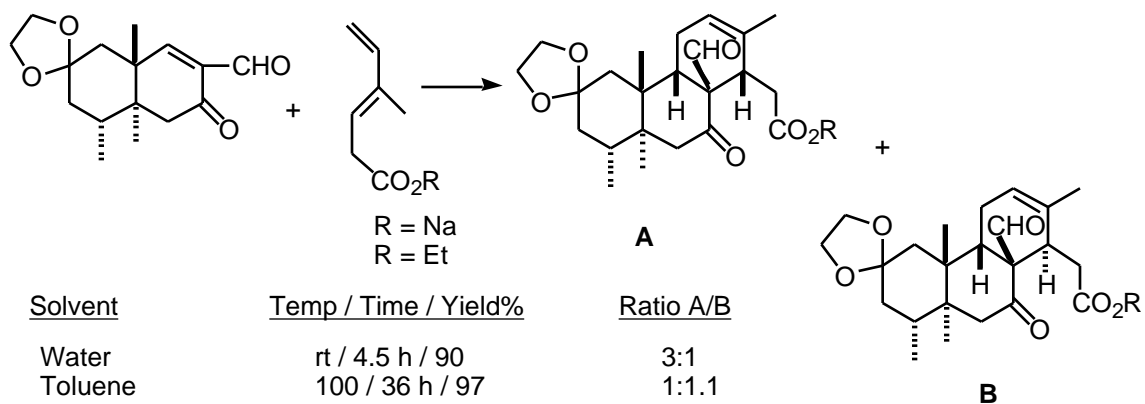
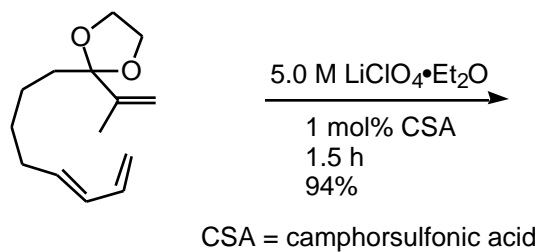




3. Explain the following: Show the transition state that leads to each isomer. (10 points)

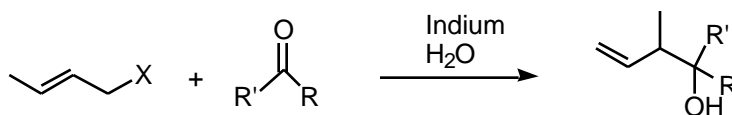


4. a) Predict the product and provide a mechanism for the following reaction: (10 points)



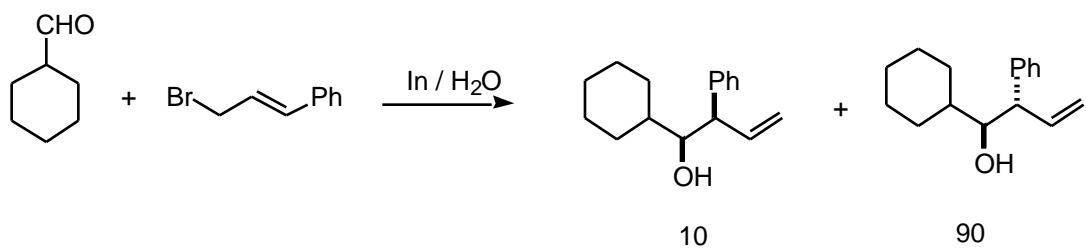
4. b) Using your mechanism, explain why this reaction requires temperature greater than 190°C in organic solvents, and does not proceed at all without added acid. (4 points)
5. a) Explain the difference between a Barbier-type and Grignard-type reaction. (4 Points)
- b) Why is indium metal the most reactive and effective metal for aqueous Barbier-Grignard-type reactions? (4 points)

6. For the reaction:

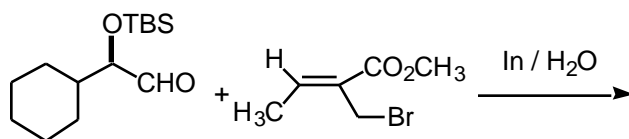


Give two reasonable mechanistic hypotheses for the role of indium in this reaction. (10 points)

7. Use transition states to explain the following diastereomeric ratio: (15 points)



8. a) Determine the product of the following reaction and rationalize your predicted stereochemistry complete with transition states: What carbonyl addition model did you use for your stereochemical explanation? (20 points)



8. b) What would you predict the stereochemistry to be if the *t*-butyldimethylsilyl group was removed before the allylation reaction? (5 points)

