

1. Draw the structure of the following compounds (12 pts).

A) (*R*)-2-fluoropentane

B) (*S*)-1-mercapto-2-hexanol

C) 2,2-dimethyloxirane

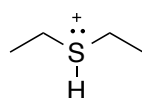
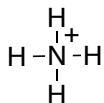
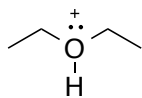
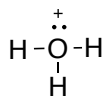
D) (*R*)-2-(methylthio)hexane

2. Rank the following acids in strength from weakest acid to strongest acid in solution (8 pts).

A)

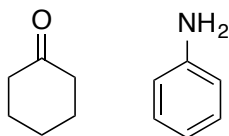
$\text{ClCH}_2\text{CH}_2\text{SH}$, $(\text{CH}_3)_2\text{CHOH}$, $\text{CH}_3\text{CH}_2\text{OH}$, $\text{ClCH}_2\text{CH}_2\text{OH}$

B)

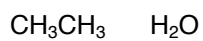


3. For each pair of molecules, draw a dashed line indicating possible hydrogen bonds. If they cannot form a hydrogen bond, draw nothing (6 points).

A)



B)

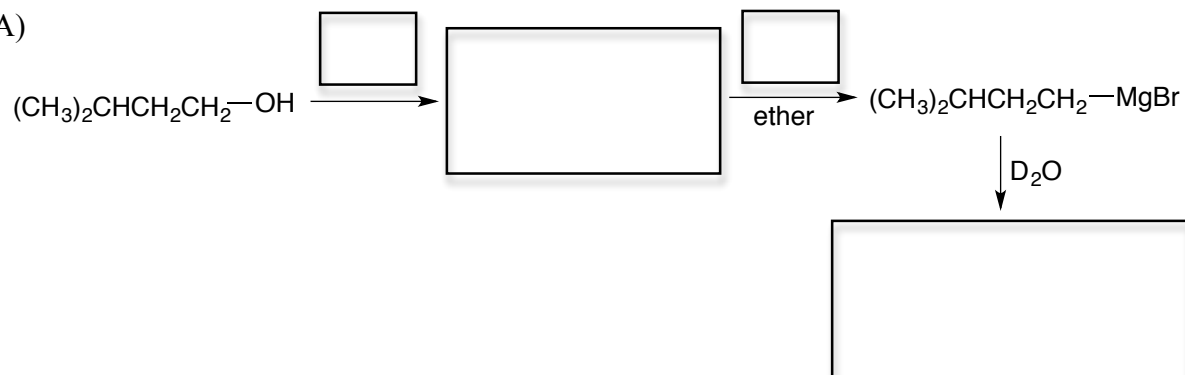


C)



4. Provide the missing reagents and products for the following reactions (26 pts).

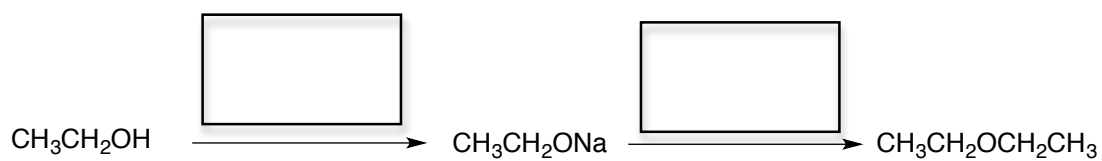
A)



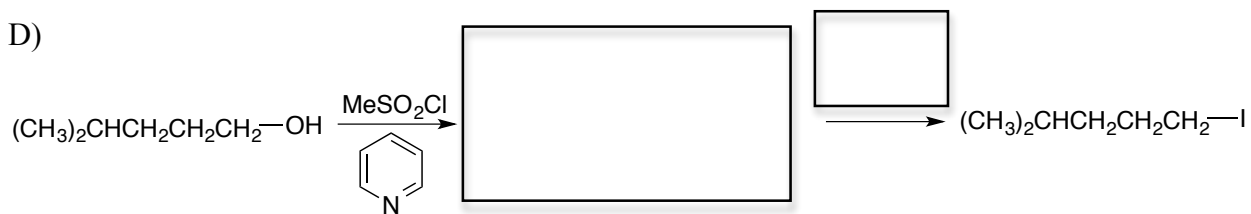
B)



C)



D)

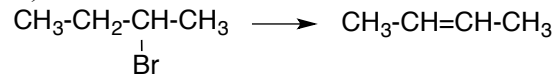


E)

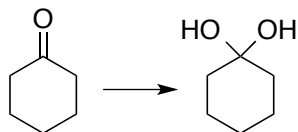


5. Are the following transformations oxidations, reductions, or neither? (8 pts).

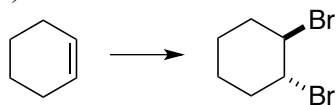
A)



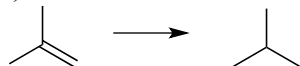
B)



C)

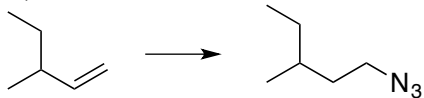


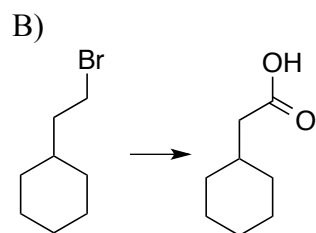
D)



6. Complete the syntheses shown below. Each synthesis may involve a sequence of several reactions. (16 pts).

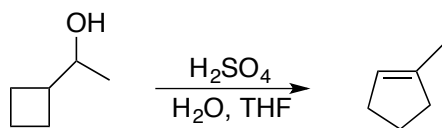
A)



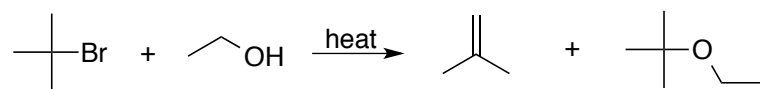


7. Provide the mechanisms for the following reactions. Show every intermediate and all the arrows required for each step of the reaction (24 pts).

A)



B)



C)

