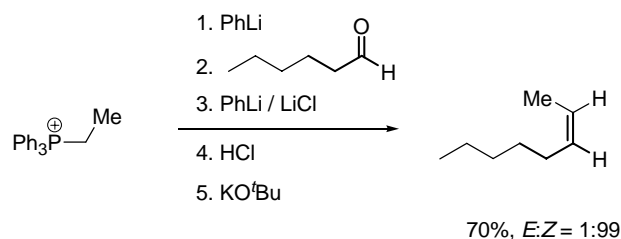


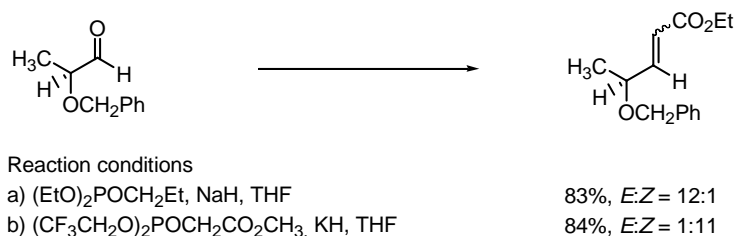
Carbonyl Olefination (part I?)

1. The nature of the phosphorus ylide usually determines the stereoselectivity in Wittig-type reactions. However, there is a number of reliable ways to change the outcome of the reaction. Discuss the following examples:

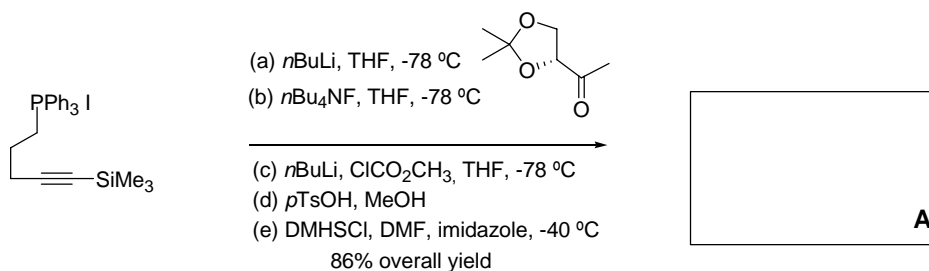
1.1. Classical Wittig reaction: the Schlosser modification on non-stabilized ylides.

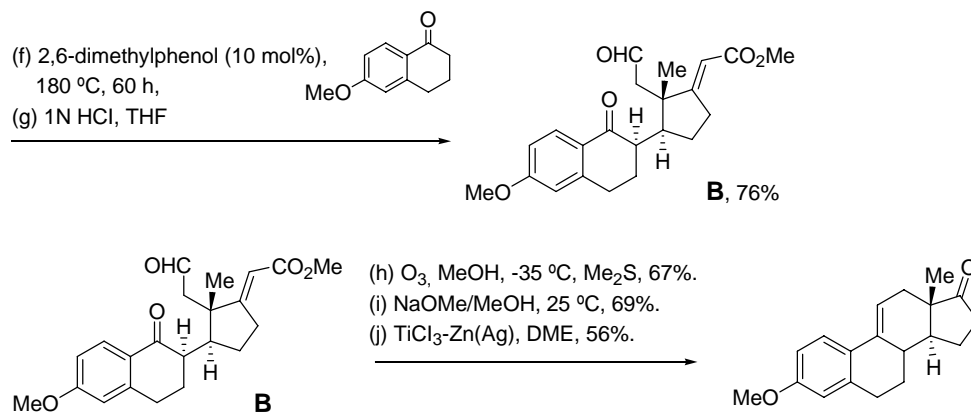


1.2. Horner-Wadsworth-Emmons reaction: the Still-Gennari modification on stabilized ylides.

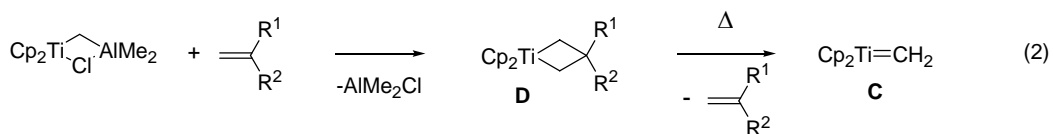
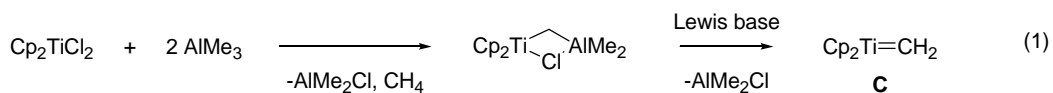


2. Road map. Mikami and Nakai completed the synthesis of (+)-9(11)-dehydroestrone methyl ether, a key intermediate in the synthesis of a number of strogens, in a reaction sequence that involves a Wittig olefination of a non-stabilized phosphorus ylide, a tandem Claisen-ene reaction and a McMurry coupling. Explain the stereochemistry of **B**, and provide a mechanism for the Ti^{IV} promoted olefination.

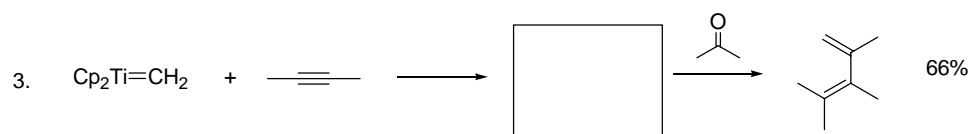
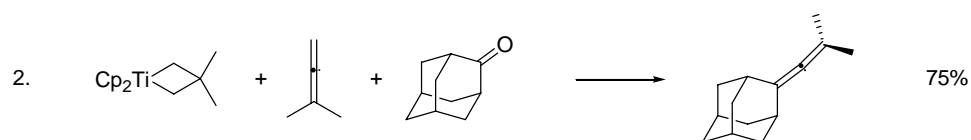
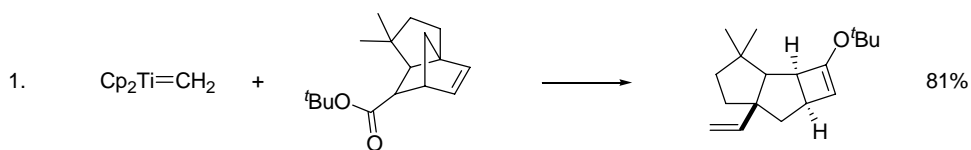




3. The titanocene methylenide **C** is formed by the action of a Lewis base such as pyridine or DMAP on the Tebbe reagent, with the expulsion of dimethylaluminum chloride (eq. 1). An alternative way to generate **C** is by thermolysis of the titanacyclobutanes **D** (the Grubbs reagent), prepared by reaction of the Tebbe reagent with an appropriate olefin (eq. 2).



As you know, this kind of reagents can be employed in the methylenation of aldehydes, ketones, esters or even amides, but it is not its only application. Can you explain the following reactions?



4. Road map again. The Takai-Ukimoto olefination was used to introduce the (*E*)-substituted double bond in Kinder's total synthesis of Bengamide B. Walk us through it, providing a mechanistic rationale for the stereoselectivity in the olefination step.

