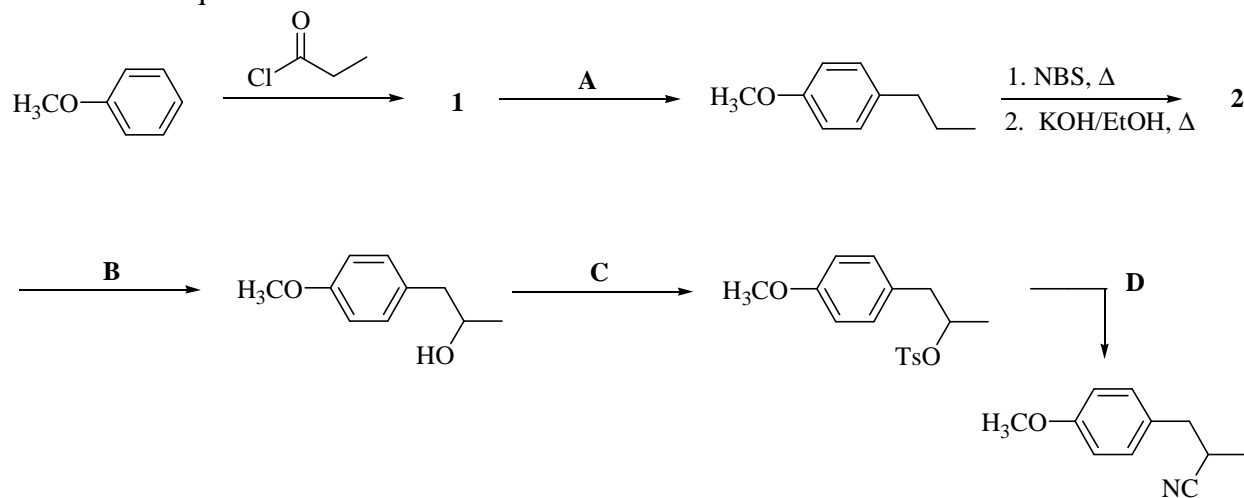


Problem Set #5

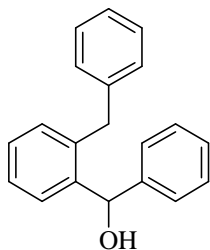
Chemistry 3231

October 2, 2001

1. Identify reagents **A-G** and identify the missing intermediate products **1-2** in the following reaction sequence:



2. When the alcohol shown below was treated with aqueous sulfuric acid, a hydrocarbon of molecular formula $\text{C}_{20}\text{H}_{16}$ was produced as the major product. Propose a structure for this product and suggest a mechanism to account for its formation.

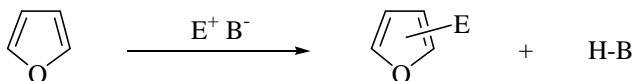


3. Furan (**3**) is aromatic. Explain how the molecular can satisfy each of the criteria for aromaticity. Are the two nonbonding electron pairs on oxygen equivalent?



3

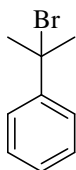
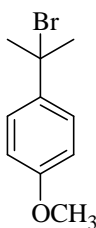
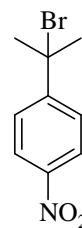
4. Furan undergoes electrophilic aromatic substitution, as shown below. The product is written to indicate that more than one mono-substituted product is possible.



- (a) How many isomers of mono-substituted furan are there?

(b) By drawing resonance structures of possible cationic intermediates for the above electrophilic aromatic substitution reaction, decide which mono-substituted furan(s) is (are) the major product(s).

5. Predict the order of reactivity of compounds **4-6** shown below toward solvolysis in aqueous acetone (i.e., S_N1 reaction in H_2O /acetone) (least reactive first). Keep in mind the electronic effects exerted by the nitro and the methoxy groups. Draw the necessary resonance forms to justify your answer.

**4****5****6**

6. Starting with benzene or toluene, suggest efficient syntheses for preparing each of the following compounds:

