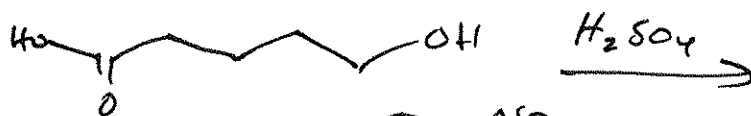


Problem Set 7

Five points. Due Monday, April 22, by the start of class.

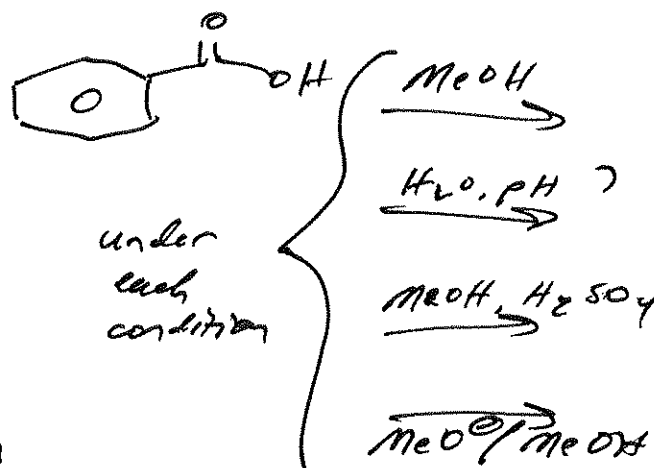
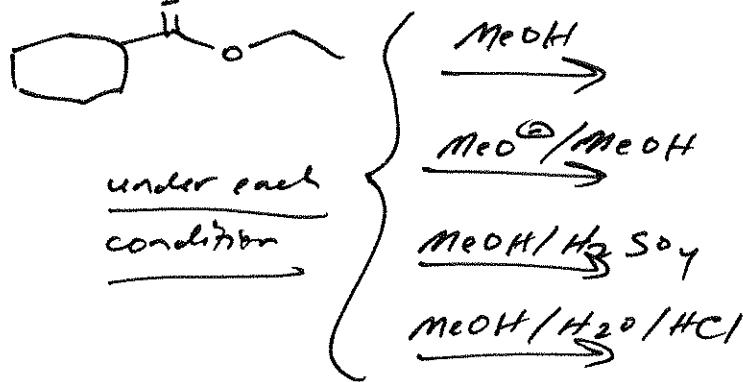
Provide answers on a separate sheet(s) of paper, stapling together multiple pages.

1. Indicate the mechanisms to show product formation in the following reactions.



Note: amides
stable here

2. Indicate the products of each of the following reactions.

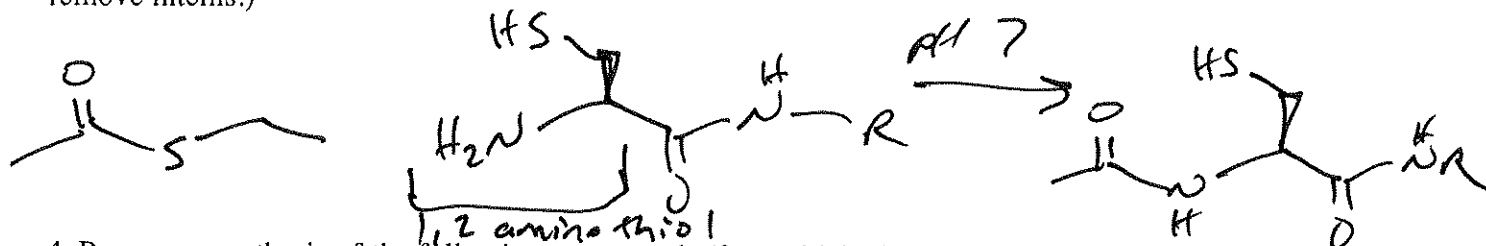


3. In contrast to esters, *thioesters* exchange (transesterification) rapidly at neutral pH (pH 7).

(a) Provide a mechanism for thioester exchange and provide two reasonable explanations why thioester exchange occurs but ester exchange does not under neutral aqueous conditions. Pay attention to protonation state.



(b) Thioesters can react with 1,2-aminothiols (e.g. an N-terminal cysteine residue) to produce amide bonds, *via a transesterification intermediate*. Notably, there is no significant reaction with lysine residues under these conditions. Provide a mechanism for this reaction. (This reaction, termed native chemical ligation, is an extremely powerful method of protein synthesis and is related to processing of proteins to remove inteins.)



4. Propose a synthesis of the following compounds (from aldehydes, ketones, or alkenes as the sole carbon sources; recall that alcohols can be converted to leaving groups (e.g. tosylates, halides (chapter 7.4))).

