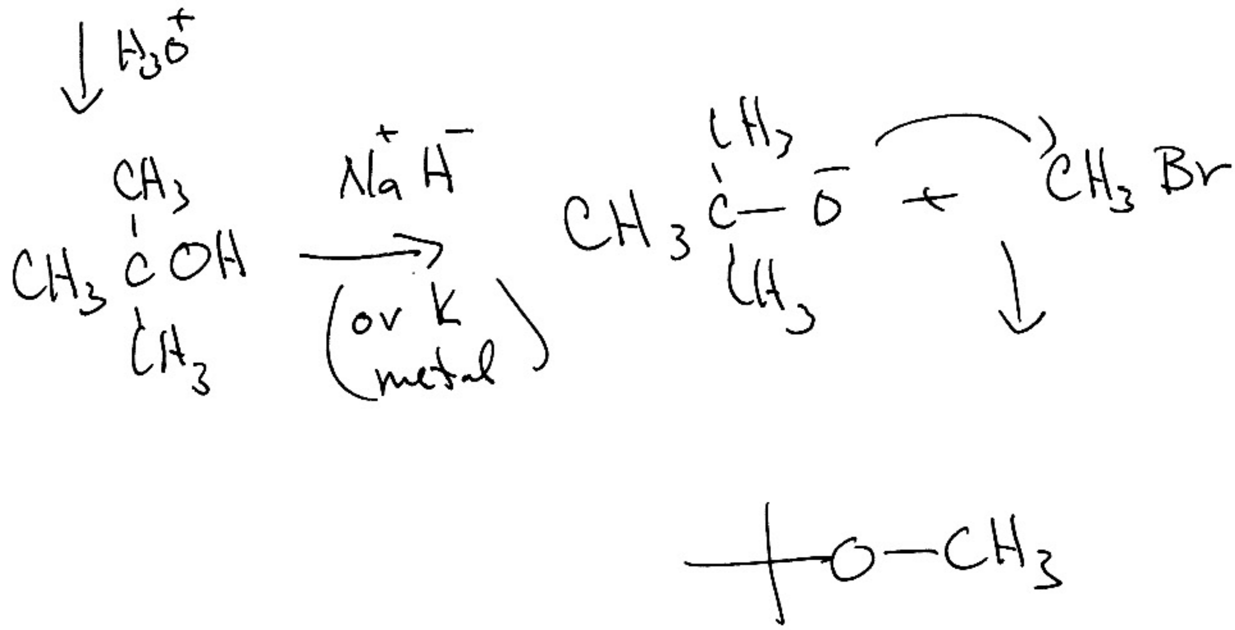
2. (15 pts) Show how to accomplish the following conversions in a practical manner.

a) $CH_3CH_2CH_2CH_2OH \rightarrow CH_3CH_2CH_2CH_2CN$

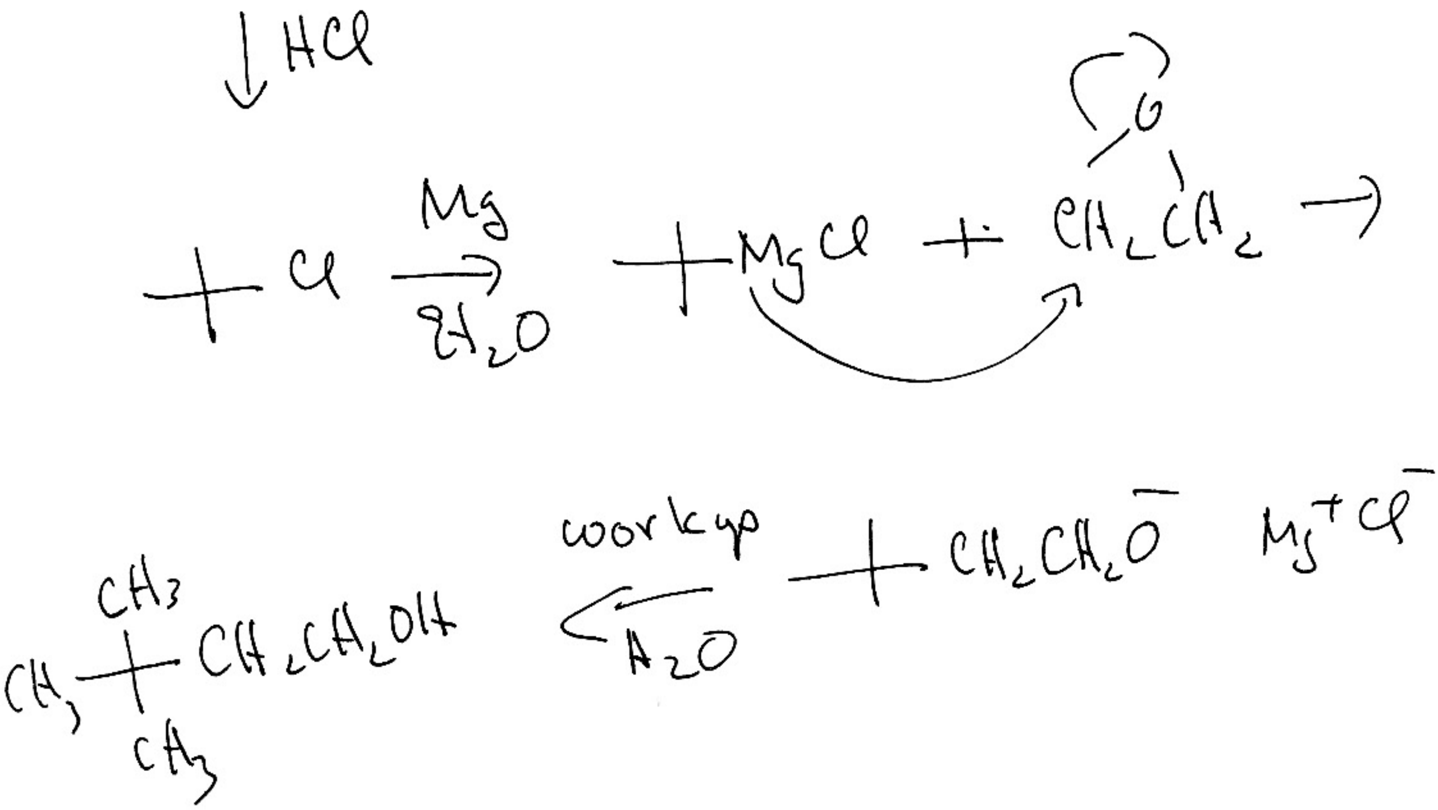
$\downarrow SOCl_2$

K^+CN^-
DMF solvent is best

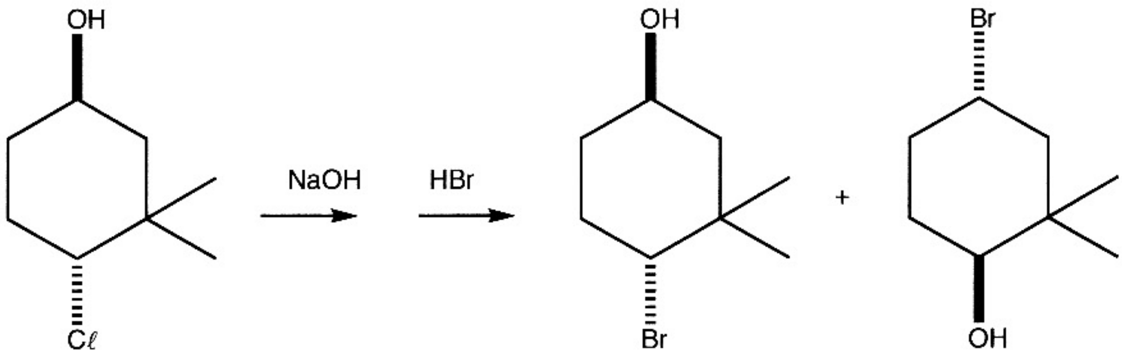
b) $(CH_3)_3CC\ell \rightarrow (CH_3)_3COCH_3$

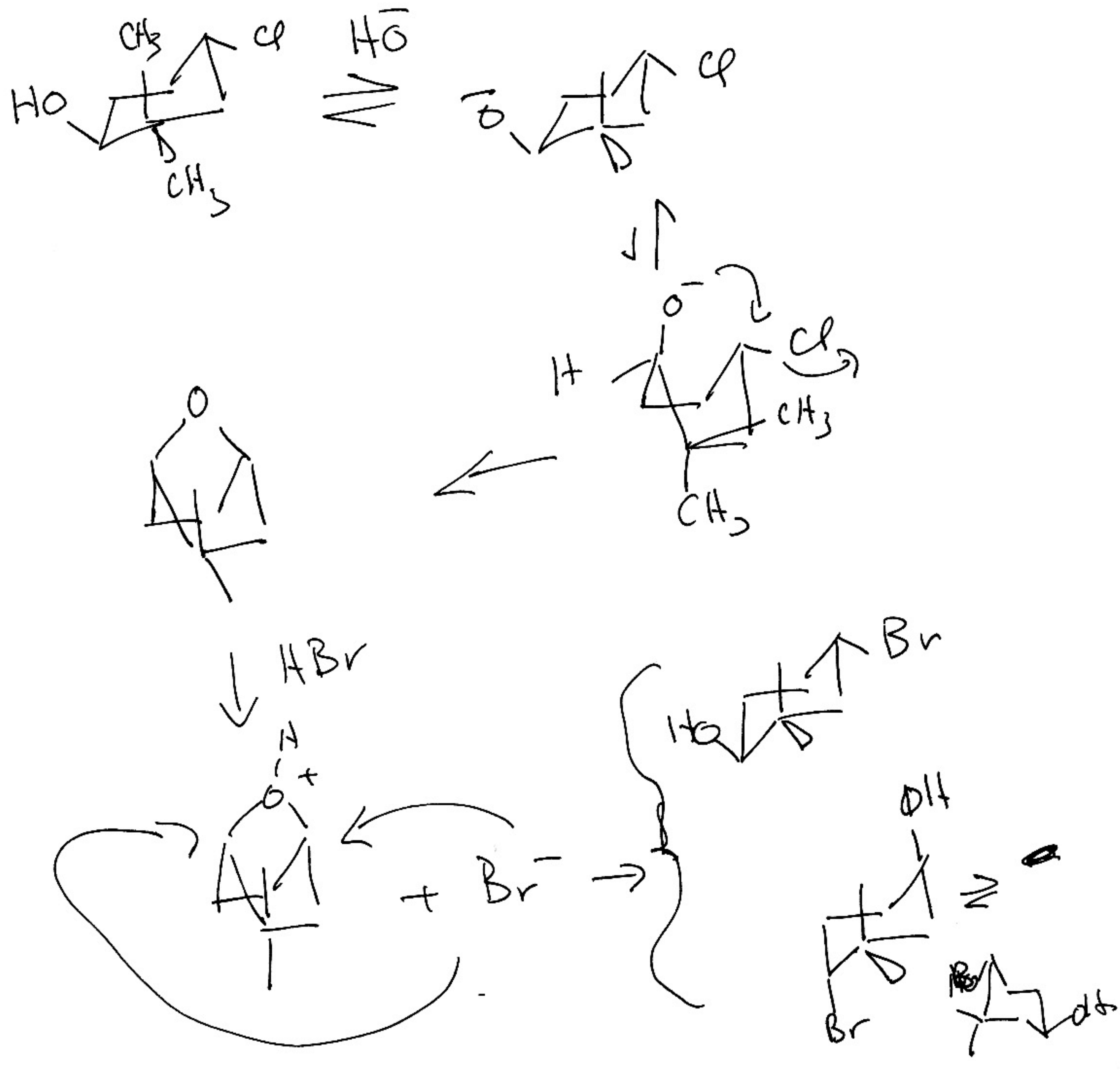


c) $(CH_3)_3COH \rightarrow (CH_3)_3CCH_2CH_2OH$

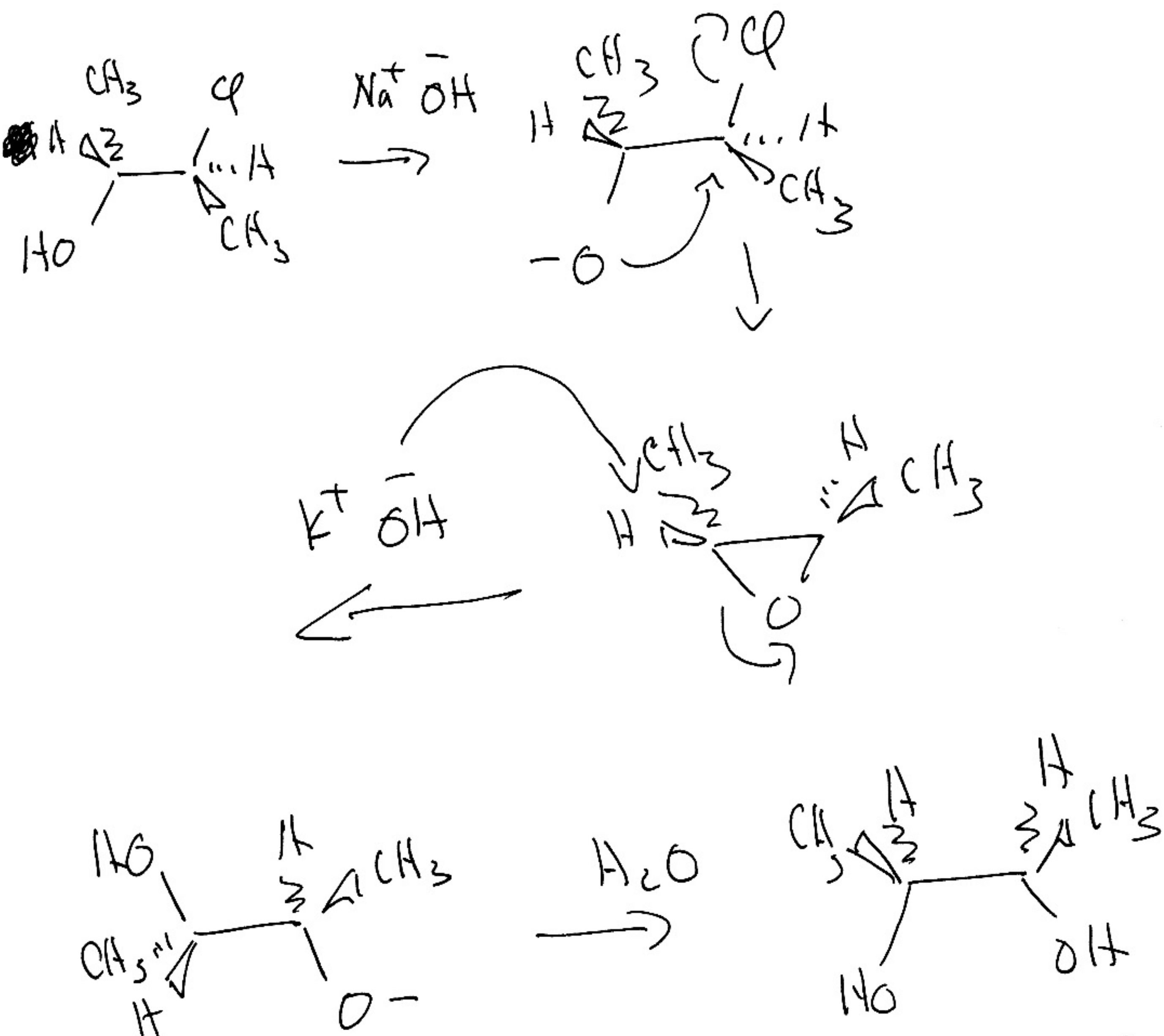


3. (10 pts) Provide a reaction mechanism.





4. (10 pts) Optically active (2R, 3S)-3-chloro-2-butanol is allowed to react with NaOH in EtOH to give an optically active oxirane, which is treated with KOH in H_2O to obtain 2,3-butanediol. What is the structure of the diol? What can be said about its optical rotation?

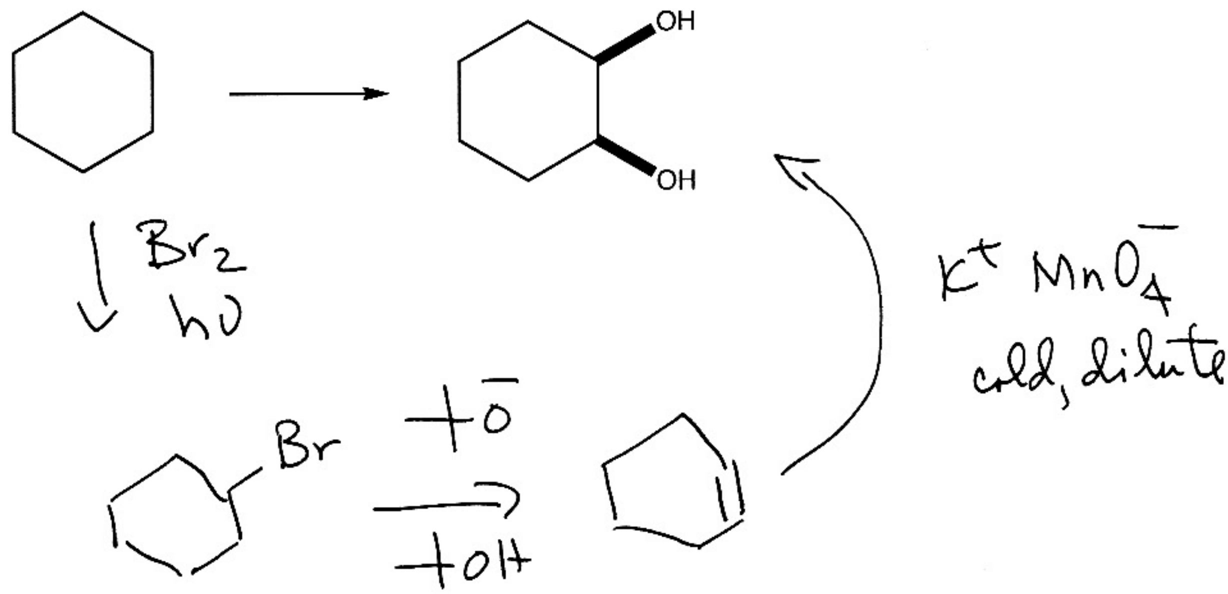


meso diol

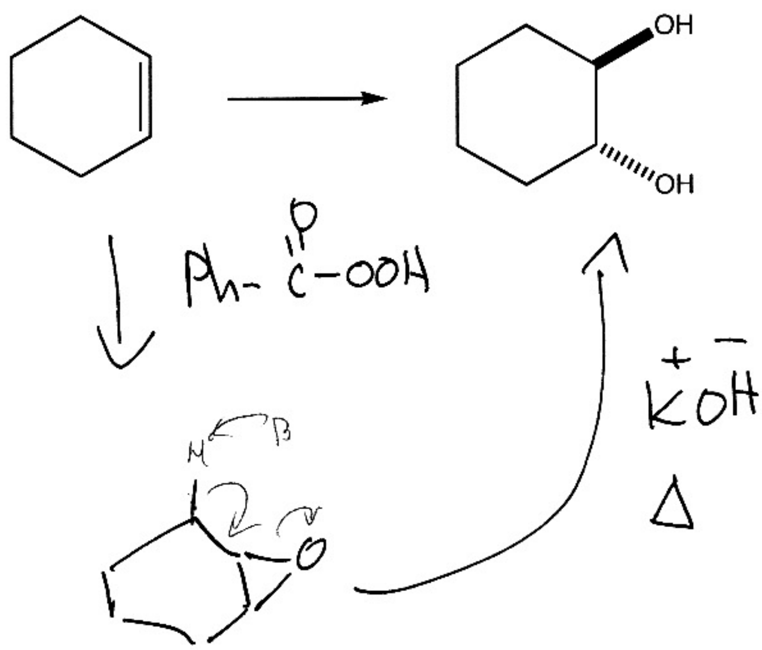
optically inactive

5. (20 pts) Show how to accomplish the following conversions in a practical manner.

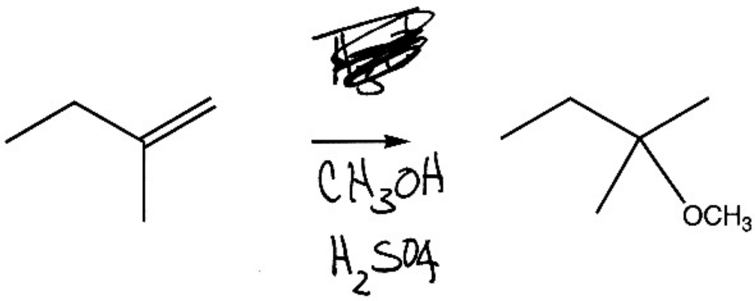
a)



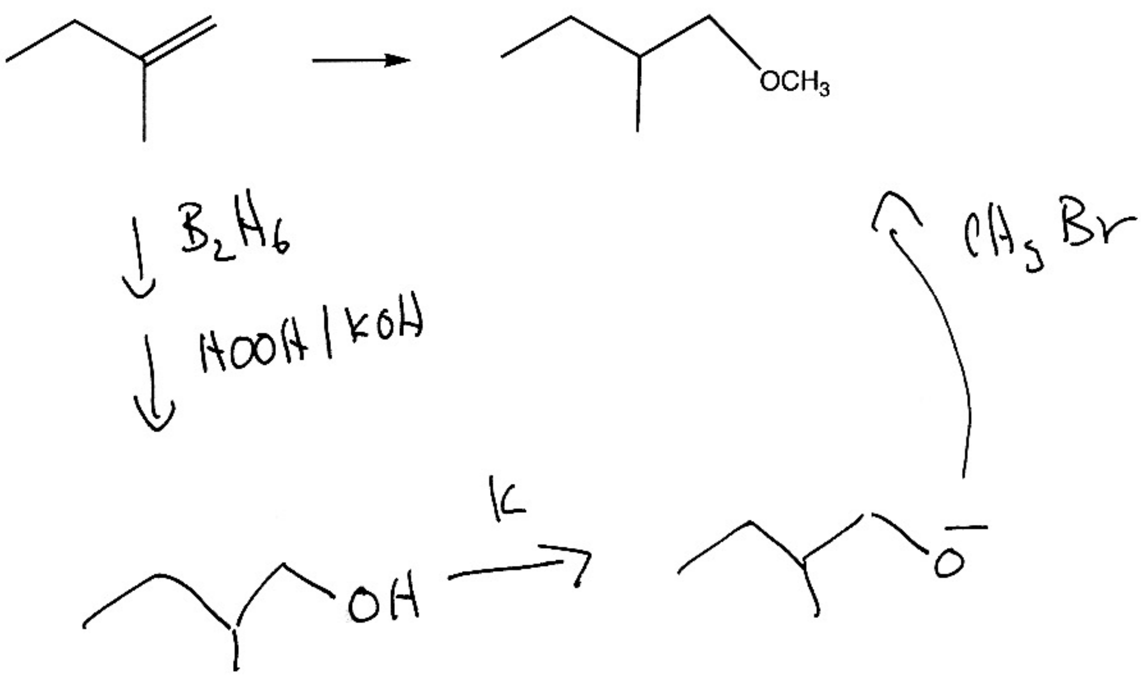
b)



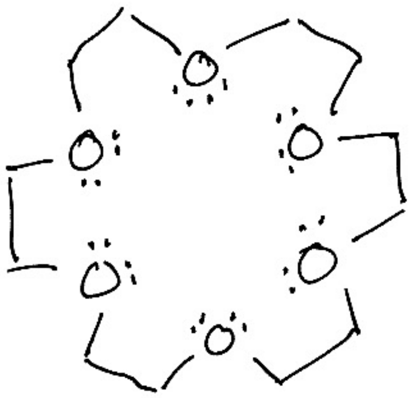
c)



d)



6. (10 pts) 18-crown-6 is a useful catalyst for some reactions of potassium salts. For example, KF reacts with 1-bromooctane to give 1-fluorooctane much faster in the presence of 10 mole % 18-crown-6 than in its absence. However, the crown ether is ineffective as a catalyst if NaF is used. Why?

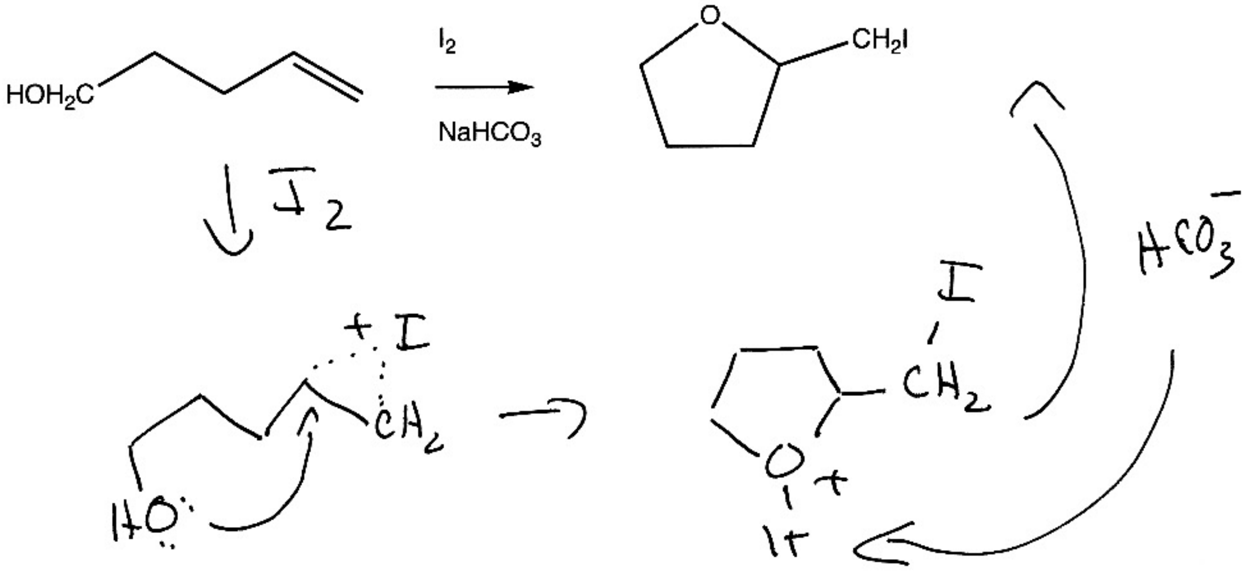


cavity in 18-crown-6 is just right for K^+

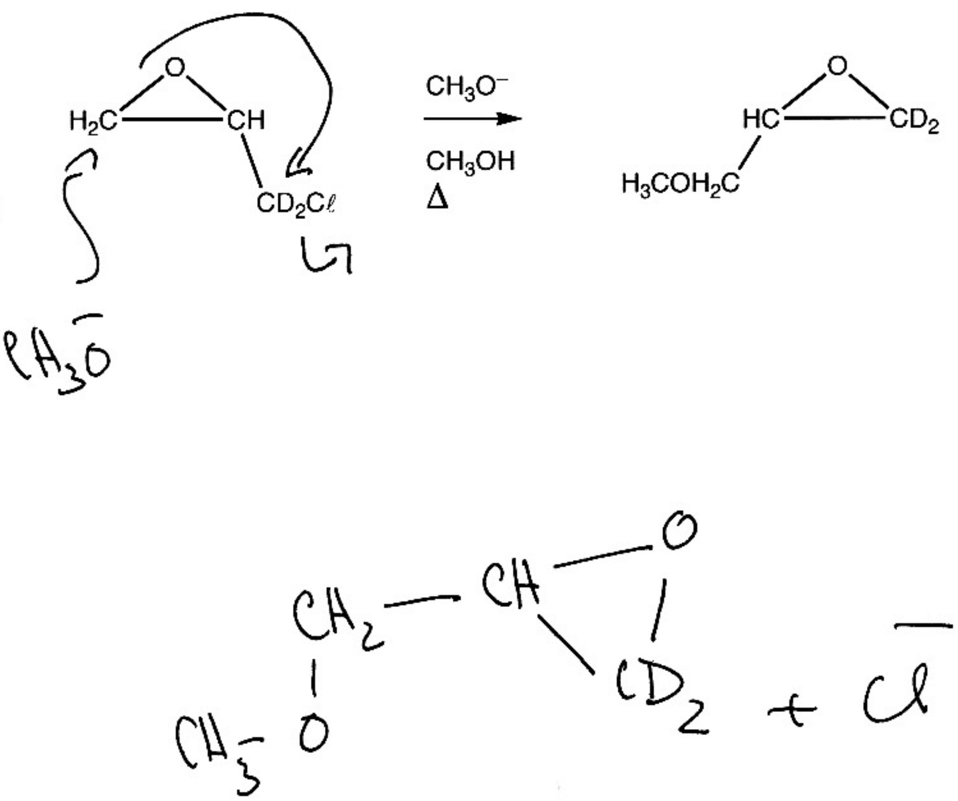
Na^+ is smaller & is not coordinated so well.

7. (10 pts) Provide a reaction mechanism.

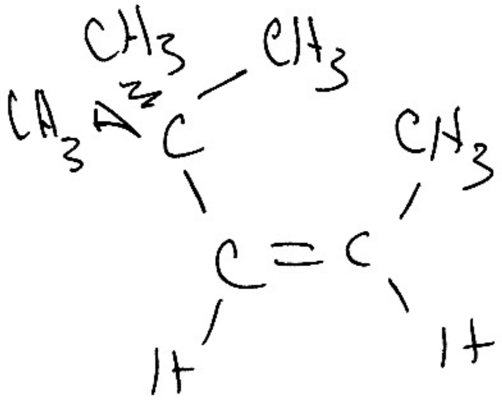
a)



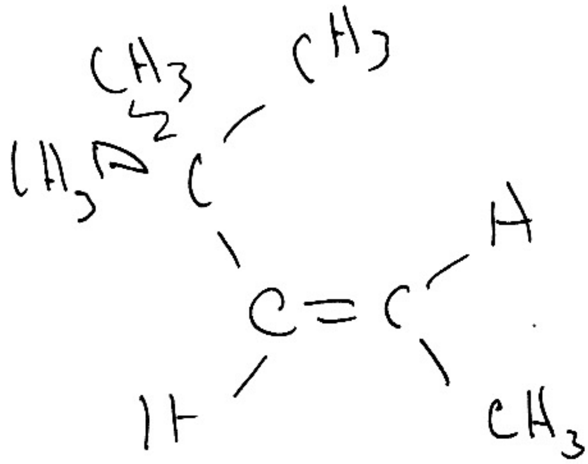
b)



8. (10 pts) Although the difference in energy between *cis* and *trans* alkenes is generally about 1 kcal mol^{-1}, for 4,4-dimethyl-2-pentene, the *cis* isomer is 3.8 kcal mol^{-1} less stable than the *trans* isomer. Explain.



cis bad, steric hindrance



trans, ok