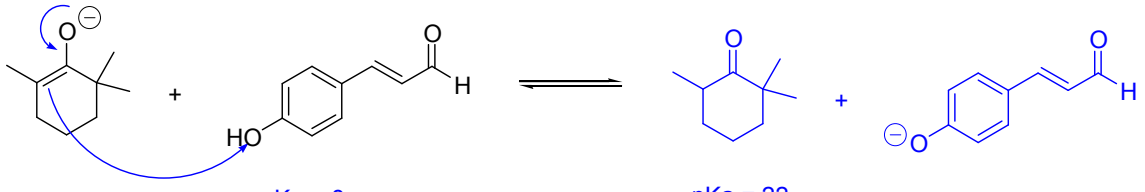
Sample final type questions 2011

CHM2120B/C

1. Show the mechanism for this reaction and explain which side the equilibrium lies on.



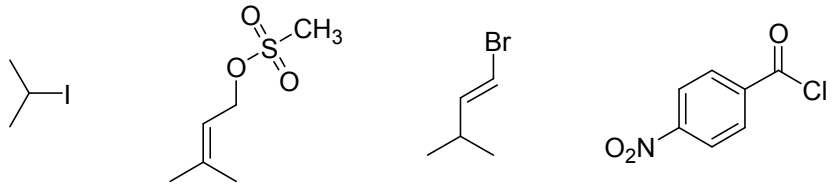
pKa = 8

pKa = 22

more stable conjugate base
- acid has a lower pKa

eq favors this side

2. Rank these electrophiles in order of increasing reactivity toward hydroxide ions.



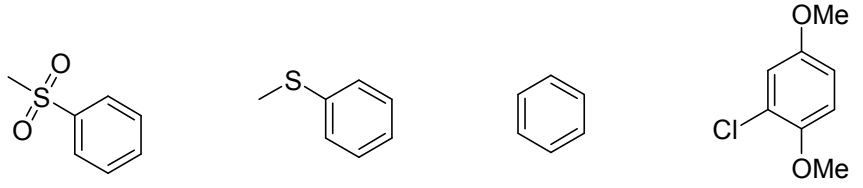
3
iodine is a good leaving group but secondary alcohol adds steric hinderance

2
allylic system plus great LG, primary carbon has very little steric hinderance

4
alkene are poor electrophile because they are very stable functional groups

1
two en atoms make the carbon very electrophilic, no backbonding from chlorine

3. Rank these aromatic compounds from least reactive to most reactive with SO_3, H_2SO_4 and show what the products will be.

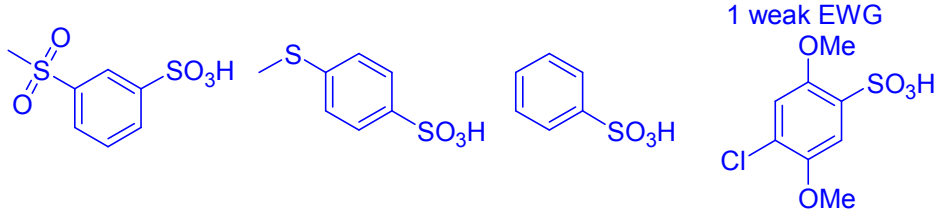


least reactive
1 strong EWG

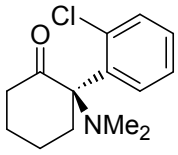
2nd most reactive
1 strong EDG

3rd most reactive

most reactive
2 strong EDG,
1 weak EWG

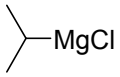


4. Which of these nucleophiles will need activation to add reversibly to N-methylketamine and which will add irreversibly to it? Show the products (don't worry about stereochemistry).



activation, reversible

weak nucleophile

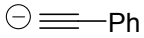


irreversible

strong nucleophile

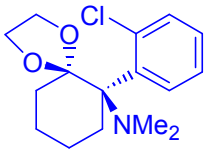
activation, reversible

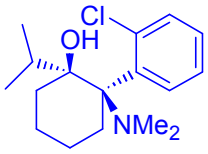
low conj acid pKa

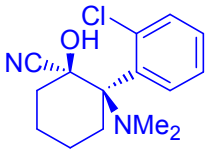


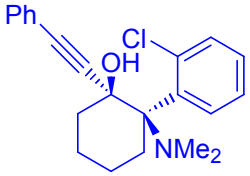
irreversible

strong nucleophile

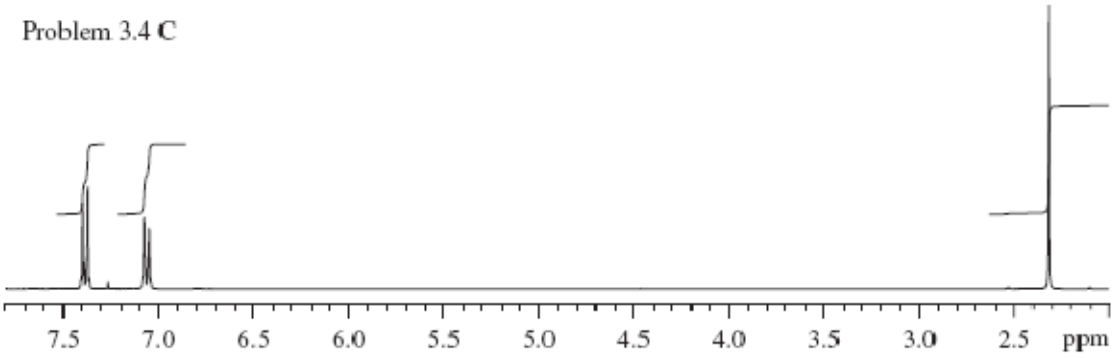


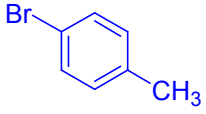




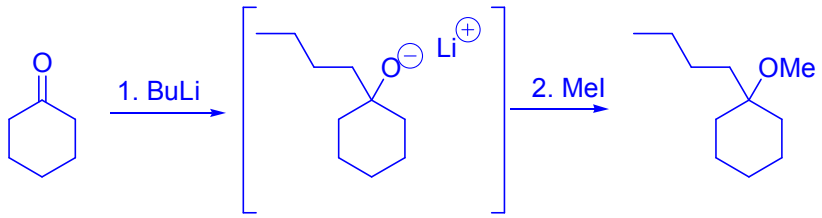


5. The chemical formula for an unknown is C_7H_7Br and the 1H NMR is shown. Determine the structure of the compound.

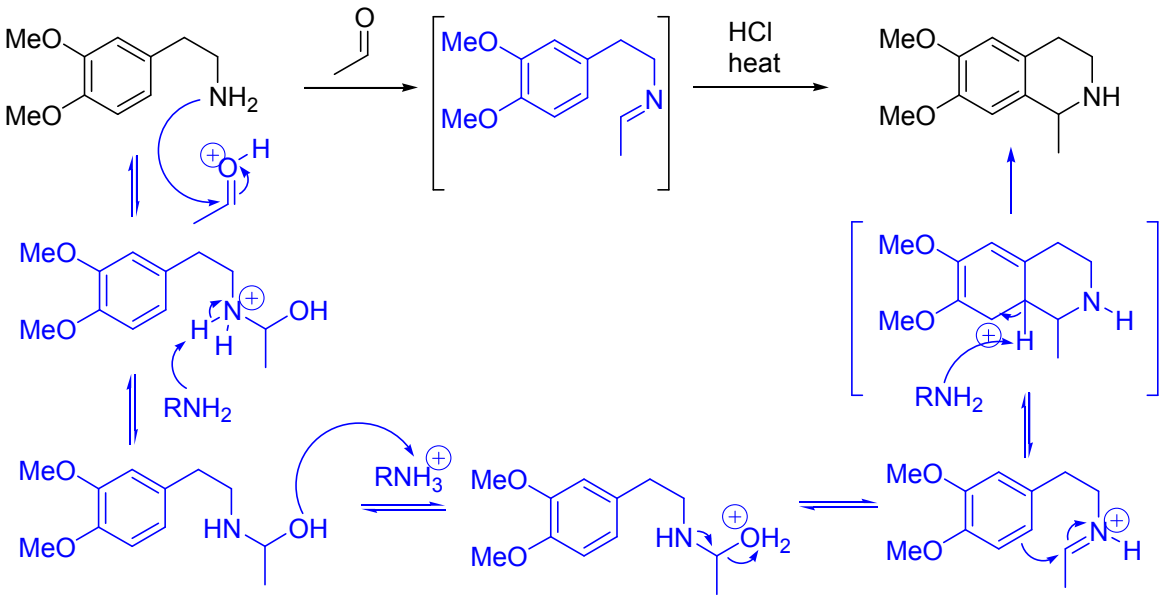




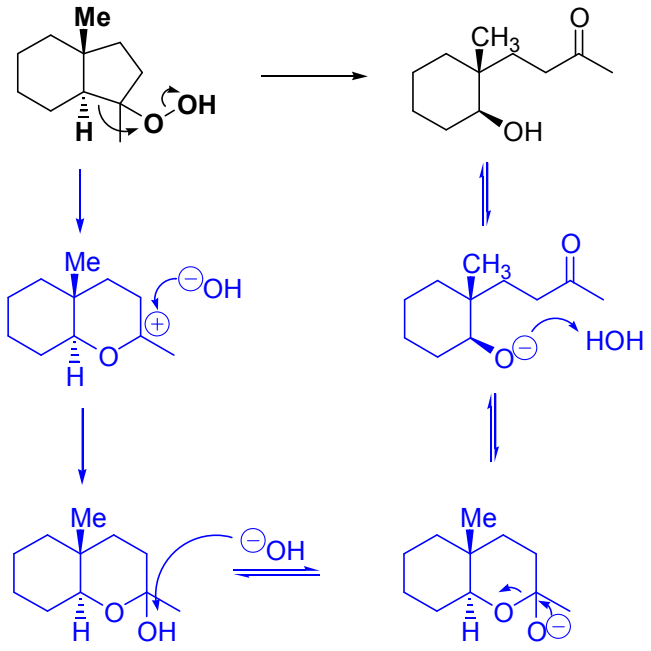
6. A molecule with the chemical formula of $C_6H_{10}O$ and 1H NMR peaks at 2.4 ppm (4H, t), 1.9 ppm (4H, quintet), 1.8 ppm (2H quintet) is treated with butyl lithium and then 1 equivalent of methyl iodide. Show the reaction and draw out the product.



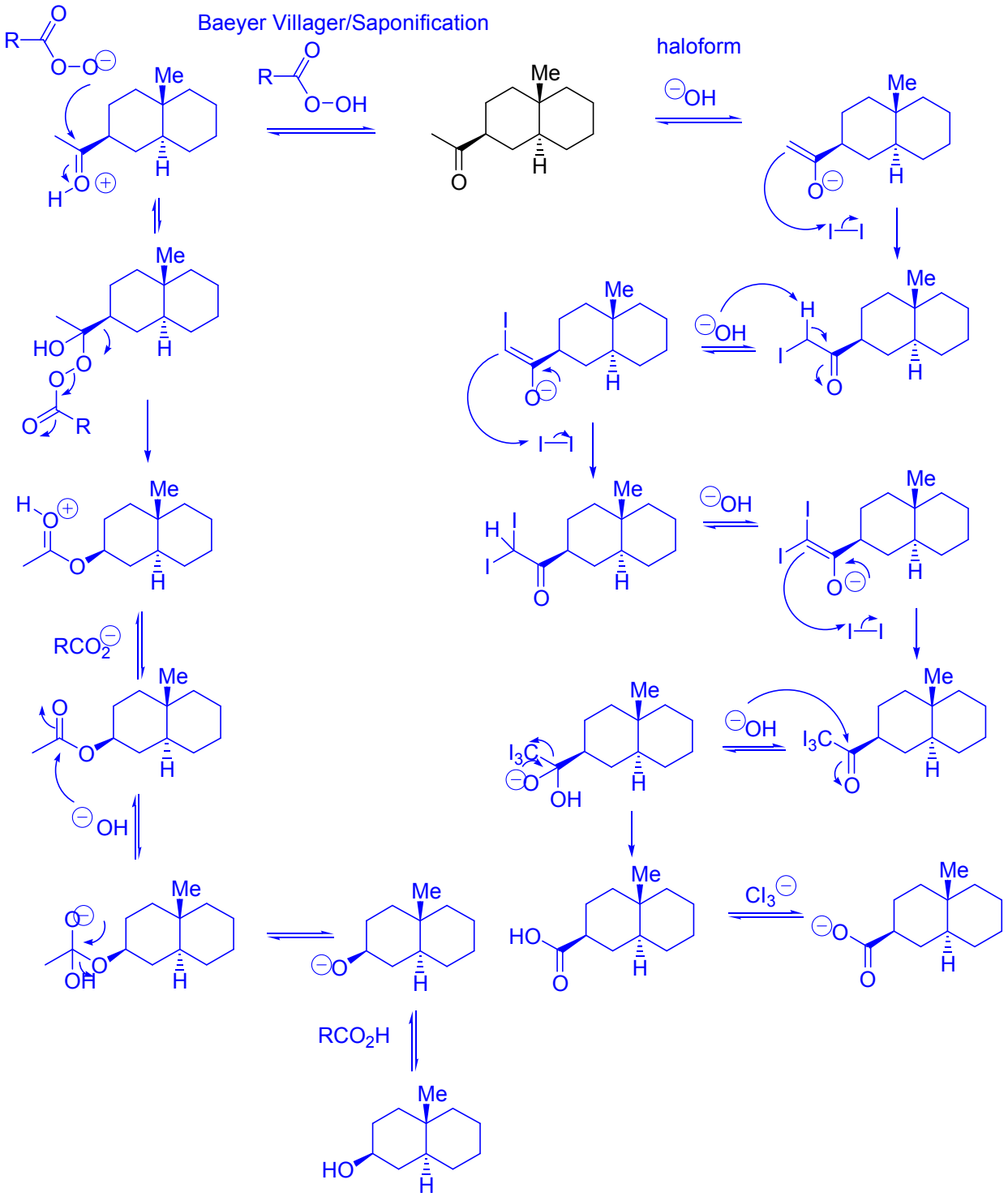
7. Provide the intermediate for the reaction and give a detailed mechanism for the intermediate formation and conversion into the product.



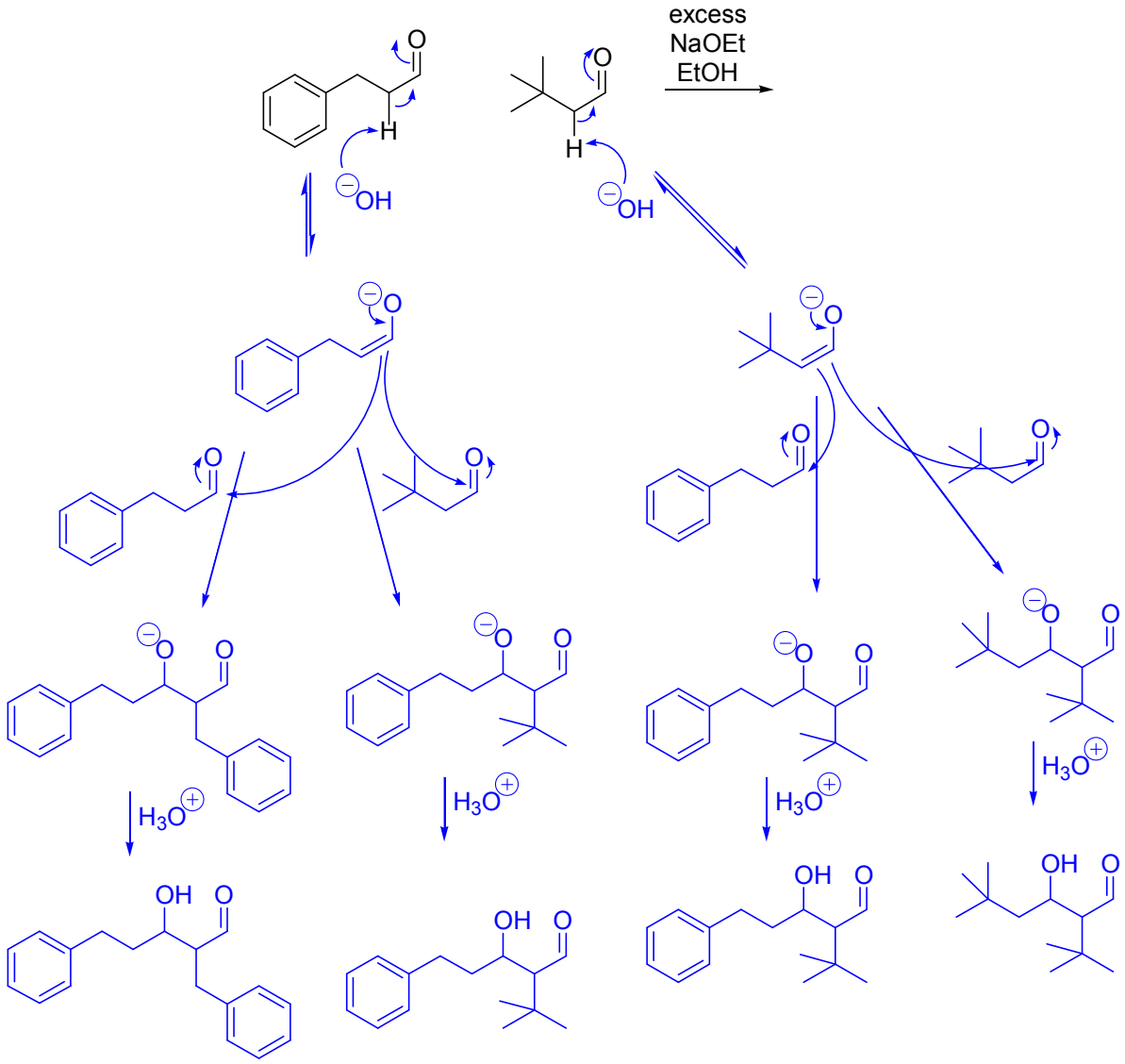
8. Provide a mechanism for this reaction. Hint: it is related to the Baeyer Villager reaction.



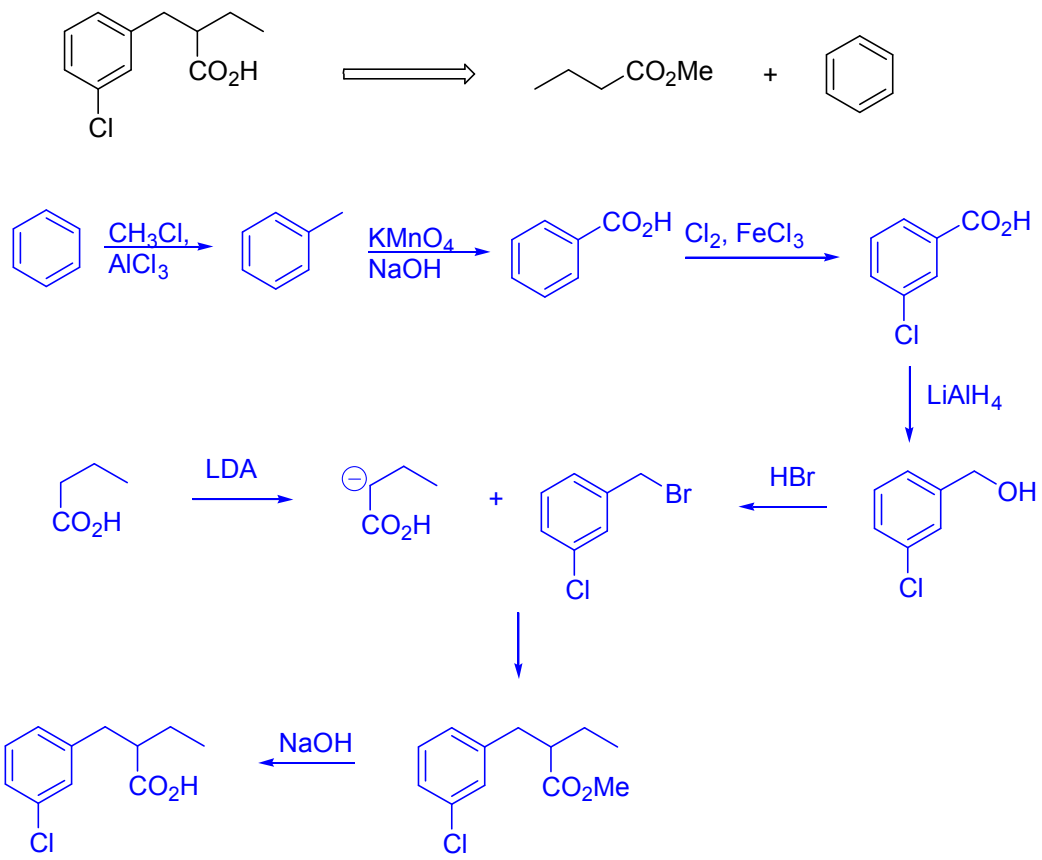
9. The Baeyer Villager/saponification and haloform reaction can be used to access the two possible carboxylic acids from methyl ketone below. Show the detailed mechanisms for Baeyer Villager/saponification reaction series and haloform reaction on this ketone.



10. Show the four possible products from this reaction and provide a mechanism for their formation.

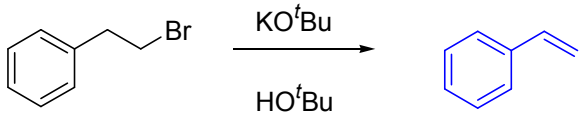


11. Provide a synthesis for this molecule from the starting material shown.

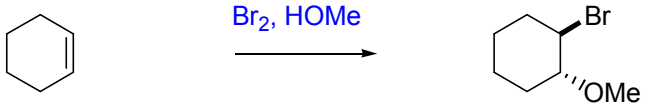


12. Give the reagents or products for the reactions below.

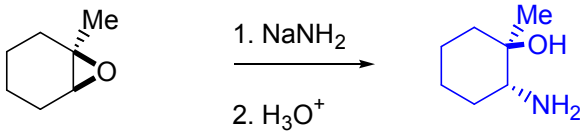
a.



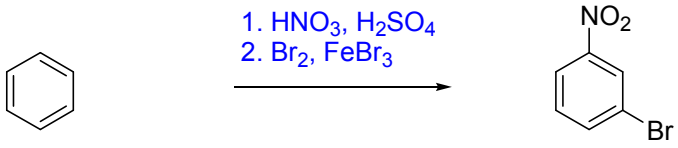
b.



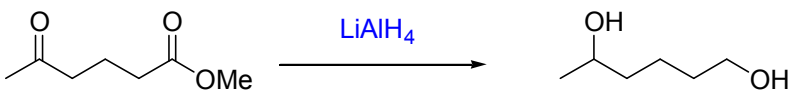
c.



d.

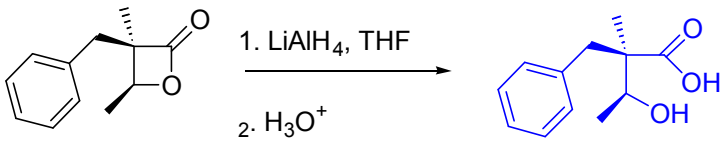


e.

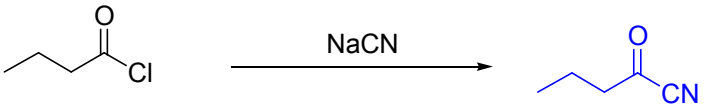


13. Give the products for the reactions shown below.

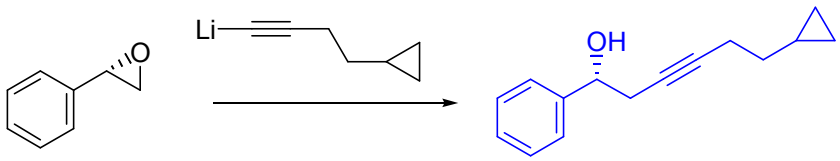
a.



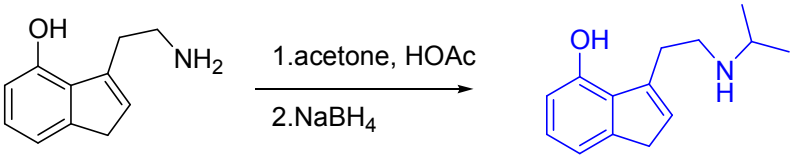
b.



c.



d.



e.