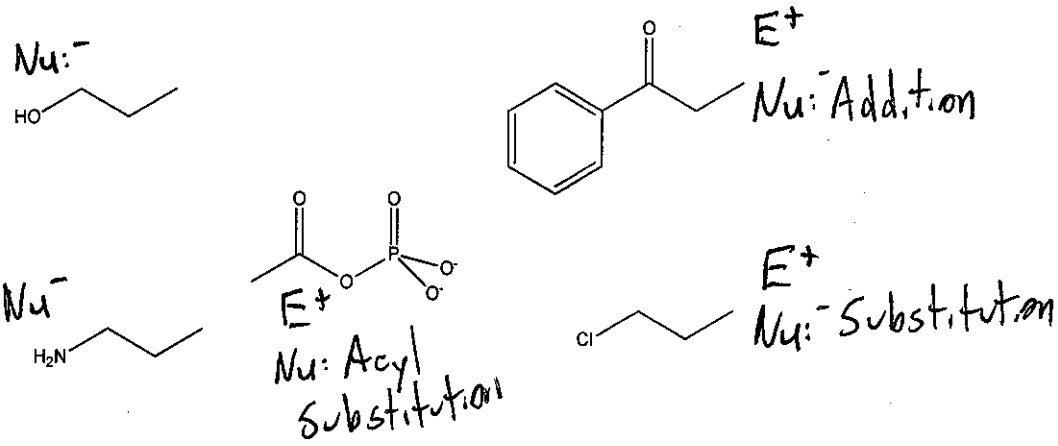
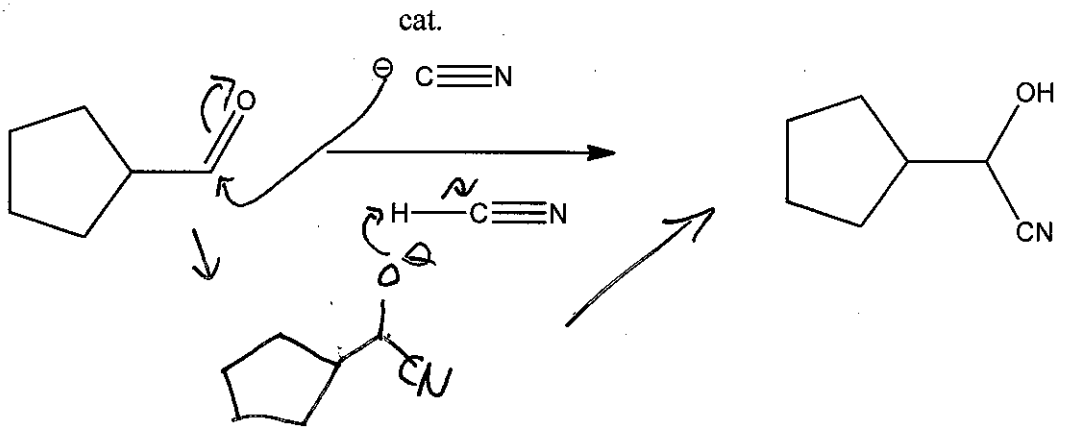
Practice Exam 3 R340

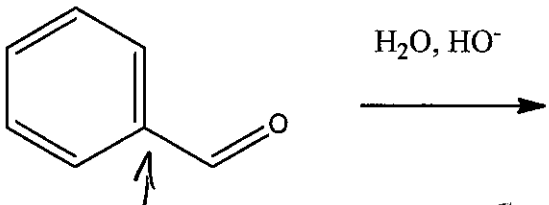
1. (10pts) For each molecule below, label it as either a nucleophile or electrophile. If it is an electrophile, indicate what type of reaction mechanism it will undergo: nucleophilic substitution, nucleophilic addition, nucleophilic acyl substitution.



2. (6pts) Propose a nucleophilic addition mechanism for this reaction.

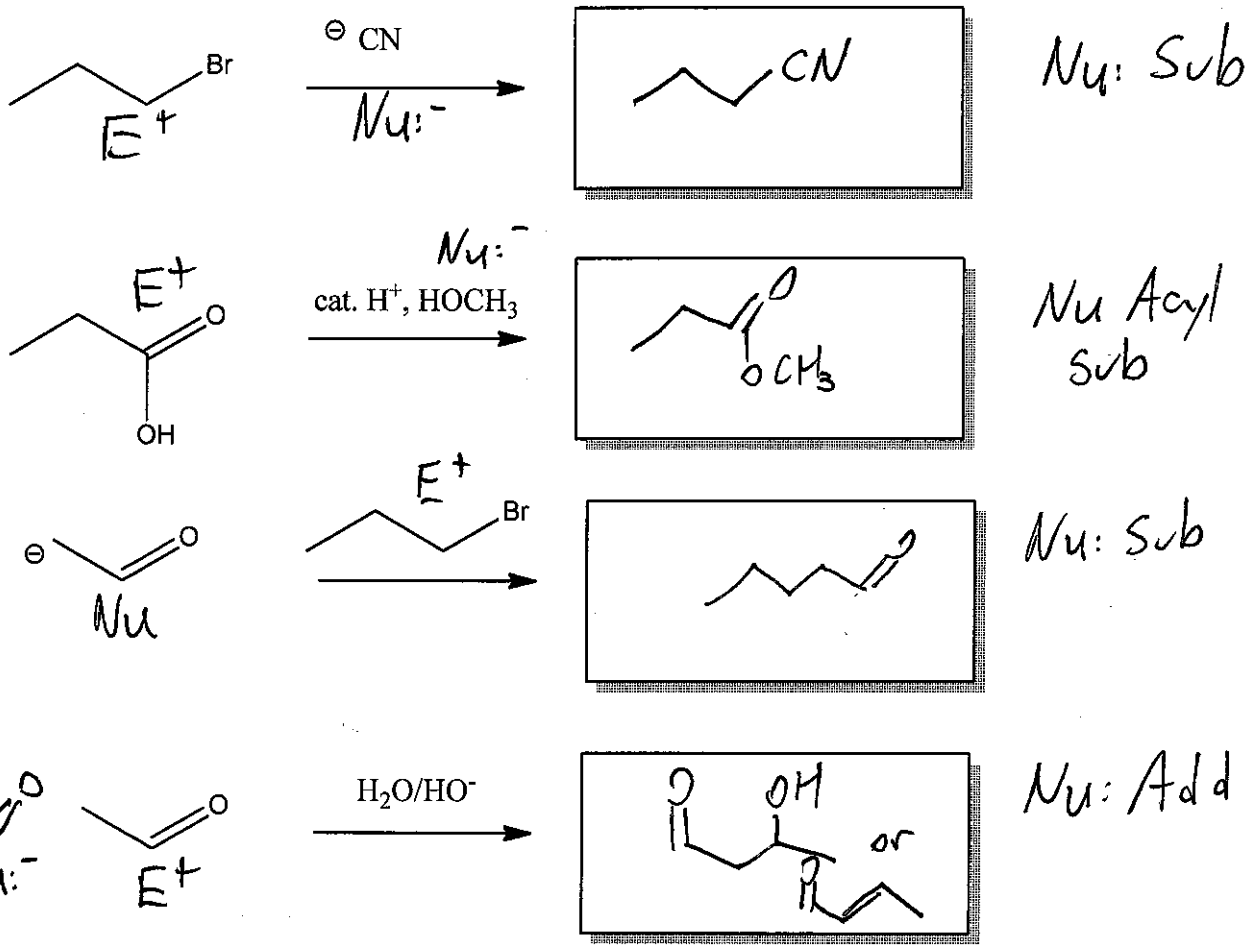


3. (4pts) A student attempted this aldol reaction. Why won't it work?

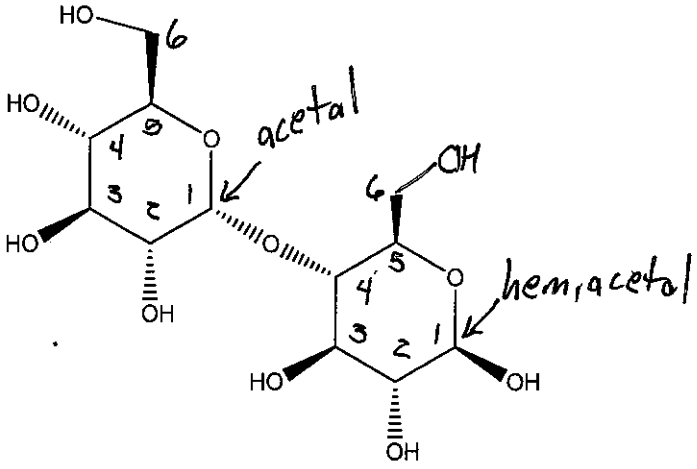


No α protons. Therefore, this compound can not be deprotonated, which means there will be no enolate to act as a Nu:⁻ in the Aldol rxn

4. (16pts) Identify the nucleophile and electrophile in each reaction. Are these reactions nucleophilic substitutions or nucleophilic additions? Predict the products.



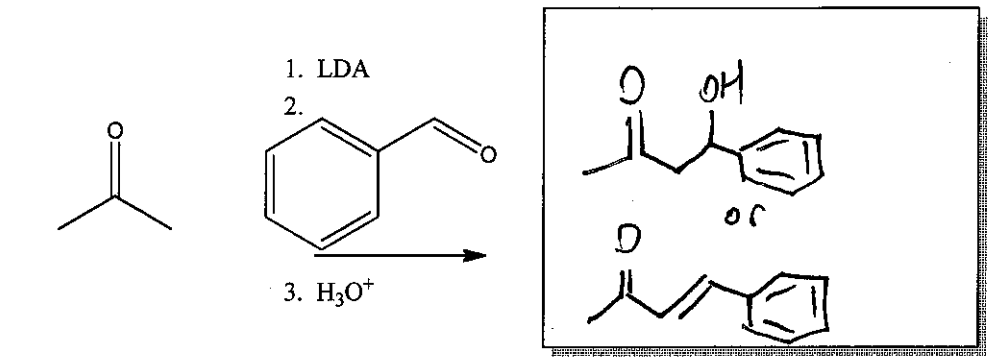
5. (6pts) Identify any hemiacetal and acetal functional groups in this molecule. What type of glycosidic bond is this?



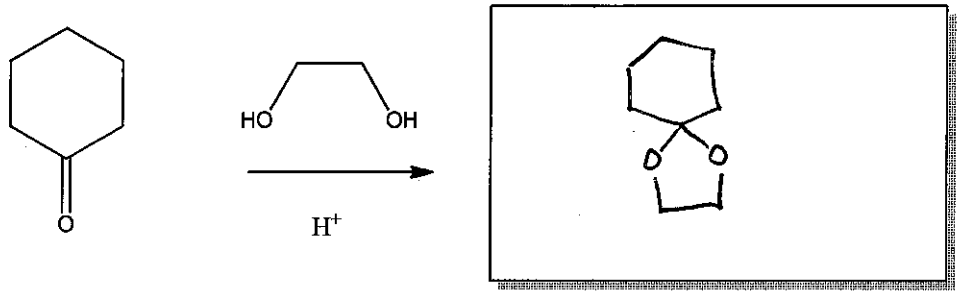
linkage:

$\alpha(1 \rightarrow 4)$

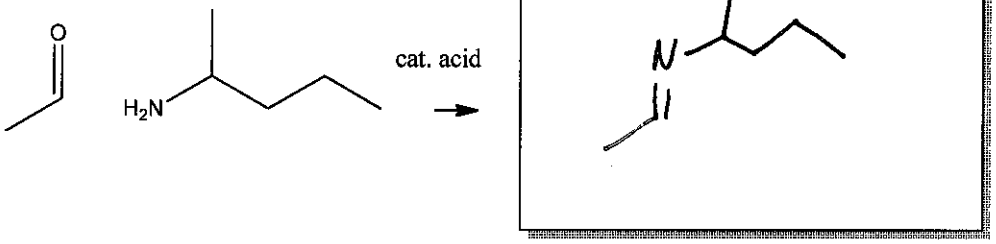
6. (12pts) Draw the product of these condensation reactions and label the type of condensation reaction.



Aldol

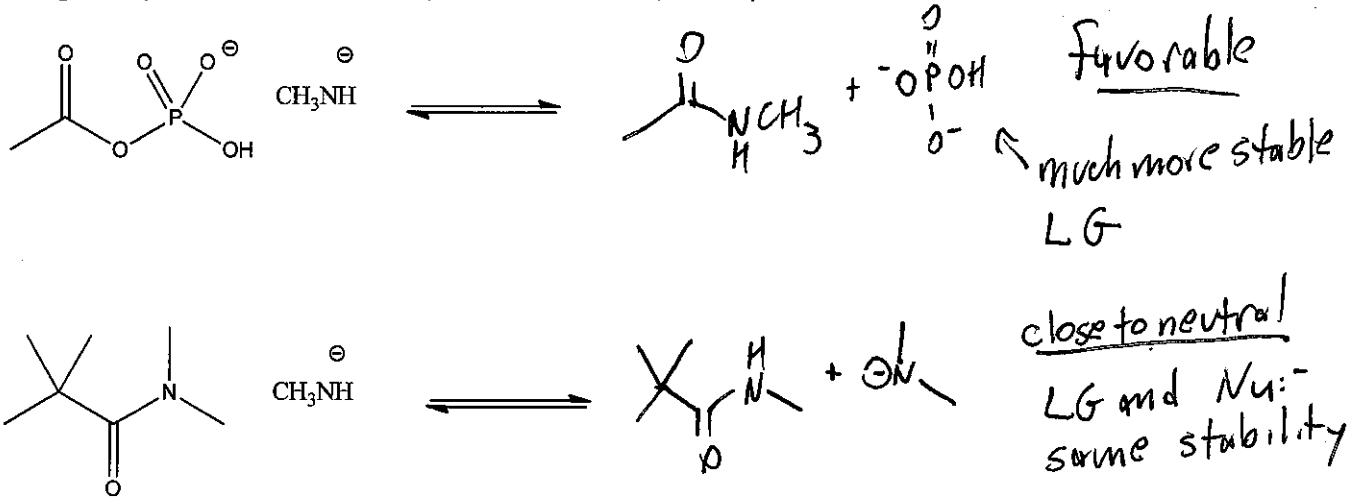


Acetal formation

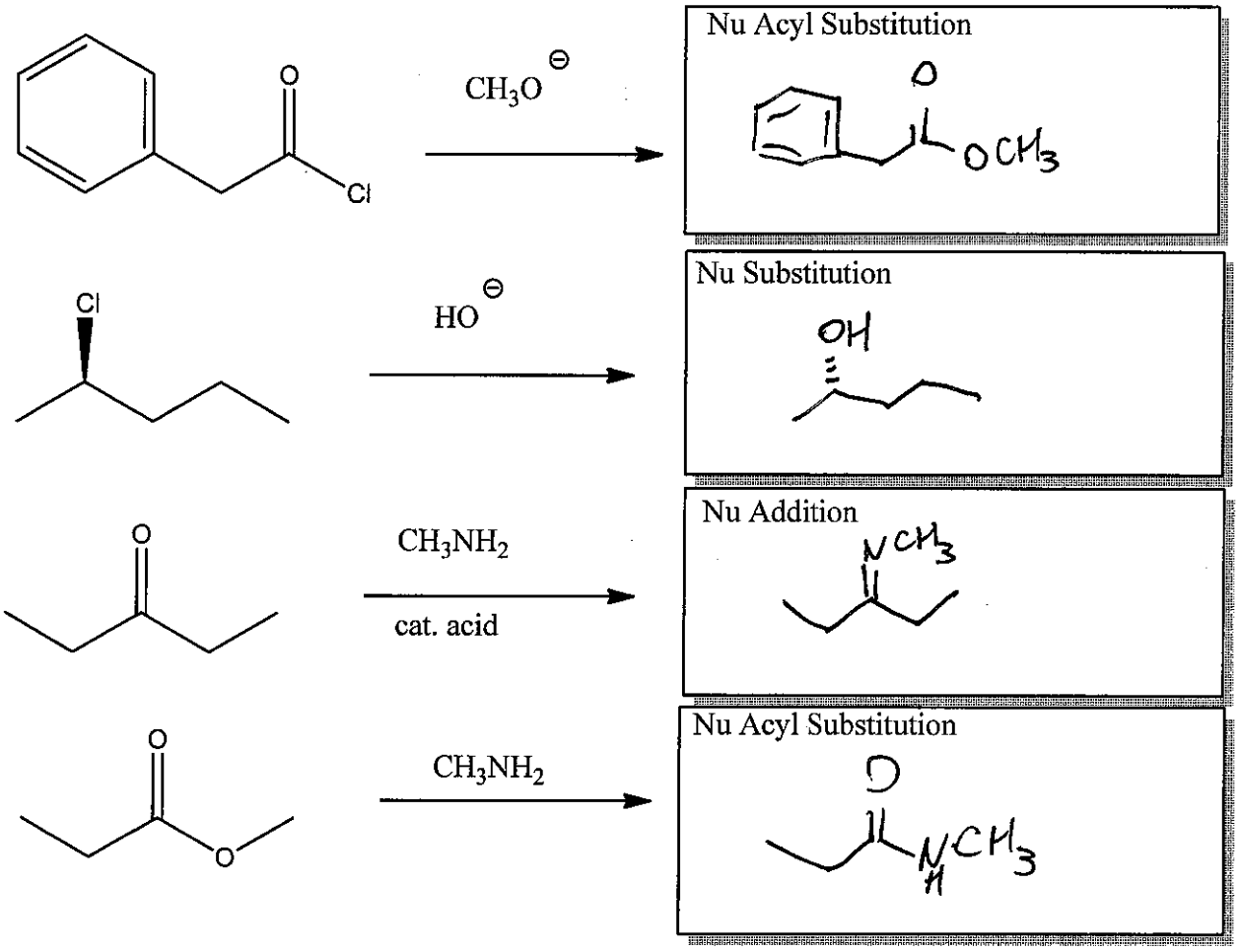


Imine formation

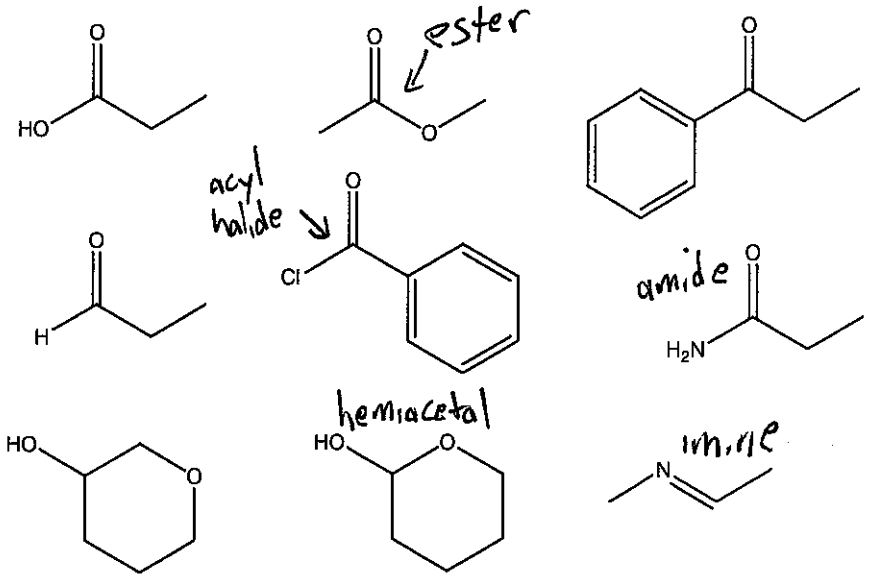
7. (8pts) Fill in the products of these nucleophilic acyl substitution reactions. Label these reactions as energetically favorable, unfavorable, or close to neutral, and explain.



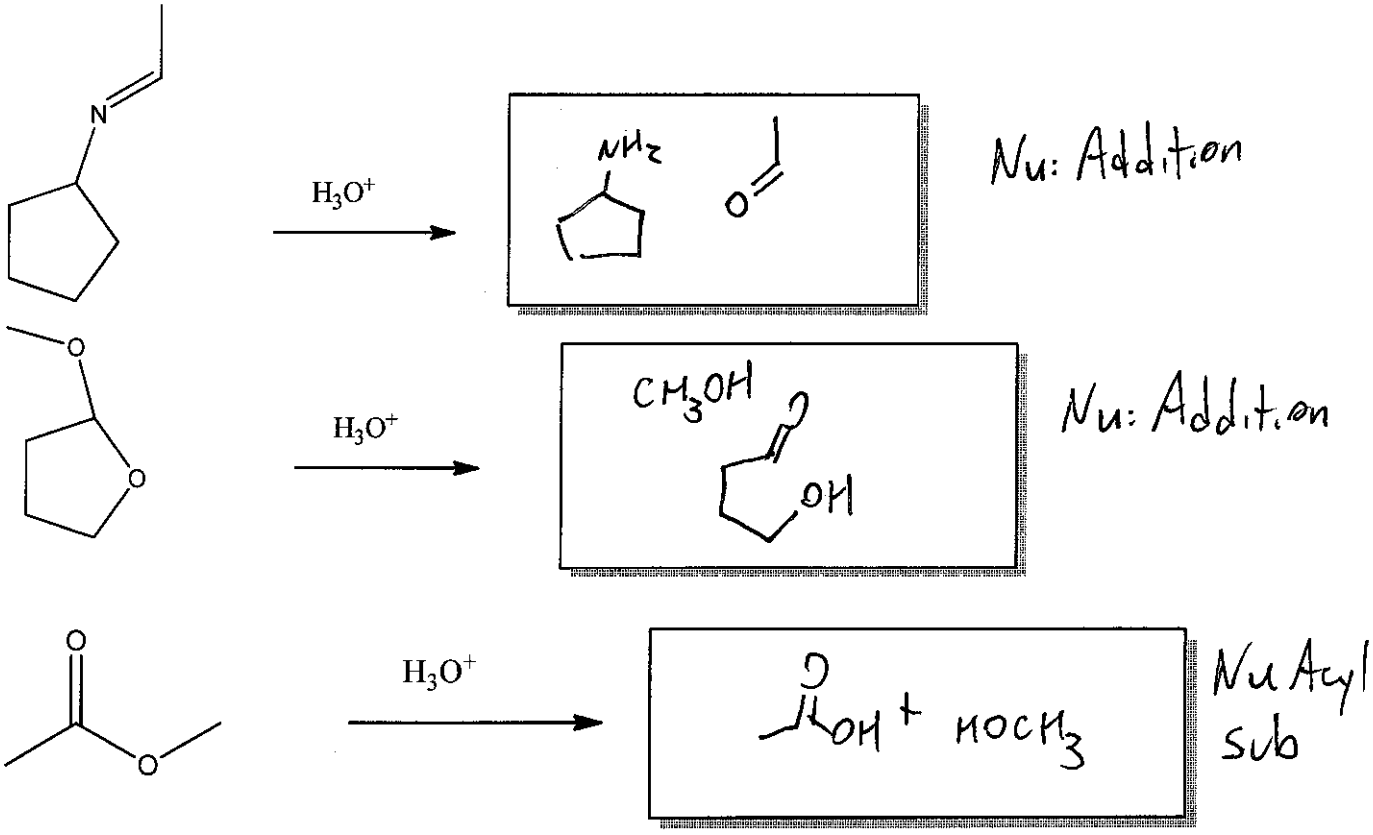
8. (12pts) Given the type of mechanism, predict the major product of each reaction.



9. (9pts) Indicate functional groups in these molecules that are susceptible to hydrolysis by naming them.

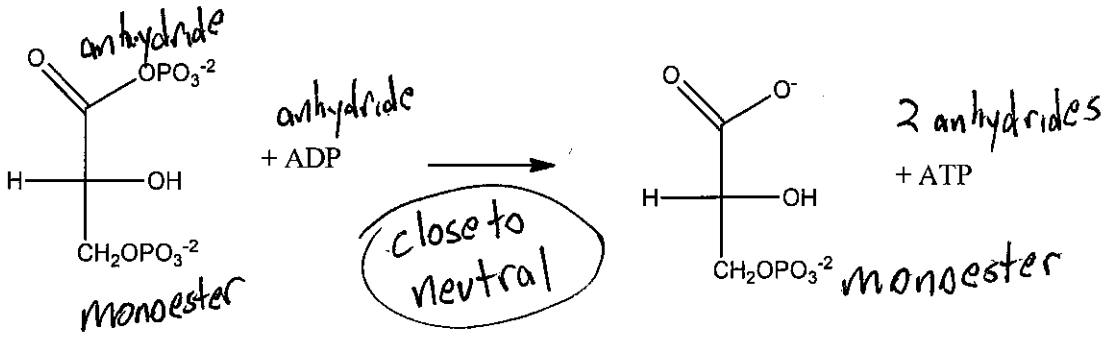


10. (9pts) What mechanism would be operable in each of these hydrolysis reactions? Predict the products of each.

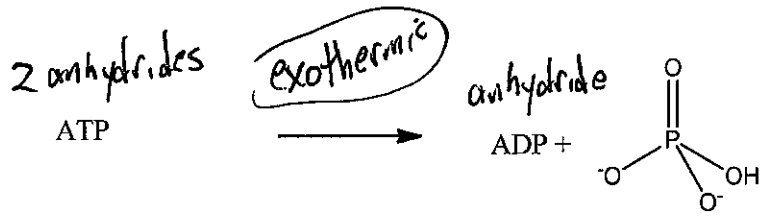


11. (8pts) Label the phosphate functional groups as "monoester", "diester" or "anhydride." Indicate the number of high energy bonds in each compound. Is each reaction endothermic, exothermic, or close to neutral based on their phosphorylation?

A.



B



C.