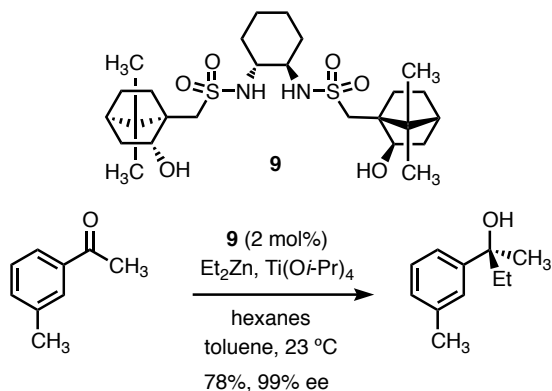


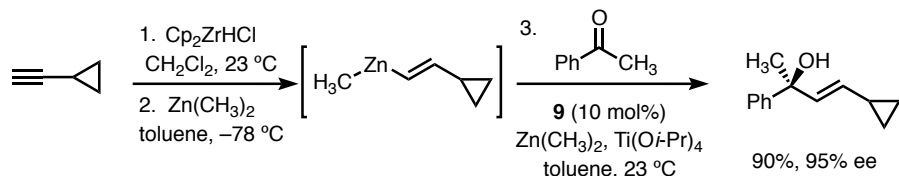
Asymmetric Addition to Ketones:

- Ketones are less reactive than aldehydes and often give 1,2-addition products in lower yields because of competitive enolization or reduction of the carbonyl group.
- Using $\text{Ti}(\text{O}i\text{-Pr})_4$ as a Lewis acid, ligand **9** catalyzes the formation of tertiary alcohols with high selectivity:

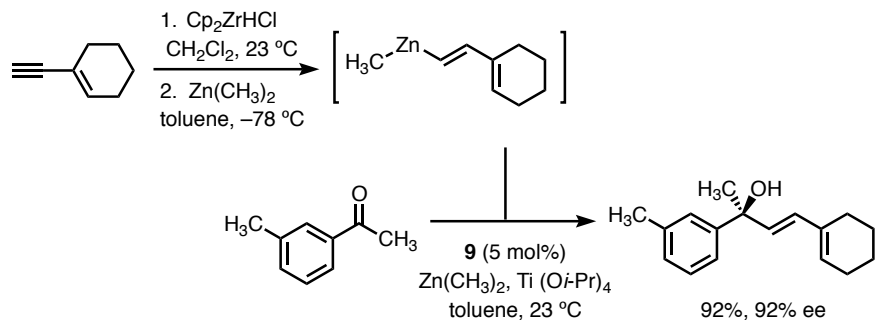


Garcia, C.; Larochelle, L. K.; Walsh, P. J. *J. Am. Chem. Soc.* **2002**, *124*, 10970–10971.

Yus, M.; Ramon, D. J.; Prieto, O. *Tetrahedron: Asymmetry* **2002**, *13*, 2291–2293.

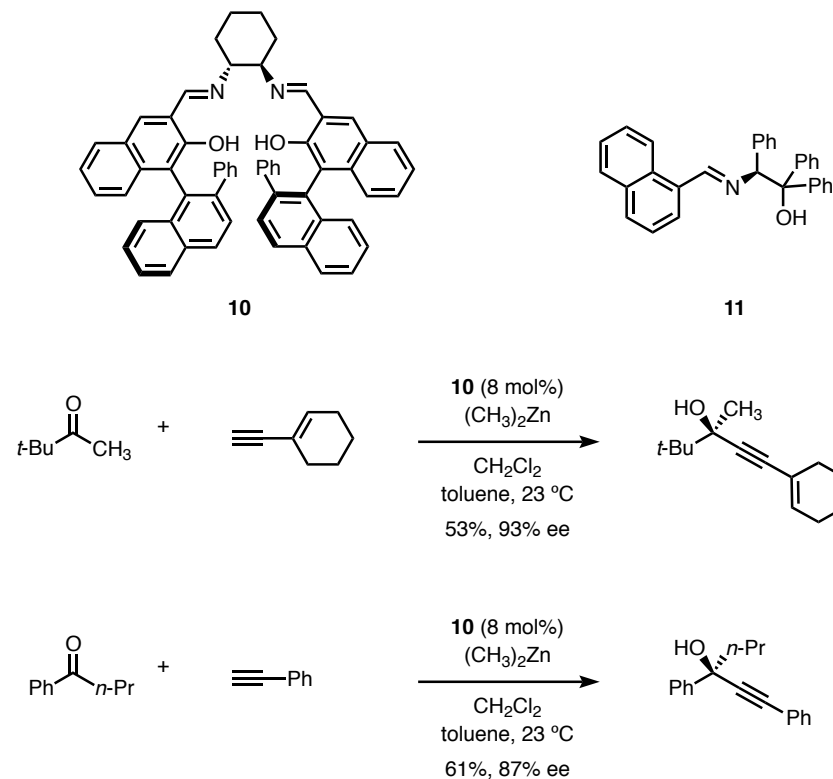


Li, H.; Walsh, P. J. *J. Am. Chem. Soc.* **2004**, *126*, 6538–6539.

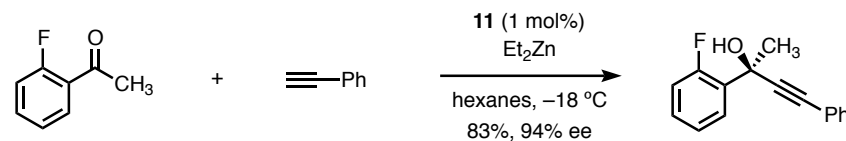


Li, H.; Walsh, P. J. *J. Am. Chem. Soc.* **2005**, *127*, 8355–8361.

- Salen ligand **10** and Schiff base ligand **11** were found to promote efficient addition of zinc acetylides to ketones:



Saito, B.; Katsuki, T. *Synlett*. **2004**, 1557–1560.



- This method is only effective for aromatic ketones.

Chen, C.; Hong, L.; Xu, Z.-Q.; Liu, L.; Wang, R. *Org. Lett.* **2006**, *8*, 2277–2280.

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