Post Spring Break Review and Practice Problems

1. a. Which nucleophile is strongest?

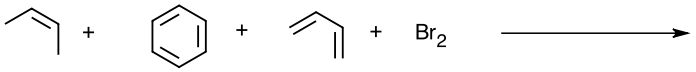
A B C D

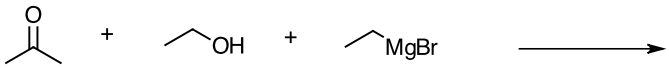
b. Which electrophile is best?

E F G H

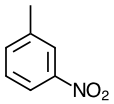
c. Which nucleophile from (a) reacts with which electrophile in (b)? Use curved arrows to show bonds breaking and forming. Draw the structure of the product.

2. Predict the product:

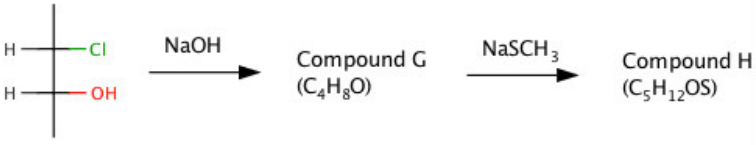




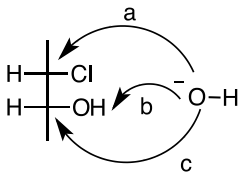
3. Describe an efficient synthesis. Choose a starting material with one or two carbons. Use any necessary reagents. For the last compound, start from benzene.



4. Draw the structure of Compounds G and H.

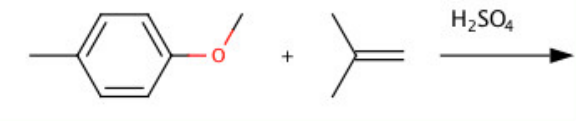


OH^- reacts with:

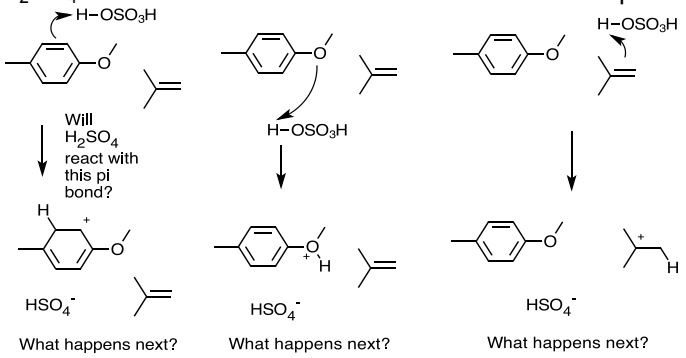


a. C bonded to Cl. But you don't get Cpd G
b. H bonded to O. What does O^- react with?
c. C bonded to OH. But -OH is a poor LG

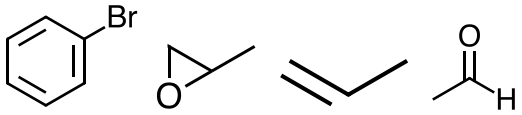
5. The following reaction has been reported in the chemical literature and gives a predominance of a single product in acceptable yield. Write the structure of the product. Monosubstitution is involved.



H_2SO_4 reacts with: a. Pi bond in aromatic b. O c. pi bond in alkene



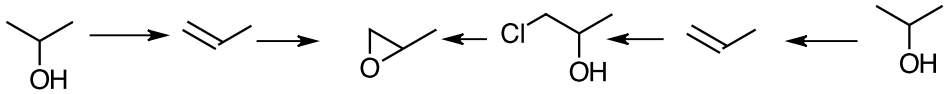
6. **Objective**: Synthesize a compound
(i) One step synthesis (given product, ID reactants or how to prepare a functional group)
ID functional group(s) in target compound.
Prepare this group from another group. (Given product, ID reactants and conditions. In other words, "***WORK BACKWARDS***")
E.g., How would you make each compound?



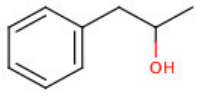
(ii) Multi-step synthesis
ID functional group(s) in target compound.
ID functional group(s) in starting compound(s).
"***WORK BACKWARDS***":

A. Make functional group (FG) in Target Cpd from another group.
B. Repeat until you get to starting compound.

Synthesize methyl oxirane from isopropanol:

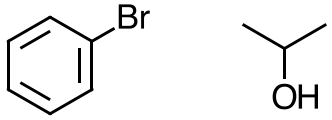


7. **Objective**: Synthesize a compound from starting materials
Often, Synthesize a ***LARGE*** target compound from a ***SMALL*** starting compound
Count number of C's in target compound vs. starting compound(s).
Smaller --> **Bigger** cpd Make C-C bond, e.g., Grignard
Describe other ways to make a C-C bond.
Sometimes:
Bigger --> **smaller** cpd Break C-C bond, e.g., O_3
a. Suggest a short efficient synthesis. Use any necessary organic or inorganic reagents.

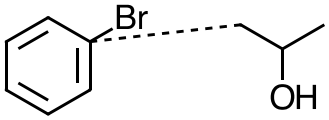


from bromobenzene and isopropyl alcohol

Target compound: 9 C aromatic and alcohol
How do you make an aromatic with a side chain?
How do you make an alcohol?
Starting cpds: 6 C aromatic 3 C alcohol



Can you make target cpd in 1 step? Can a C-C bond be formed directly?



Which method works?