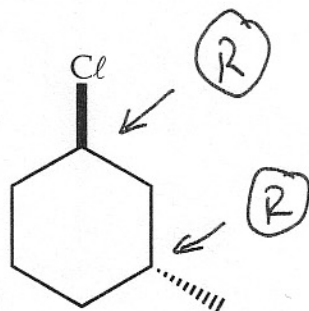


Chemistry 3351-100
Organic Chemistry / Dr. Barney Ellison
Thursday: Oct. 25th @ 7:00pm → 9:00 / 2nd Exam / Hellemms 252

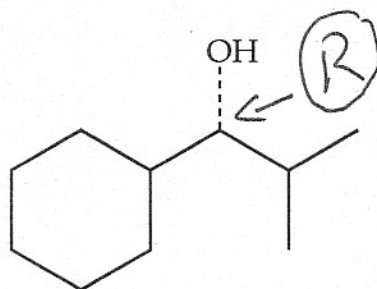
Name: Keg (please print)

1. (20 pts) For each of the following compounds, assign R or S the each stereocenter.

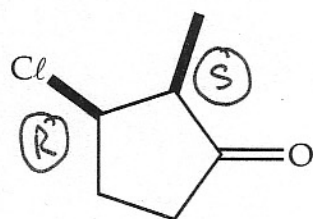
a)



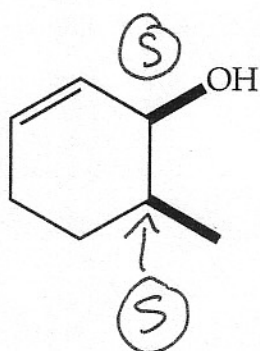
b)



c)



d)

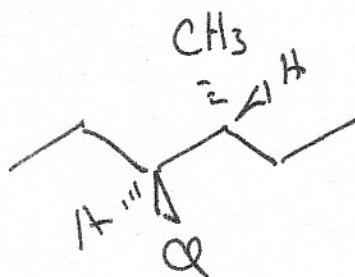


2. (20 pts) Write structures for each of the following compounds

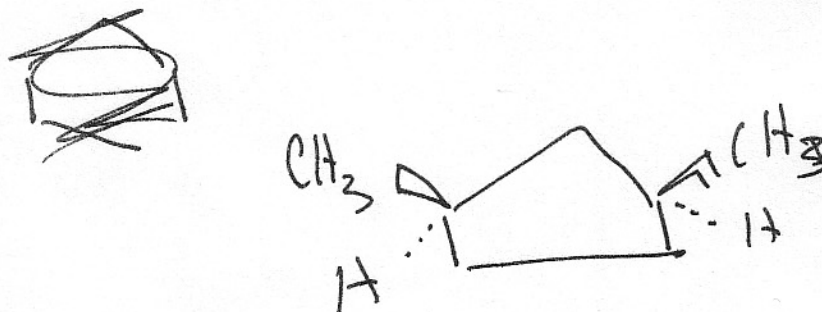
a) (1R, 3R)-1,3-dichlorocyclohexane



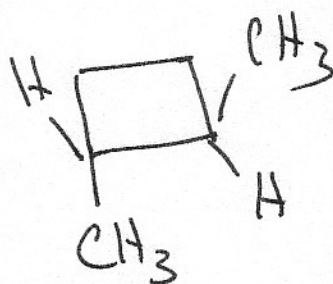
b) (3S, 4R)-3-chloro-4-methylhexane



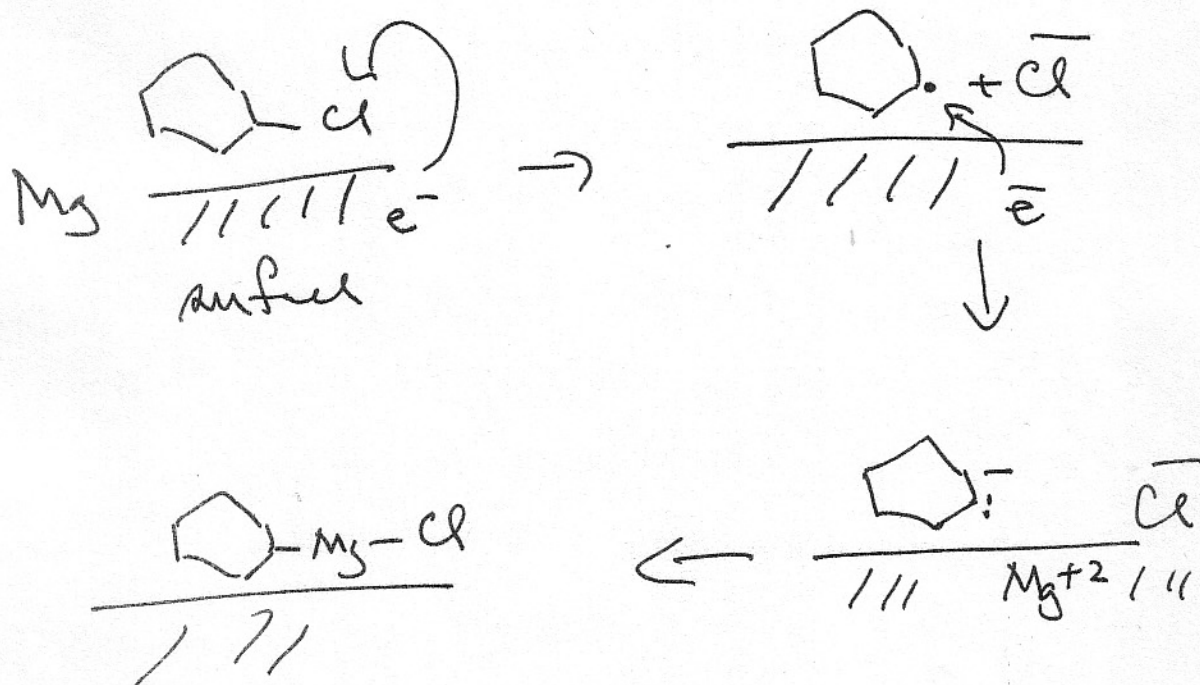
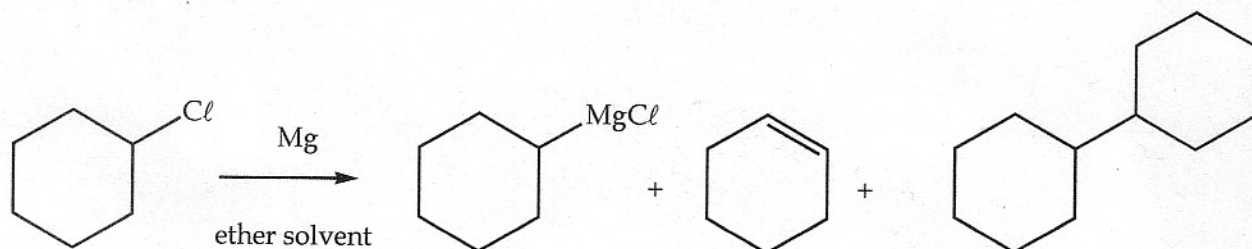
- c) the *meso* isomer of 1,3-dimethylcyclopentane



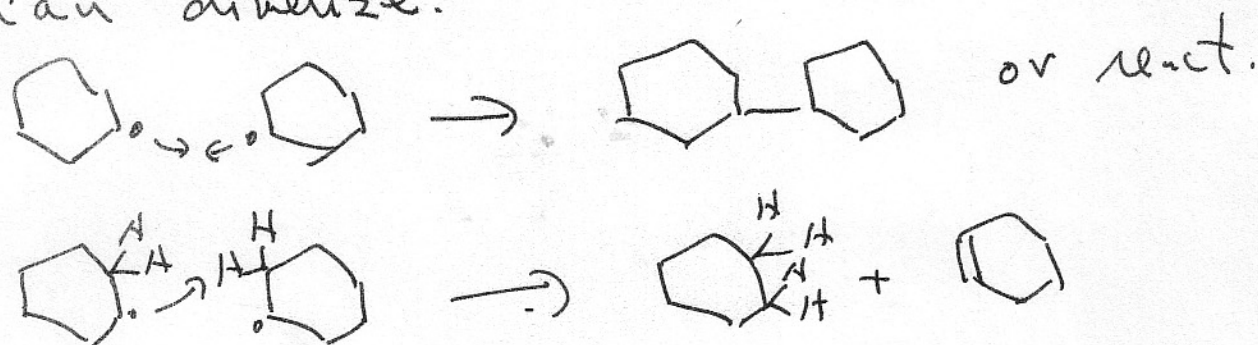
- d) an optically active isomer of 1,2-dimethylcyclobutane



3. (10 pts) In the formation of Grignard reagents from Mg and alkyl halides, the most frequent side reactions are dimerization and disproportionation, as in the following example. Propose a mechanism for these side reactions.

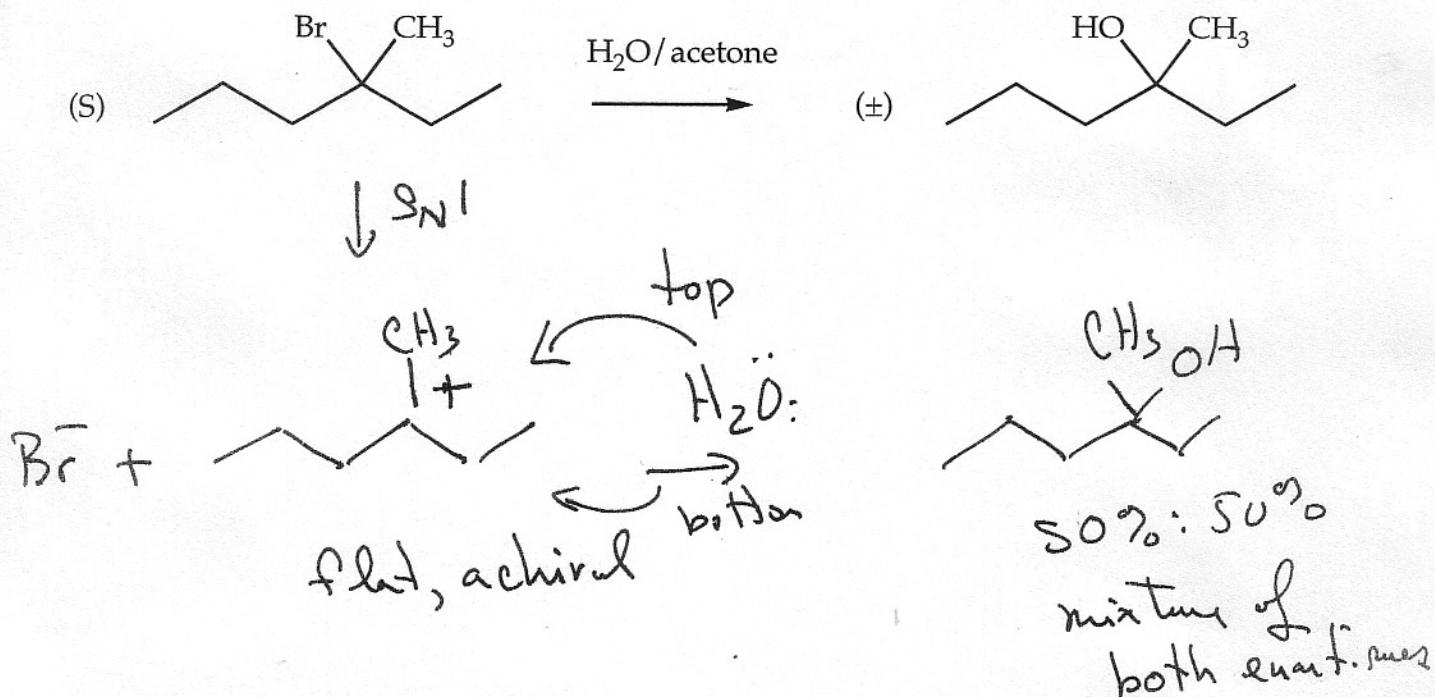


So before $\text{C}_6\text{H}_{11}\text{MgCl}$ can form, the $\text{C}_6\text{H}_{11}\cdot$ radical can dimerize.

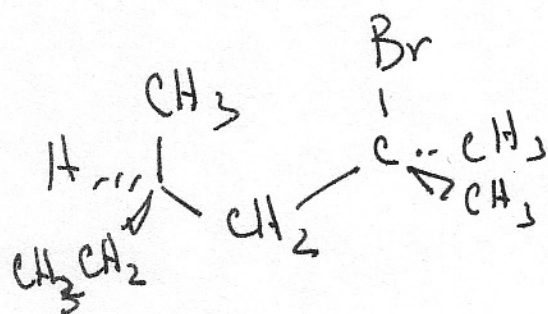


4. (10 pts) Explain the following observations.

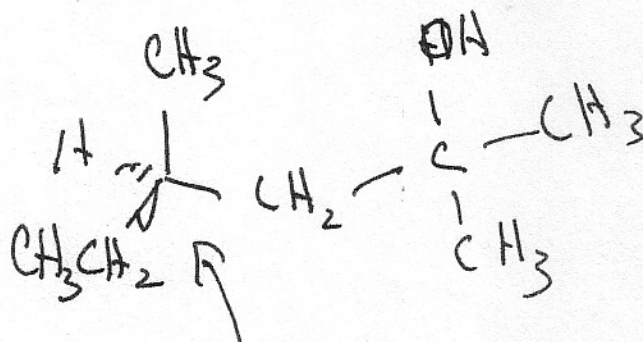
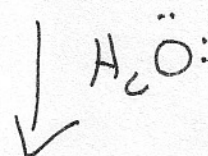
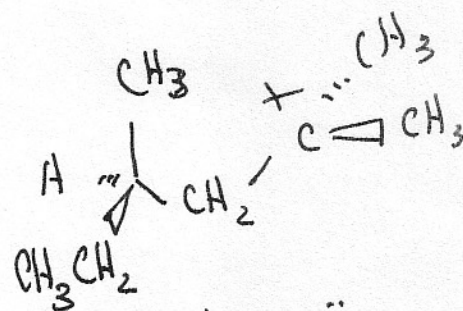
a) (S)-3-bromo-3-methylhexane reacts in aqueous acetone to give racemic 3-methyl-3-hexanol.



- b) (R)-2-bromo-2,4-dimethylhexane reacts in aqueous acetone to give optically active 2,4-dimethyl-2-hexanol.

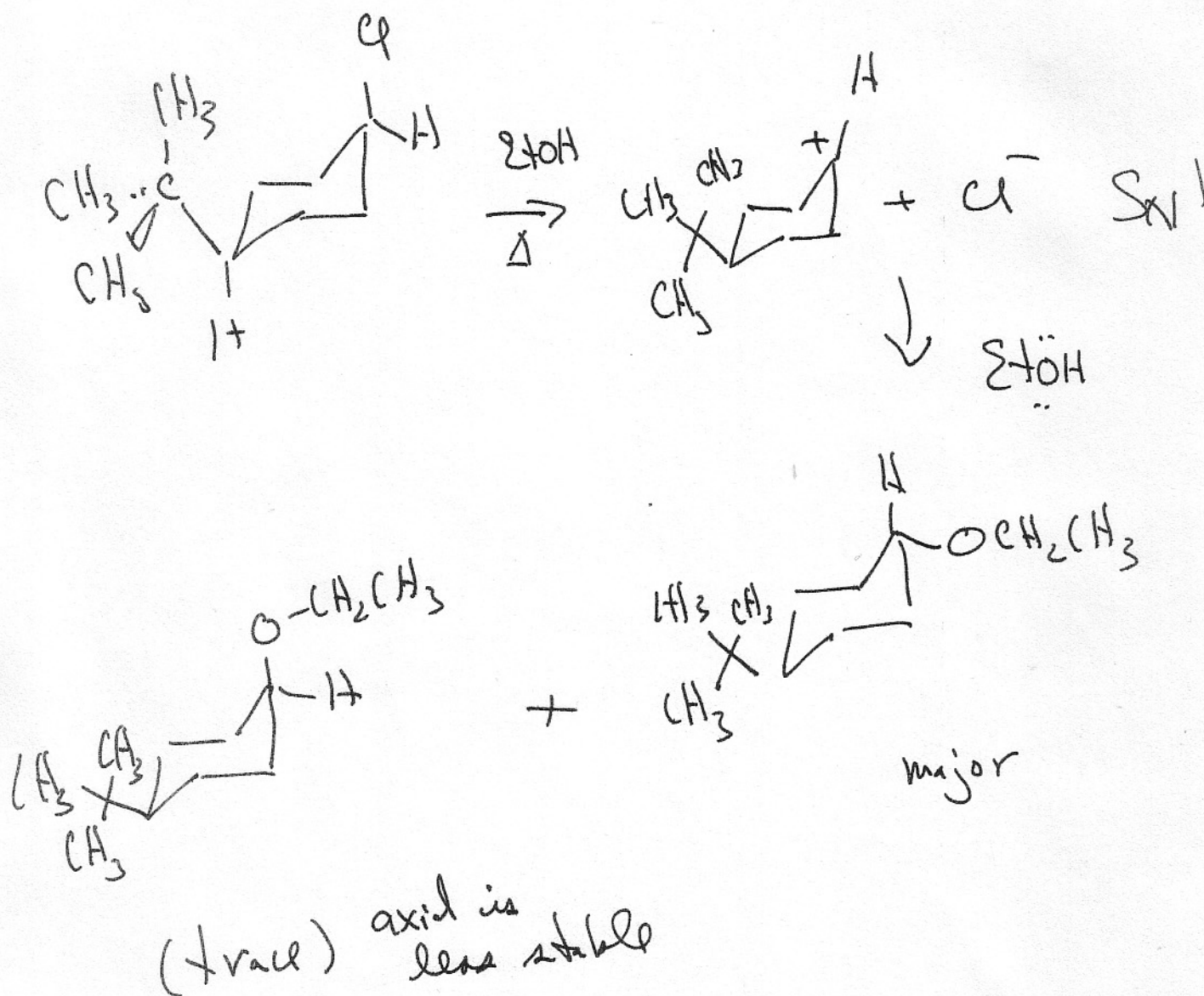


S_N1

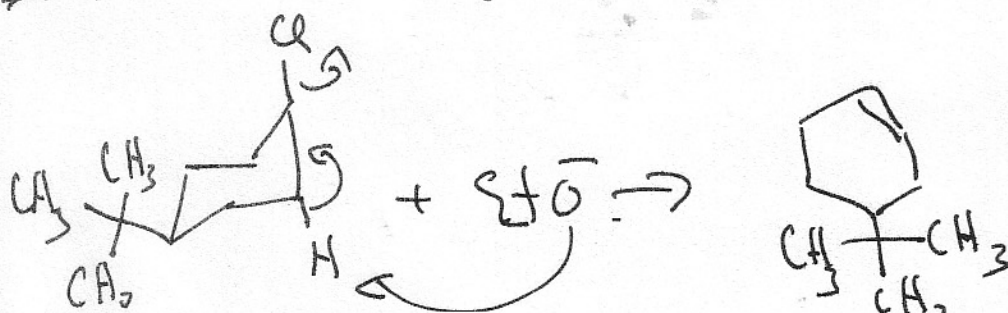


Chiral center is not touched

5. (10 pts) When a solution of *cis*-1-*t*-butyl-4-chlorocyclohexane in ethanol is refluxed for several hours, the major product is found to be *trans*-1-*t*-butyl-4-ethoxycyclohexane. However if the solution is made 2.0 M in sodium ethoxide, the major product is found to be 4-*t*-butylcyclohexene. Explain.

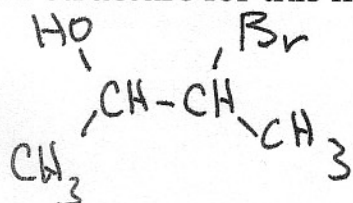


~~EtO~~ EtO^- is a strong base & eliminates

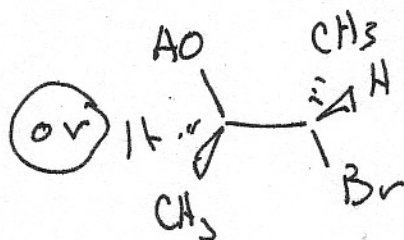
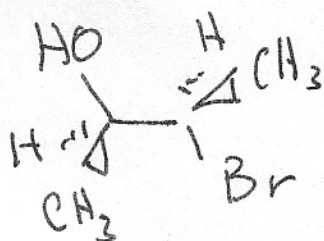


$\text{S}_{\text{N}}2$ reaction is too hindered & is slow.

6. (10 pts) Optically active 3-bromo-2-butanol is treated with KOH in CH_3OH to obtain an optically inactive product having the formula $\text{C}_4\text{H}_8\text{O}$. What is the structure for this material?

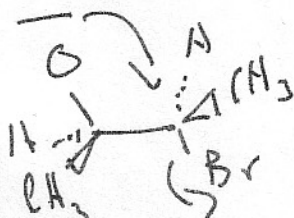


can be:

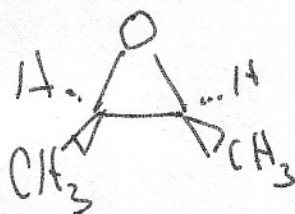


+ the 2 mirror images

$\downarrow \text{HO}^-$



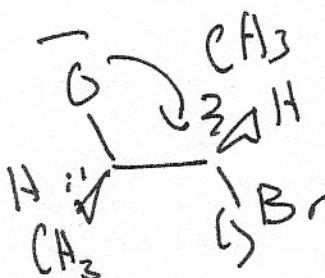
$\downarrow$



meso-achiral

↑
correct product

$\downarrow$

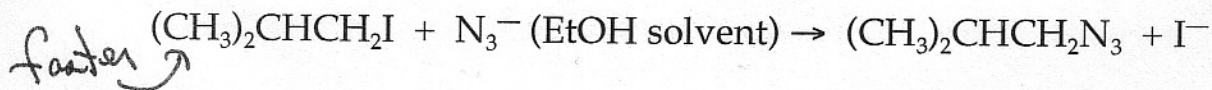
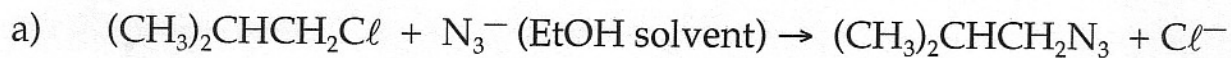


$\downarrow$

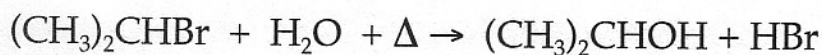
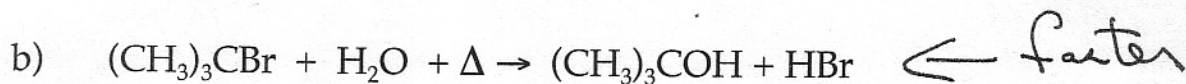


chiral not found

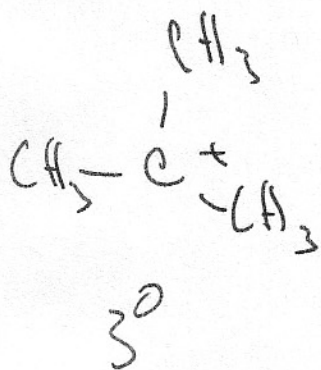
7. (20 pts) In each of the following pairs of reactions, predict which one is faster and explain why.



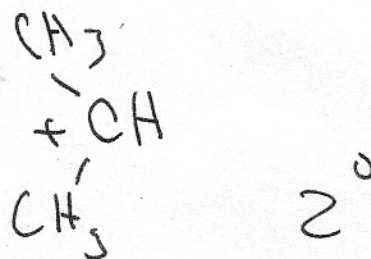
I^- is a better leaving group than Cl^-

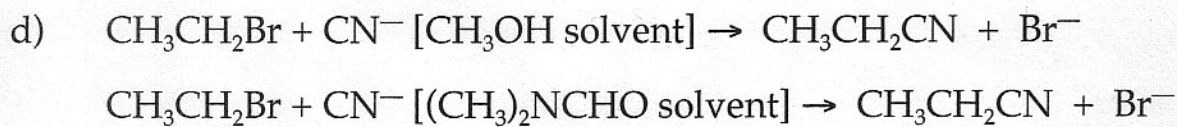
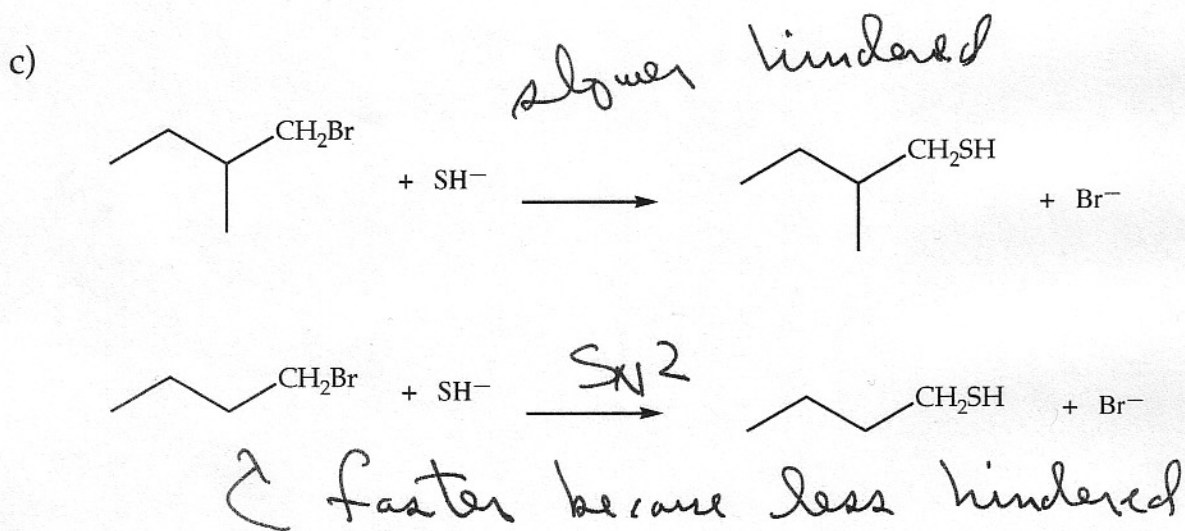


These are $\text{S}_\text{N}1$ rxns.



is more stable than





~~DMF~~ DMF reaction is faster

~~DMF~~ CN^- is H-bonded in CH_3OH but is not complexed

