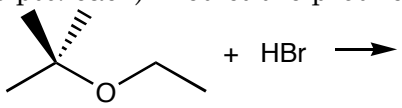
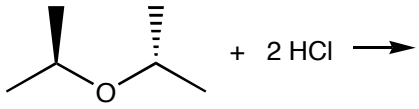
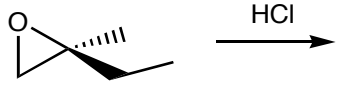
Name_____ Test 3 (4/13)
PHYS 0203 (Organic II) Spring 2007

1. (6 pts. each) Predict the product(s) for the following reactions.

a. 

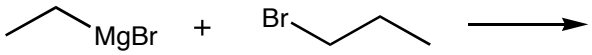

b. 


c. 

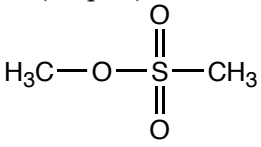

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____

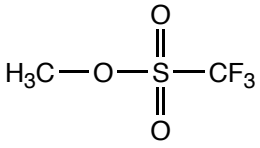
2. a. (8 pts.) Explain why Grignard reagents act as nucleophiles.

b. (4 pts.) Predict the product of the following reaction.

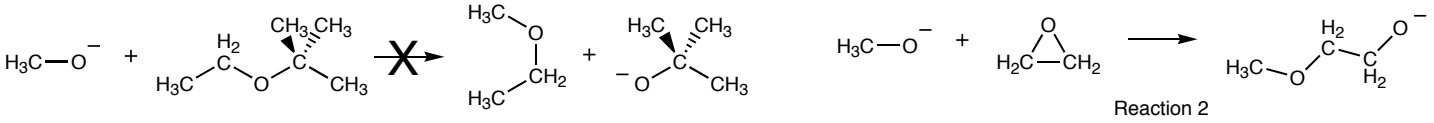



3. (12 pts.) Circle the molecule that contains the better leaving group. Explain your choice.



4. Epoxides are cyclic ethers that are much more reactive than linear ethers. For example, consider that the reaction of an ether with an alkoxide, Reaction 1, will not occur, yet the reaction of an alkoxide with an epoxide, Reaction 2, will occur.

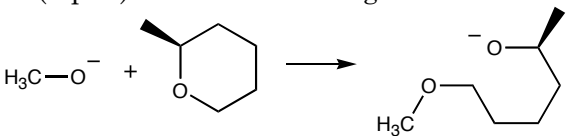


Reaction 1

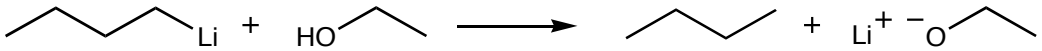
Reaction 2

a. (8 pts.) Explain why Reaction 2 will occur but Reaction 1 will not.

b. (6 pts.) Will the following reaction occur? Explain your response.

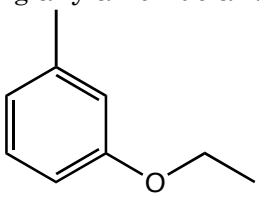


5. (6 pts. each) Alcohols can be converted to alkoxides, by reacting them with strong bases like the organometallic reagent butyl lithium. Alkoxides are excellent nucleophiles, and when combined with alkyl halides, ethers can be formed.

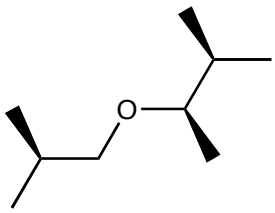


Using any alkoxide and any alkyl halide you wish, propose a synthesis for the following ethers.

a.



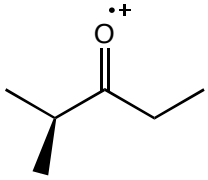
b.

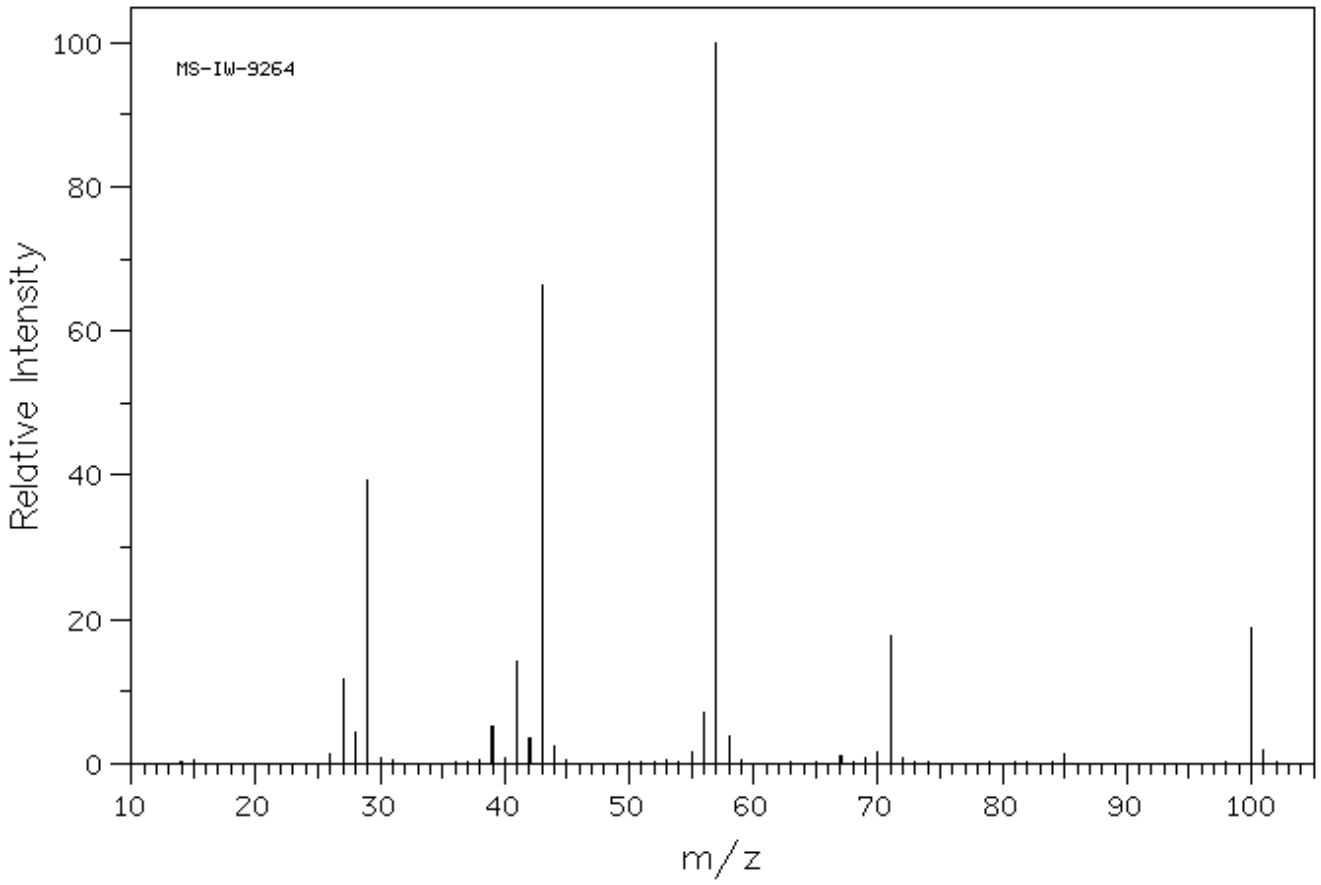


6. a. (8 pts.) Draw the products of one of the possible homolytic cleavage reactions for the molecular ion drawn below.

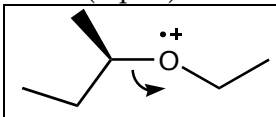
b. (8 pts.) Label the fragment(s) that you expect to see in the mass spectrum, and label the corresponding peaks in the mass spectrum.

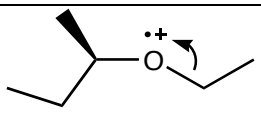
c. (4 pts.) Label the "base peak" with the words "base peak".



7. a. (8 pts.) Draw the products of the two heterolytic cleavage reactions below.
b. (6 pts.) Indicate which reaction is more likely.





8. The following is a mass spectrum of a molecule that contains a bromine atom.
a. (6 pts.) Circle the peaks that are likely to be the result of ions that contain bromine atoms.

b. (6 pts.) Explain how you chose the peaks that you circled.

| *m/z* | % |
|---|---|
| 15.0 | 1.5 |
| 26.0 | 5.7 |
| 27.0 | 29.4 |
| 28.0 | 13.3 |
| 29.0 | 40.9 |
| 38.0 | 2.0 |
| 39.0 | 14.8 |
| 40.0 | 2.2 |
| 41.0 | 64.5 |
| 42.0 | 3.2 |
| 43.0 | 3.9 |
| 50.0 | 1.6 |
| 51.0 | 1.4 |
| 53.0 | 1.5 |
| 55.0 | 7.2 |
| 56.0 | 16.4 |
| 57.0 | 100.0 |
| 58.0 | 4.6 |
| 79.0 | 1.0 |
| 81.0 | 1.0 |
| 93.0 | 1.4 |
| 95.0 | 1.3 |
| 107.0 | 3.7 |
| 109.0 | 3.6 |
| 136.0 | 7.9 |
| 138.0 | 7.8 |