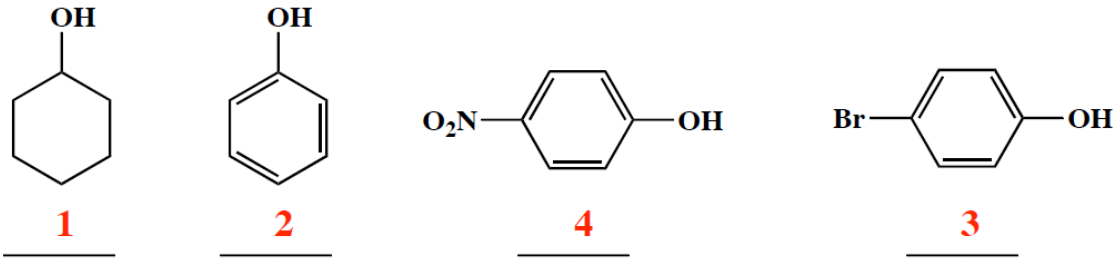
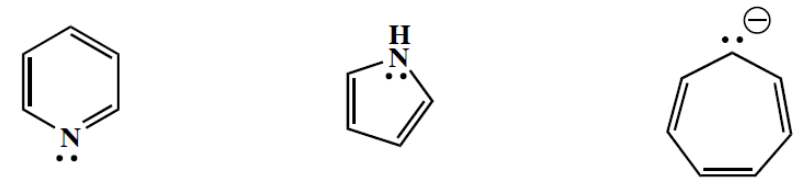
Tuesday Problem Solving Session 5/5/15

Rank from least to most acidic, with a **1** under the least acidic and a **4** under the most acidic molecule.



1 2 4 3

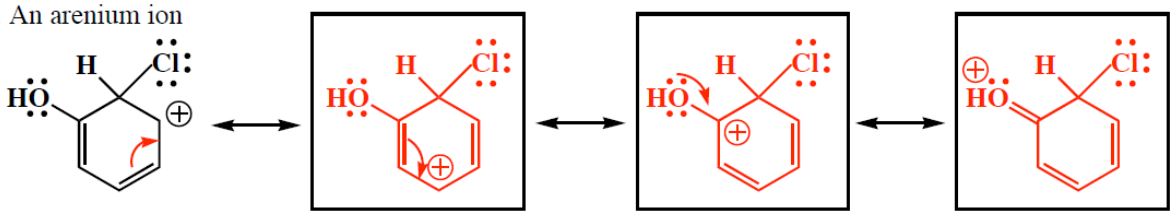
Rank from least to most basic, with a **1** under the least basic and a **3** under the most basic molecule.



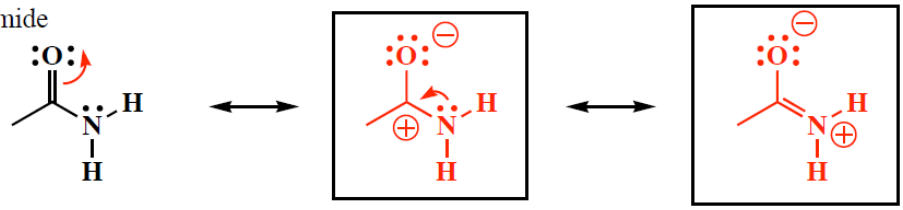
2 1 3

Draw the indicated number of most important resonance contributing structures. Show all lone pairs, pi bonds and formal charges. Use arrows to indicate the redistribution of electrons on each molecule to the left, that leads to the contributing structure you draw immediately to its right. Only the structure on the farthest right will have no arrows. For each set, A, B, and C indicate the type of molecule/ion.

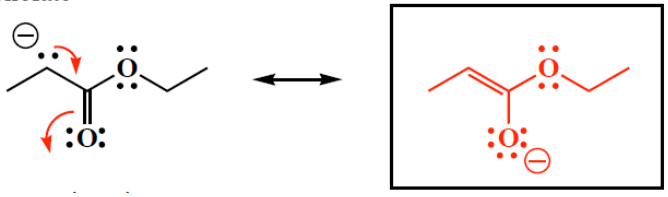
A. An arenium ion



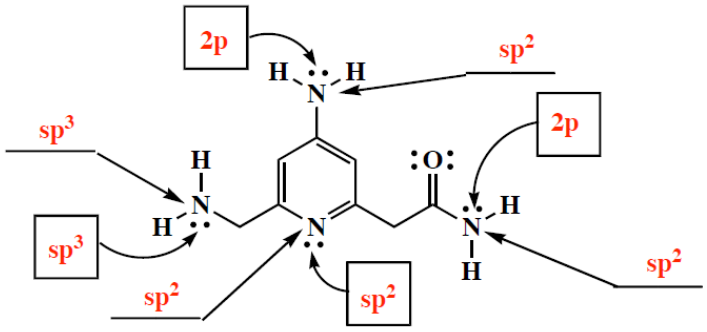
B. An amide

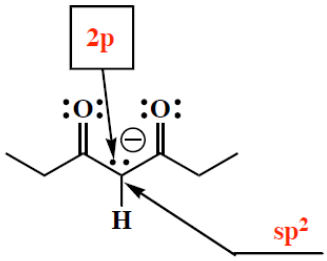


C. An enolate



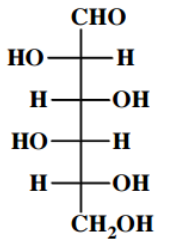
9. (2 pts each) **On the lines provided**, state the hybridization state of each atom indicated in the following molecule. **In the box provided**, state what type of atomic orbital contains the lone pair indicated by the arrow.





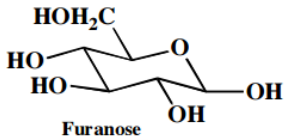
For the following structures, draw a circle around the terms that provide the most accurate description.

A.



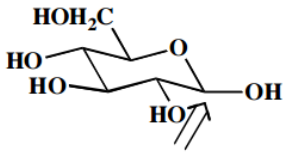
L carbohydrate
D carbohydrate
X-rated carbohydrate
S carbohydrate

B.



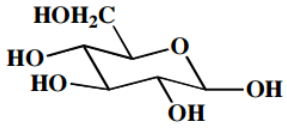
Furanose
Pyranose
Runny nose
Bloody nose
Bottlenose

C.



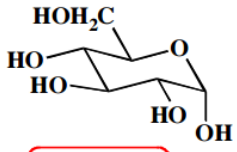
Monomeric carbon
Anomeric carbon
Polymeric carbon
All-American carbon

D.



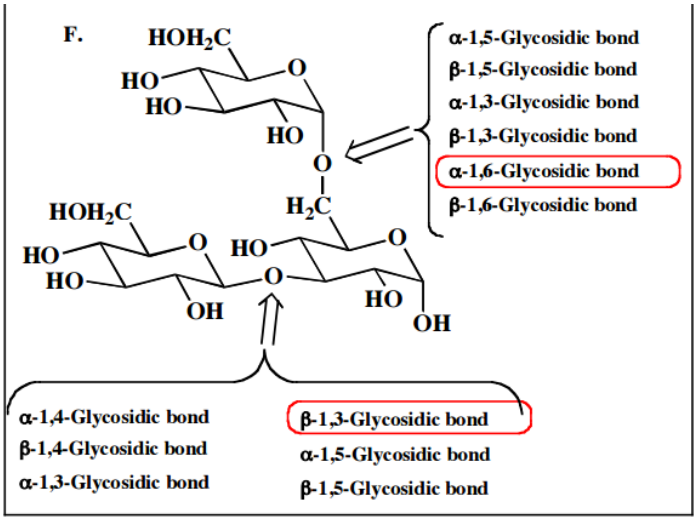
α-D-Glucose
β-D-Glucose
βββ-D-Glucose
ΣΑΕ-D-Glucose
Fiji-D-Glucose

E.



α-D-Glucose
β-D-Glucose
βββ-D-Glucose
ΣΑΕ-D-Glucose
Fiji-D-Glucose

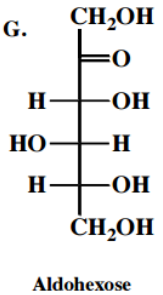
F.



α-1,5-Glucosidic bond
β-1,5-Glucosidic bond
α-1,3-Glucosidic bond
β-1,3-Glucosidic bond
α-1,6-Glucosidic bond
β-1,6-Glucosidic bond

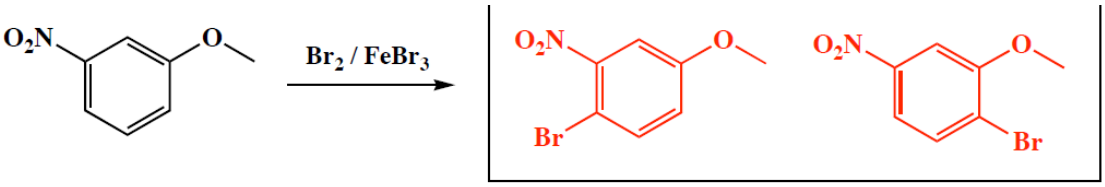
α-1,4-Glucosidic bond
β-1,4-Glucosidic bond
α-1,3-Glucosidic bond
β-1,3-Glucosidic bond
α-1,5-Glucosidic bond
β-1,5-Glucosidic bond

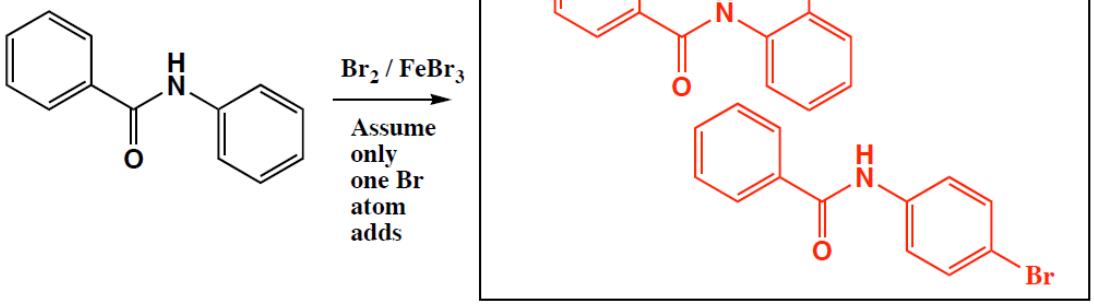
G.

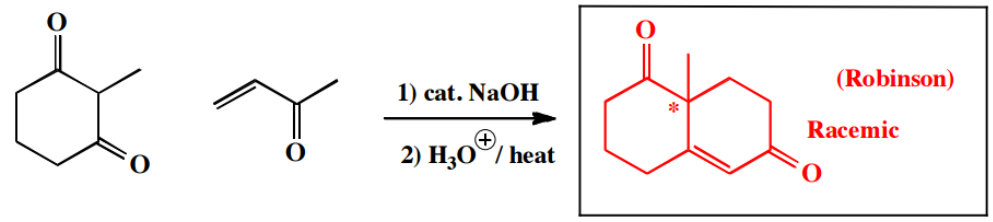


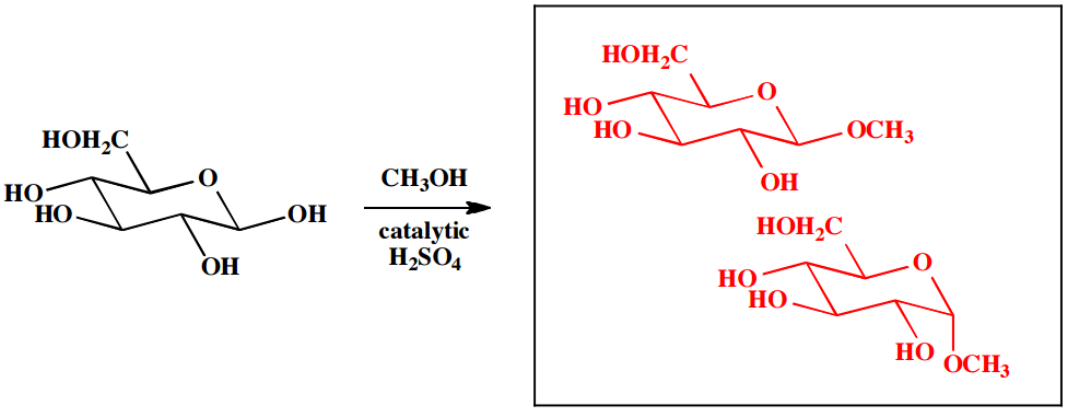
Aldohexose
Ketohexose
Aldopentose
Pointy toes

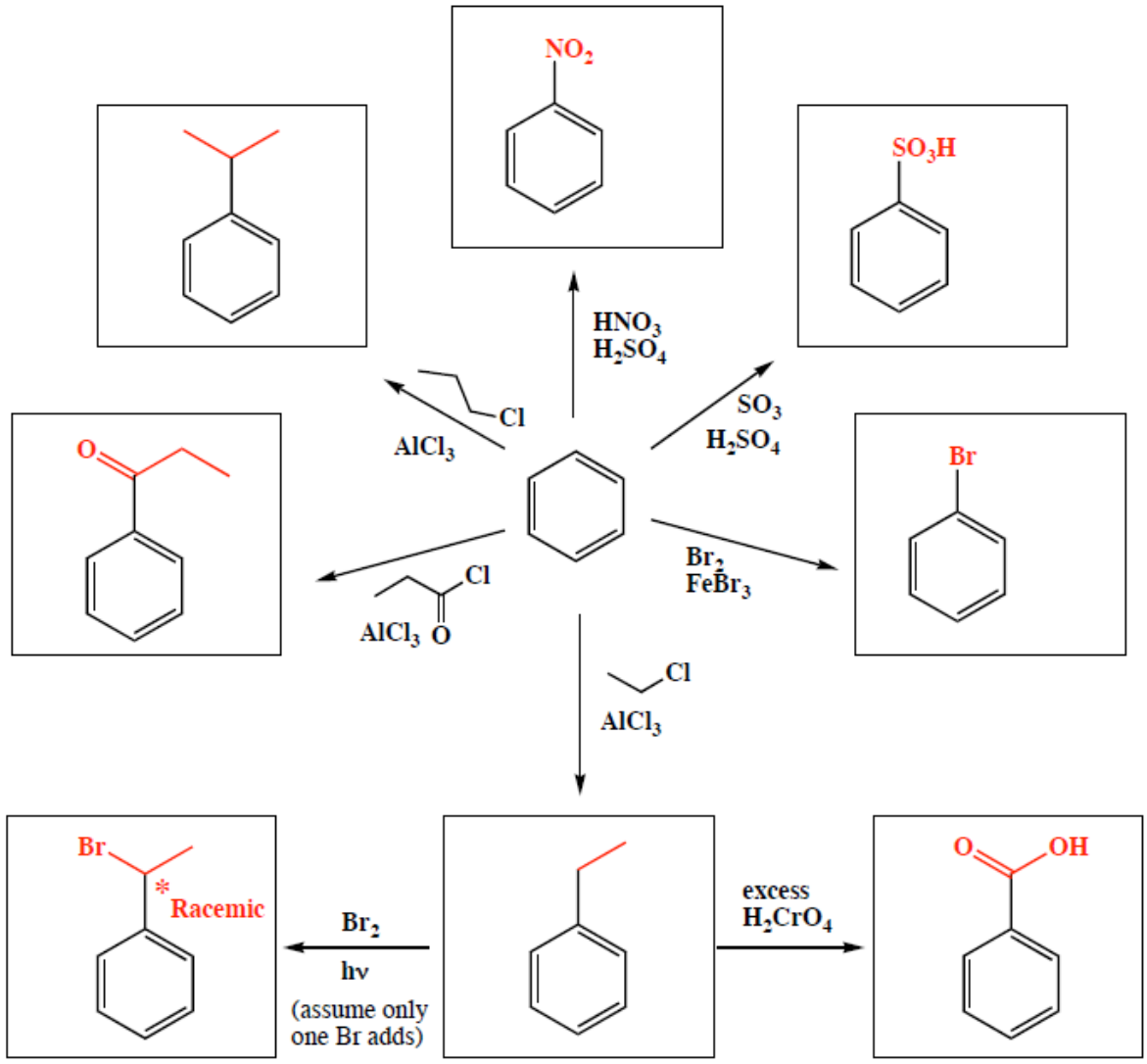
Predict the product(s):



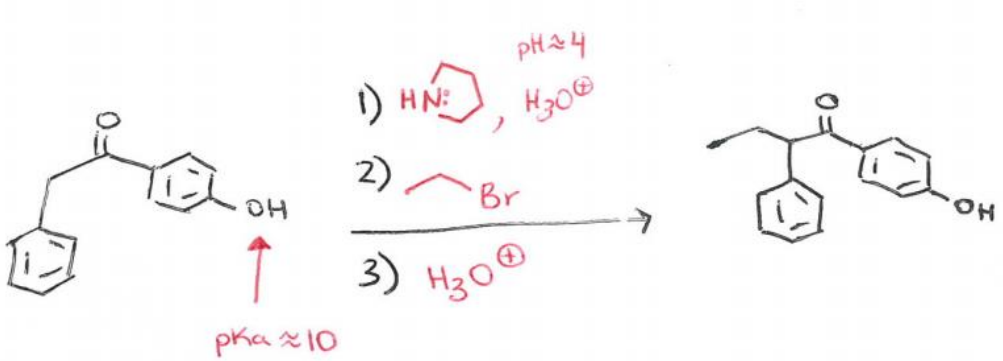






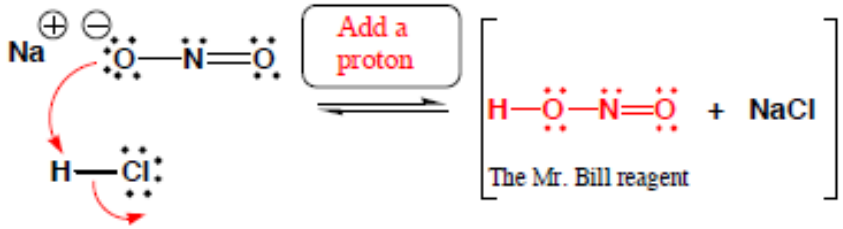


Predict the Reagents:

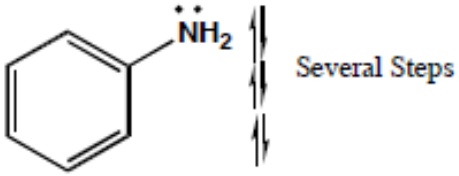


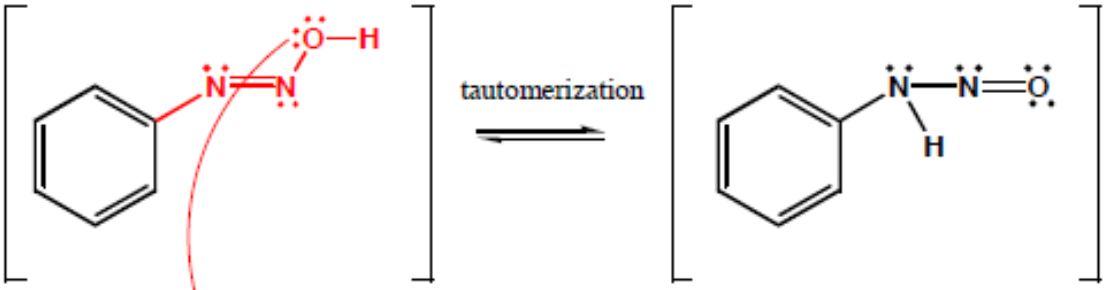
* can't use strong base because will deprotonate phenol

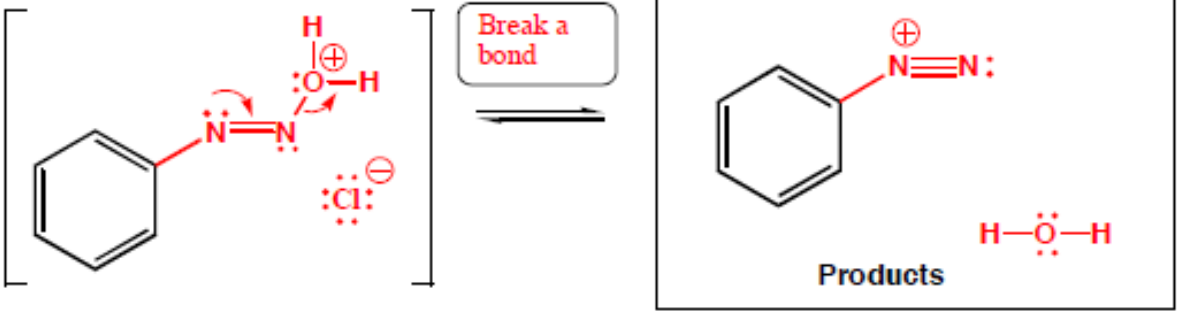
12. (17 pts) Complete the mechanism for the Mr. Bill reaction. Be sure to show arrows to indicate movement of all electrons, write all lone pairs, all formal charges, and all the products for each step. Remember, I said all the products for each step. IF A NEW CHIRAL CENTER IS CREATED IN AN INTERMEDIATE OR THE PRODUCTS, MARK IT WITH AN ASTERISK AND LABEL AS "RACEMIC" IF RELEVANT. IN THE BOX BY EACH SET OF ARROWS, WRITE WHICH OF THE 4 MECHANISTIC ELEMENTS IS INDICATED IN EACH STEP OF YOUR MECHANISM (For example, "Add a proton").

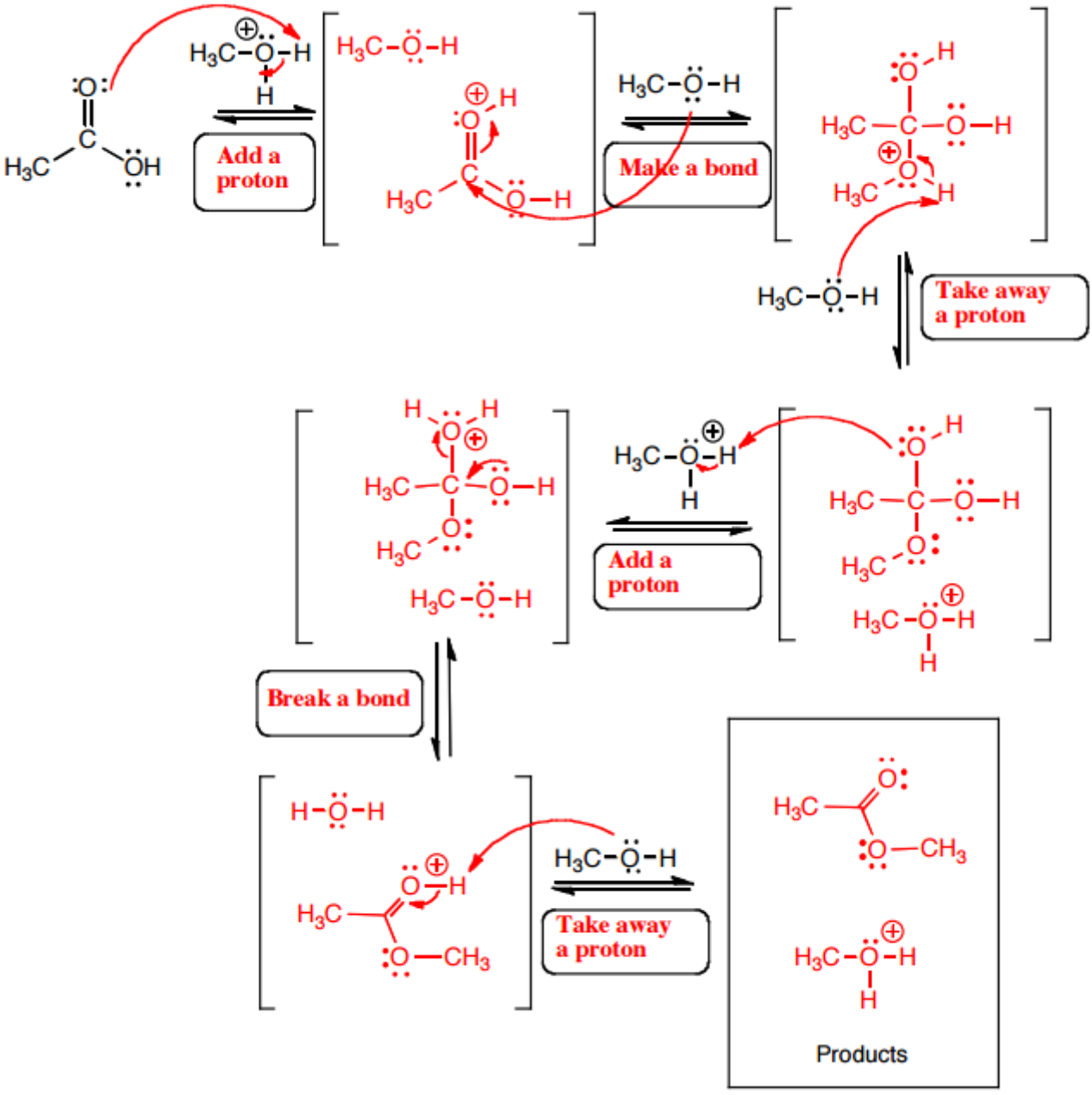


Note we drew a benzene ring in each box to serve as a template and save you a little time



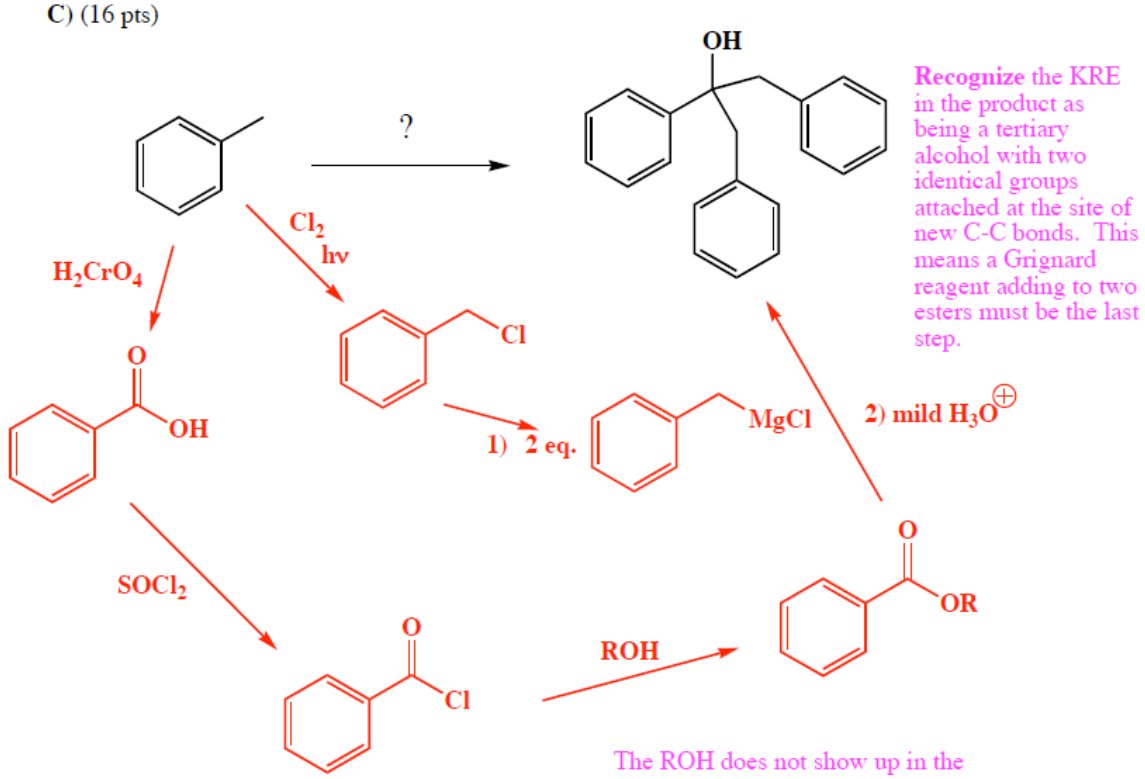





Add a proton
Make a bond
Take away a proton
Add a proton
Break a bond
Take away a proton
Products

18. Using any reagents turn the starting material into the indicated product. All the carbons in the product must come from the given starting material or starting materials. Draw all molecules synthesized along the way. When it doubt, draw the molecule! If an ortho/para mixture will be the major products of a reaction, you can choose whether you would like to isolate the ortho or para product for your synthesis.

C) (16 pts)

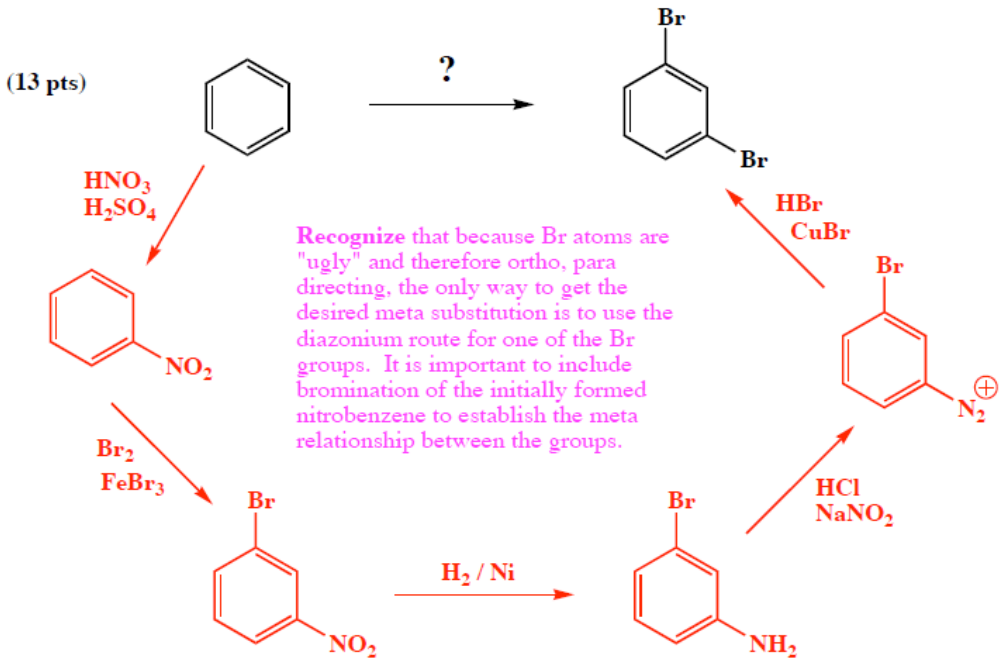


Recognize the KRE in the product as being a tertiary alcohol with two identical groups attached at the site of new C-C bonds. This means a Grignard reagent adding to two esters must be the last step.

The ROH does not show up in the products, so it does not need to come from the starting material

The ROH does not show up in the

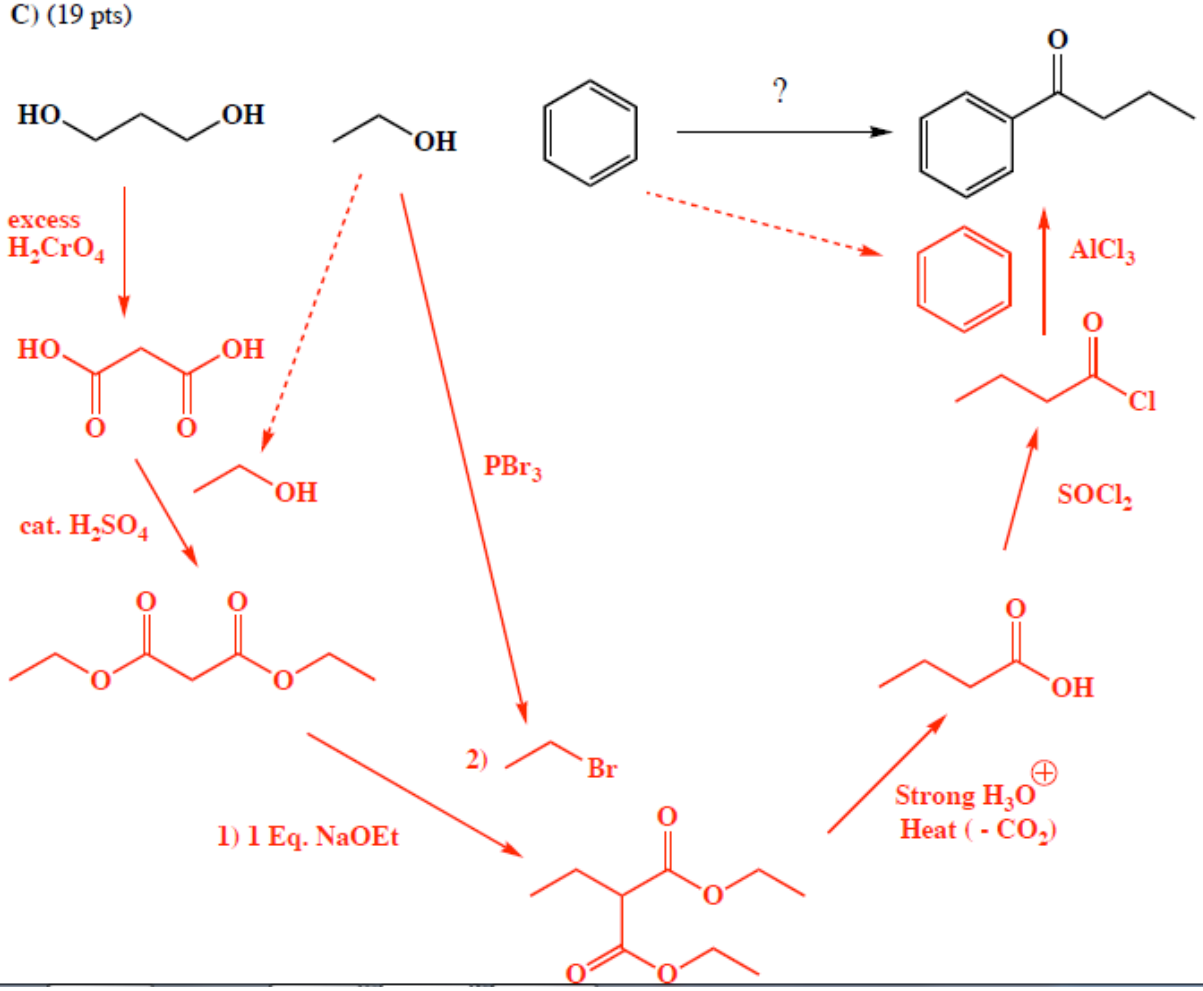
(13 pts)



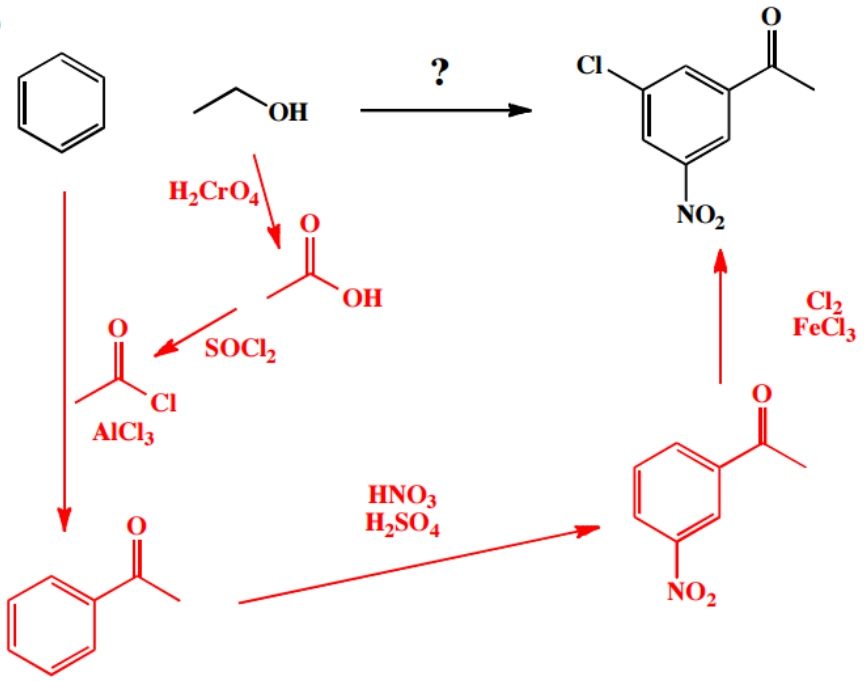
Recognize that because Br atoms are "ugly" and therefore ortho, para directing, the only way to get the desired meta substitution is to use the diazonium route for one of the Br groups. It is important to include bromination of the initially formed nitrobenzene to establish the meta relationship between the groups.

11. Using any reagents turn the starting material into the indicated product. All the carbons in the product must come from the given starting material or starting materials. Draw all molecules synthesized along the way. When it doubt, draw the molecule!

C) (19 pts)



(13 pts)



Recognize that this is the only sequence of reactions that will work. The Friedel-Crafts acylation must be done first, because it does not work with a nitro group on the ring. The Cl must be added last so that the meta orientation is present. **Recognize** that the acetyl chloride needed for the acylation can be made by H_2CrO_4 oxidation of ethanol followed by treatment with $SOCl_2$.