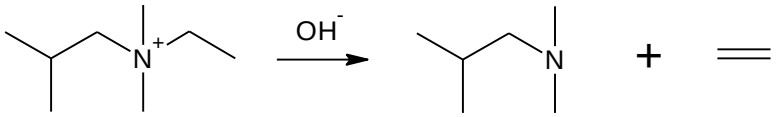
ChemV12B, Organic Chemistry II

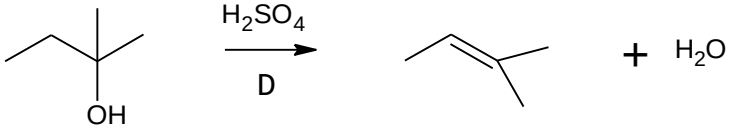
1.) Determine the **major organic product(s)** from each of the following reactions. Include stereochemistry (wedges and dashes) where applicable. (60 pts, 10 pts ea)

a.)



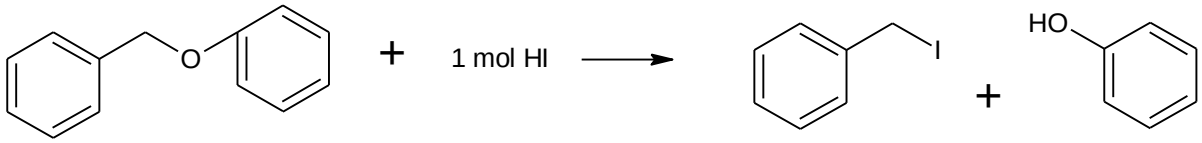
(Hoffman Elimination)

b.)



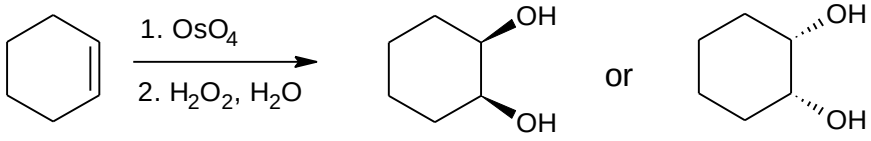
(dehydration)

c.)

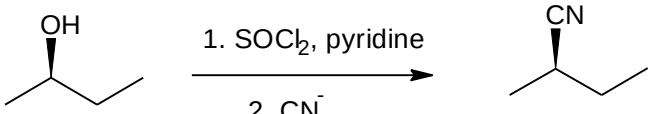


(substitution)

d.)

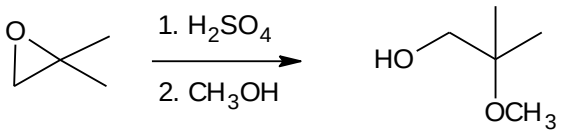


e.)



(TWO SN2 reactions)

f.)



2.) Consider 1-butanethiol and 1-butanol. (12 pts, 6 pts ea)

a.) Which boils at a *higher* temperature? **Explain.**

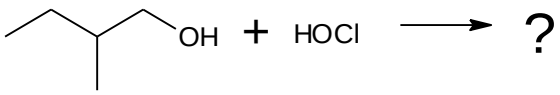
1-butanol. O is more electronegative than S and can form hydrogen bonds, making its attractions harder to break to boil.

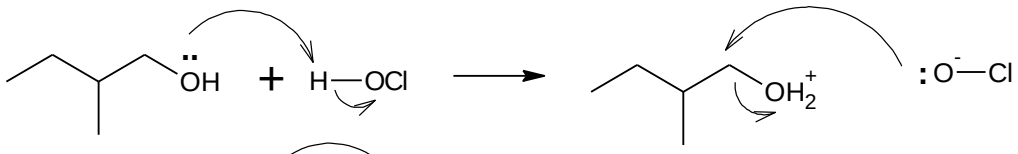
b.) Which is the *weaker* acid? **Explain.**

1-butanol. O is smaller than S so is less stable with a negative formal charge as a conjugate base, after donating a proton.

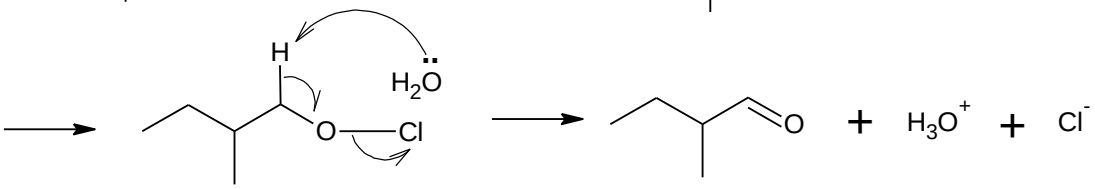
3.) Show the complete arrow-pushing mechanisms for the following reactions. Include all formal charges, and bonds and electrons that are involved in the reaction. (40 pts, 20 pts ea)

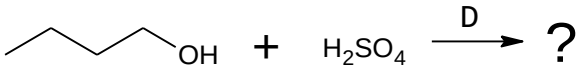
a.)



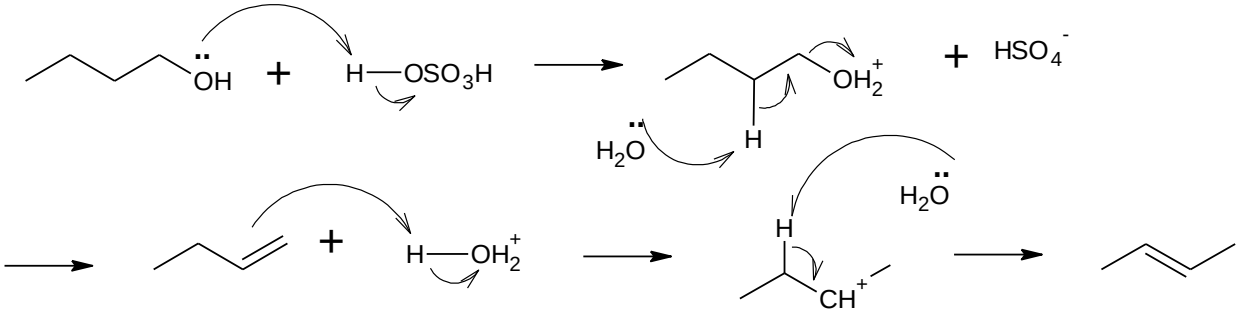


b.)





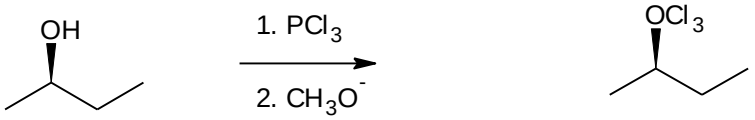
(Hint: this reaction occurs *twice*).



4.) Consider (2R)-2-butanol. Give the structure of the **major organic product(s)** including stereochemistry (wedges or dashes) when it is reacted with: (20 pts, 10 pts ea)

a.) PCl_3 in pyridine, then CH_3O^-

SN2, adds Cl

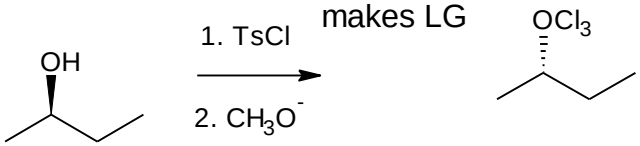


still R (inverted, inverted)

SN2, adds OCH_3

b.) TsCl in pyridine, then CH_3O^-

makes LG



now S (inverted)

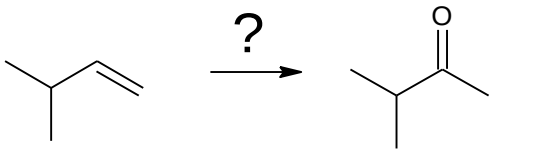
SN2, adds OCH_3

5.) Which is more reactive: an ether or an epoxide? **Explain**. (10 pts)

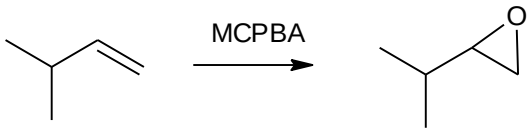
Epoxide. The three-membered ring has greater ring strain so is eager to react to relieve it.

6.) Design syntheses to convert the following reactants to the indicated products. Include all necessary reagents and reaction conditions. If the synthesis requires multiple steps, show each individually. (68 pts, 34 pts ea)

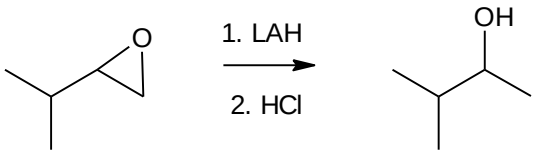
a.)



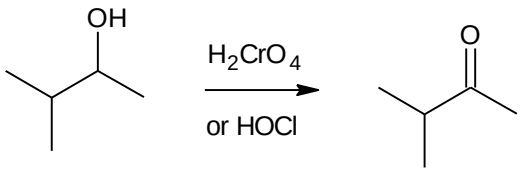
(1)



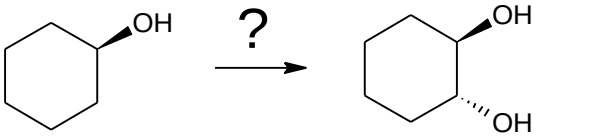
(2)



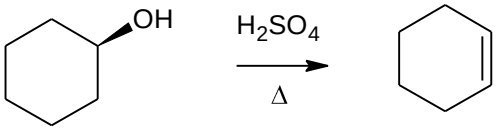
(3)



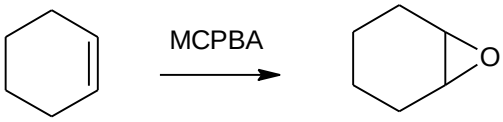
b.)



(1)



(2)



(3)