Homework - Chapter 15
Chem 2320

Name _____

1. Write a reaction in which the following occurs. Briefly describe in what way the starting material is reacting (acid, base, nucleophile, electrophile, etc).

a) a tertiary alcohol reacts with sulfuric acid

b) the product of a) dissociates to form a carbocation

c) the carbocation in b) reacts with a water molecule to form an alkene

d) the carbocation in b) reacts with a chloride ion

e) a primary alcohol reacts with a carbocation

f) a primary alcohol reacts with phosphorus trichloride

g) a primary alcohol reacts with tosyl chloride in the presence of pyridine

h) the product of g) reacts with an acetylide anion

i) a secondary alcohol reacts with tosyl chloride and pyridine

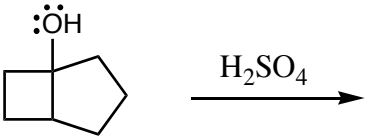
j) the product of i) reacts as an acid with potassium tert-butoxide

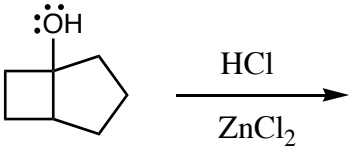
k) a secondary alcohol acts with sodium hydride

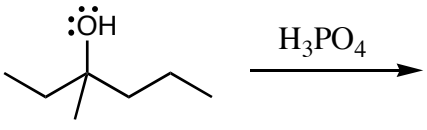
l) the product of k) reacts with a primary alkyl halide

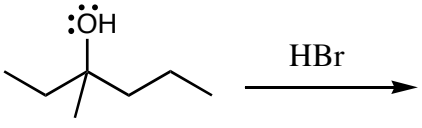
m) the product of k) reacts with the product of g)

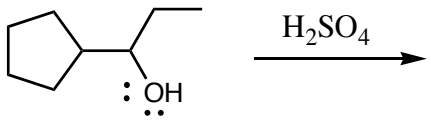
2. Give the intermediate carbocation, then the products of the following reactions.

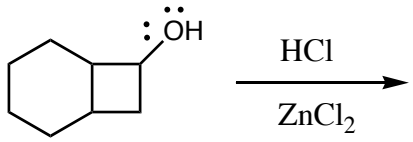
a) 

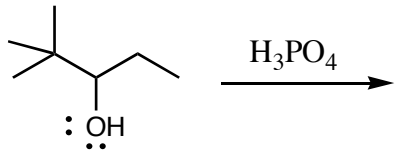
b) 

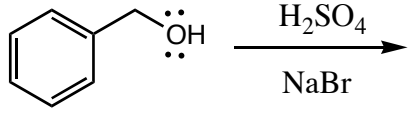
c) 

d) 

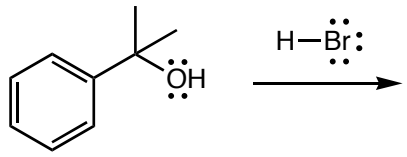
e) 

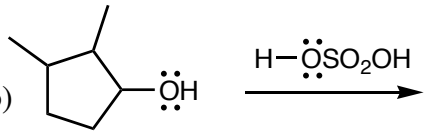
f) 

g) 

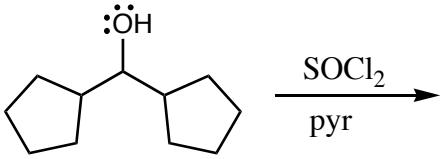
h) 

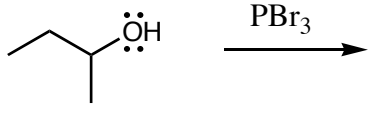
3. Give the mechanism for the following reactions, showing how all products are formed.

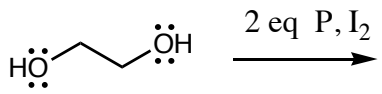
a) 

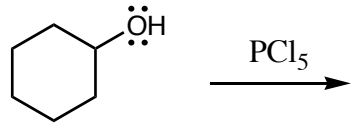
b) 

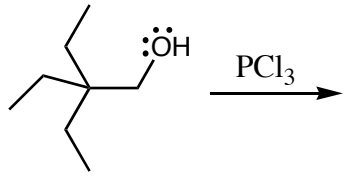
4. Give the products of the following reactions.

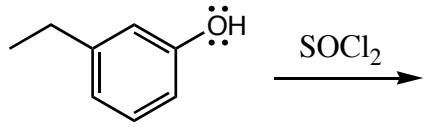
a) 

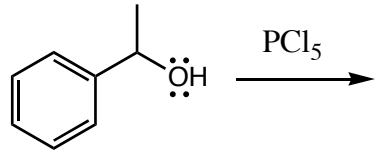
b) 

c) 

d) 

e) 

f) 

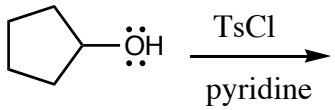
g) 

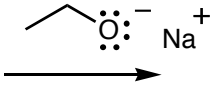
5. Give the products of the following reactions. Draw arrows to show the reactions in the second step.

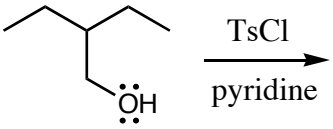
a) 

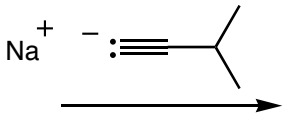
b) 

c) 

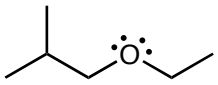
d) 

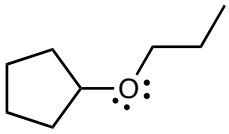


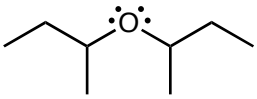
e) 

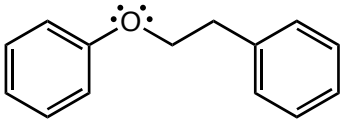


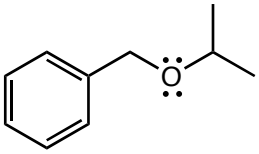
6. Form the following ethers using an S_N2 reaction, using either an alkyl halide or a tosylate. Avoid side products from E2 reactions where possible; when side-products are unavoidable, make a note of it.

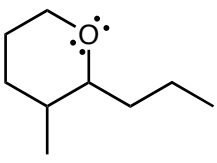
a) 

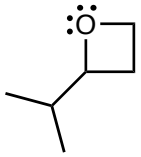
b) 

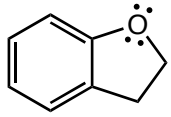
c) 

d) 

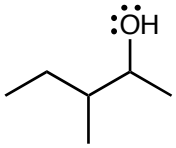
e) 

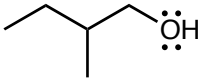
f) 

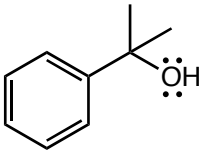
g) 

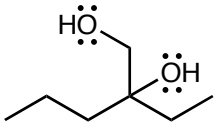
h) 

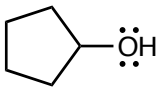
7. Give the products of the following reactions.

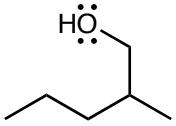
a)  $\xrightarrow[H_2SO_4,\ H_2O]{Na_2CrO_4}$

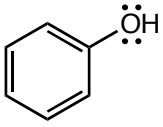
b)  $\xrightarrow[H_2SO_4,\ H_2O]{Na_2Cr_2O_7}$

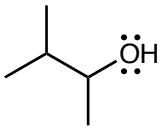
c)  $\xrightarrow[H_2SO_4,\ H_2O]{K_2CrO_4}$

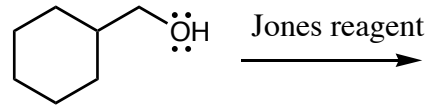
d)  $\xrightarrow{HIO_4}$

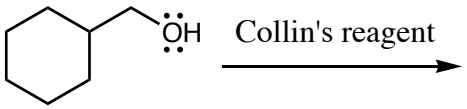
e)  $\xrightarrow[\text{pyridine}]{CrO_3}$

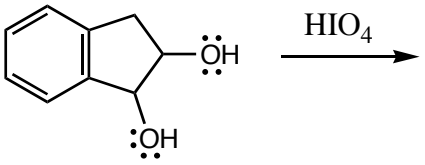
f)  $\xrightarrow[\text{pyridine}]{CrO_3}$

g)  $\xrightarrow[\text{pyridine}]{CrO_3}$

h)  $\xrightarrow{\text{Jones reagent}}$

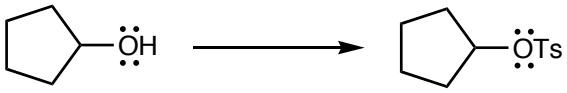
i) 

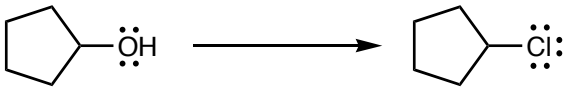
j) 

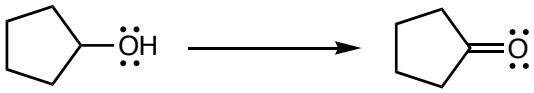
k) 

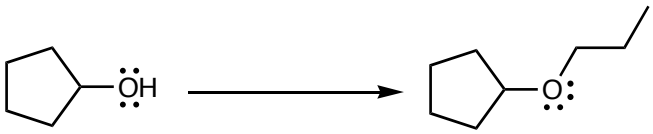
8. Give the reagents that would be necessary to convert the following starting materials to the products shown.

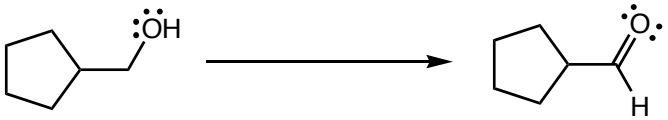
a) 

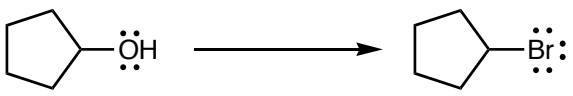
b) 

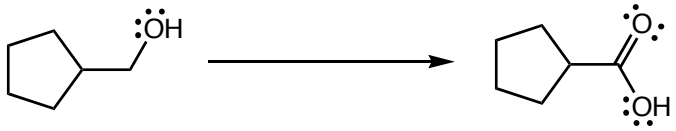
c) 

d) 

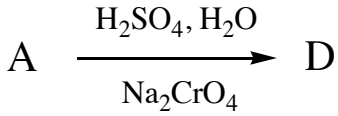
e) 

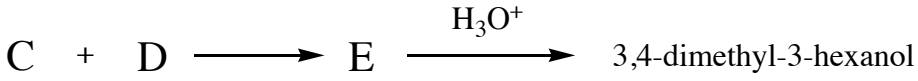
f) 

g) 

h) 

10. Give the compound that correspond to each letter in the following reaction sequence.





A = D =

B = E =

C =

11. Write a reaction sequence (starting materials, reagents, and products) in which the following transformations occur.

a) primary alcohol --> alkyl chloride --> organolithium reagent --> alkane

b) secondary alcohol --> alkyl bromide --> Grignard reagent --> tertiary alcohol

c) alkene --> vicinal diol --> two aldehydes

d) ketone --> secondary alcohol --> alkoxide --> ether

e) alkene --> primary alcohol --> tosylate --> alkyne

f) primary alcohol --> aldehyde --> secondary alcohol

12. Fill in reagents and products which could be used to complete the following synthesis.