Synthesis of Alkynes from Aldehydes and Ketones

Christina Arcand, Dr. Carolyn Weinreb
Department of Chemistry, Saint Anselm College

NH-INBRE

Abstract

The synthesis of phenylacetylene from acetophenone, 1-heptyne from heptanal and cyclododecyne from cyclododecanone was attempted. This synthesis is a proposed alternative to the Cory-Fuchs reaction used in the synthesis of 1,3,5,7-tetraethynyladamantane. The phenyalcetylene was produced with a yield of 70%, the 1-heptyne was produced with a yield of 108%, and the cyclododecye with a yield of 110%. The formation of the alkyne was confirmed with ^{13}CNMR, and IR spectroscopy.

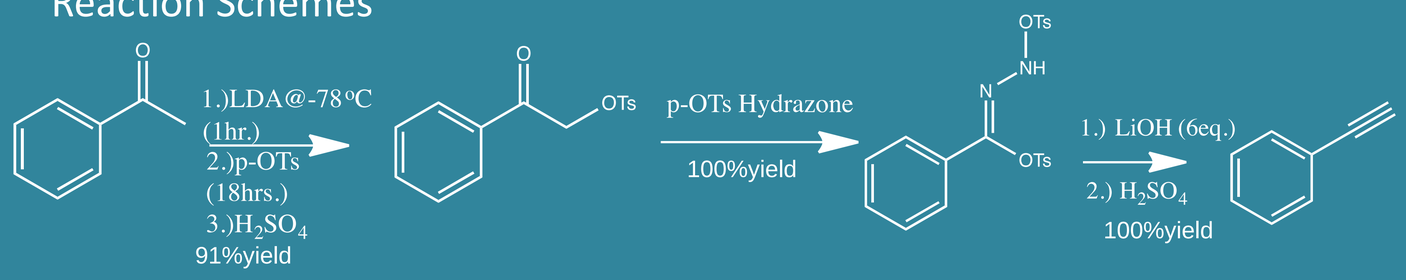
Introduction

- Alkynes are carbon-carbon triple bonds.
- They are highly reactive and used to make many different products.
- Alkynes are used in medicine, as aggressive anti-tumor medications such as dynemycin-A, and as biological messengers in bacteria and plants
- The most common ways to produce an alkyne are using a Corey-Fuchs reaction or a Seyferth–Gilbert homologation.
- This is an alternative and versatile way to make both internal and terminal alkynes.

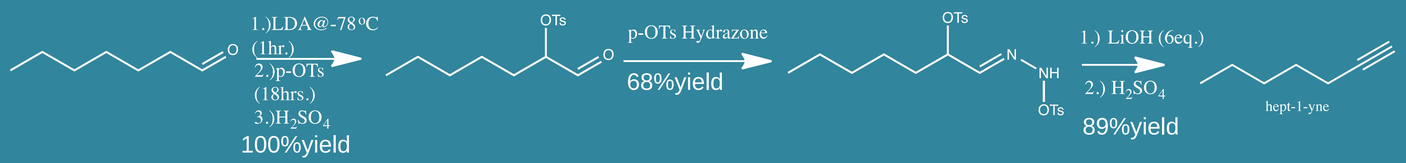
Conclusions

- The method of synthesizing alkynes from aldehydes and ketones is viable.
- The appearance of a peak in the IR at approximately 2200cm^{-1} and a peak between 60-100 in the ^{13}CNMR confirmed the synthesis of the alkyne from all three starting materials.
- The synthesis of LDA *in situo* yields better product.
- There is further research to be done to yield a completely pure product, since the product is currently contaminated with remaining tosic acid.
- This method should also be tried with compounds of different sizes.

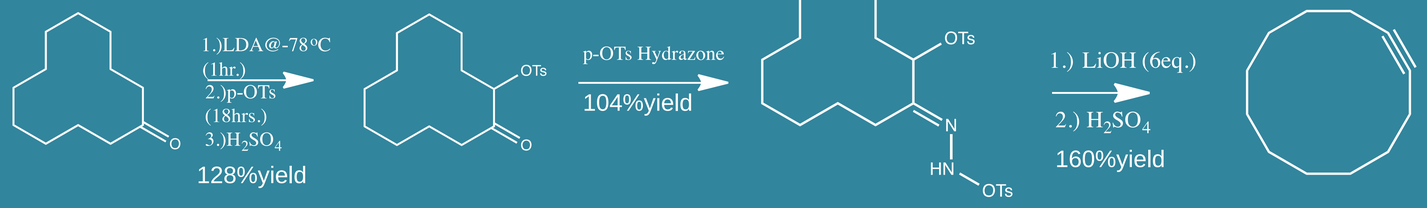
Reaction Schemes



Acetophenone to Phenylacetylene

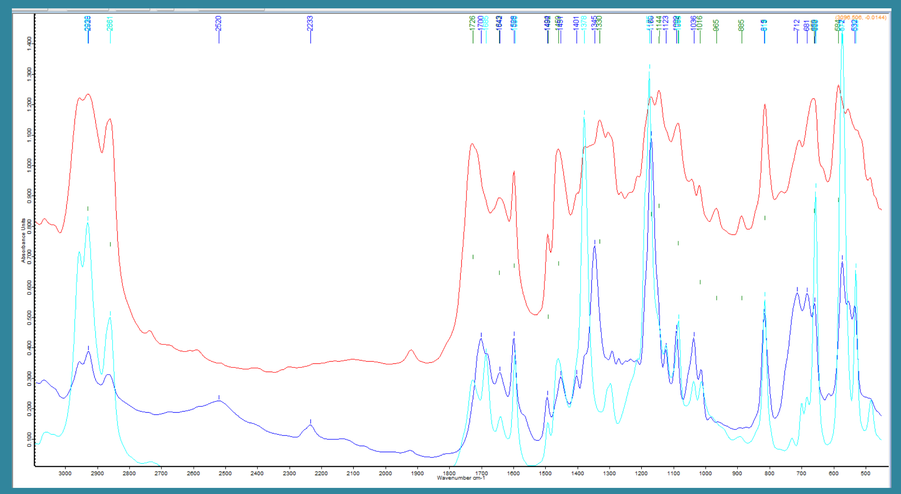


Heptanal to 1-Heptyne



Cyclododecanone to Cyclododecyne

Results



1-Heptyne: First Step, Second Step, 1-Heptyne

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