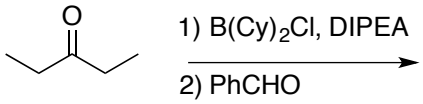
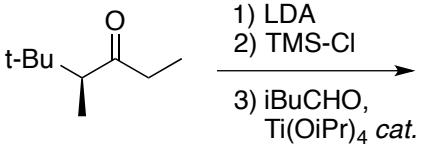
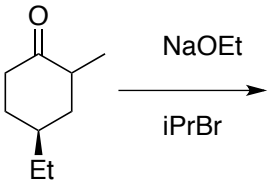
Chem 200
Fall 2014
Problem set 5
Due Monday Dec 15/2014

(6 Points) Draw the transitions state or intermediate that is responsible for the observed regio- chemo- or stereoselectivity in each reaction. Draw the product you expect to form, including all relevant stereochemistry.

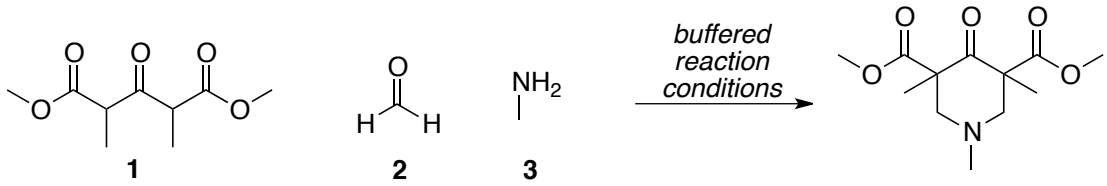




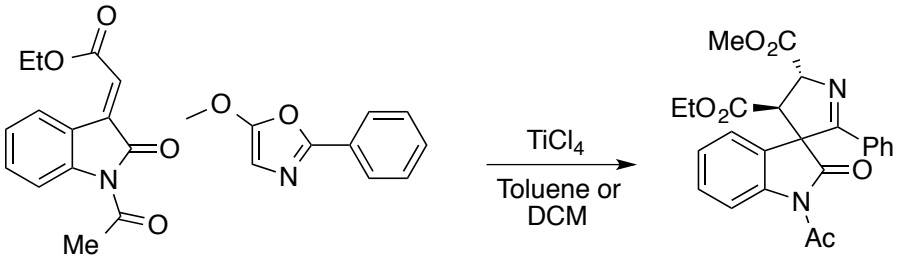


2) (4 Points)

When ketone **1** was mixed with excess formaldehyde (**2**) and methylamine (**3**) a cyclic amine was formed. Propose a mechanism that explains this reaction.
NOTE: The reaction is performed under buffered conditions so both basic and acidic species are present in the reaction media.



3) (4 Points) The Aldol reaction (enolate attacking an aldehyde or ketone) is the basis for many reactions that differ only slightly (imine in place of a carbonyl for example). Below is one such reaction, which is similar to a Mukaiyama aldol reaction. It only works when a Titanium catalyst is added and give the rearranged product shown.



a) What is the mechanism of this reaction?
b) How is this like an aldol reaction? What steps are in common and what are different?
c) Why do you get only the trans product? Show an intermediate and make an argument that supports your answer.
d) This reaction only works in non-coordinating solvents such as DCM or toluene. Why does the reaction fail in THF or MeOH?

4) (4 Points) A recent article was discussing the reaction of azomethine imines to make new compounds using a formal dipolar cycloaddition strategy.
    a. Find this paper and report the literature reference including:
        i. Authors
        ii. Journal
        iii. Publication date
        iv. Pages (if assigned)
        v. DOI
    b. Choose any compound in Figure 5 and draw out the starting materials you would use and the mechanism of the reaction
    c. When the reaction uses a chiral Lewis base the reaction can be done enantioselectively. Using the models they present in the paper and our latest discussion explain how the Lewis base makes the reaction enantioselective