

ORGANIC CHEMISTRY 2 LECTURE GUIDE 2019

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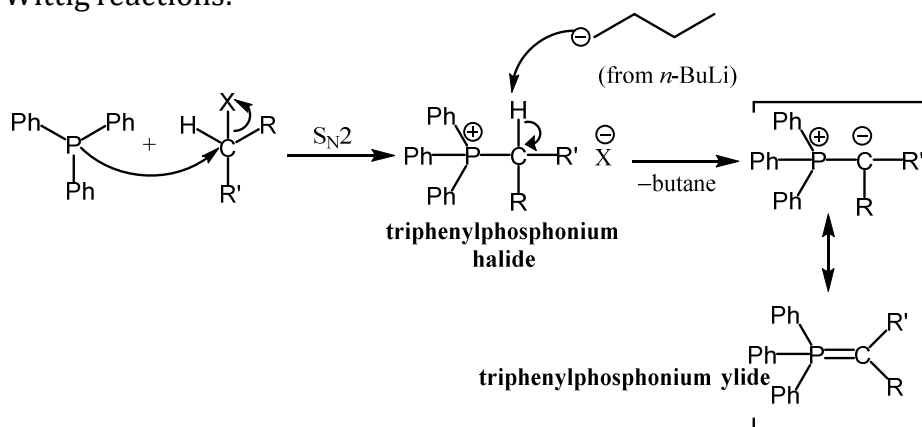
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Lesson VI.8: The Wittig Reaction

Making an alkene from a carbonyl!

A special type of nucleophile called a **phosphonium ylide** can be formed from a phosphonium salt, and then used as a nucleophile to do a Type D reaction with aldehydes and ketones. This particular Type D reaction is called the **Wittig Reaction**, and produces alkene products.

Here is how the phosphonium salt and the phosphonium ylide are generated in the Wittig reactions:



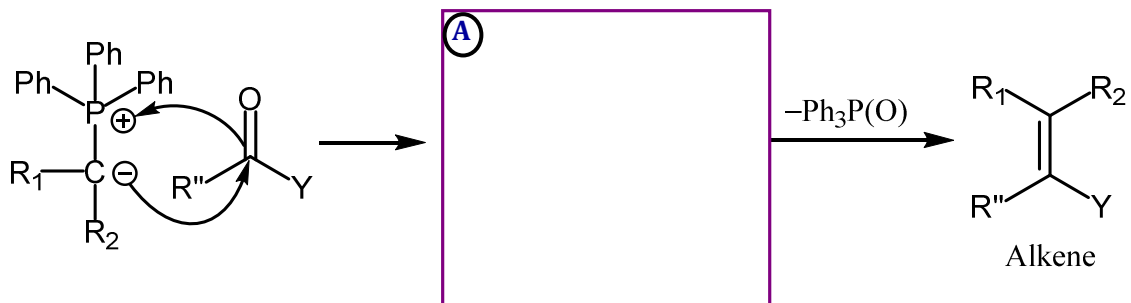
Notes

This is a Type D reaction (option II):

The carbonyl double bond to O is replaced by two bonds to CR_2 !

Lesson VI.8: The Wittig Reaction*Making an alkene from a carbonyl!*

Once the ylide is generated, it reacts with the carbonyl by a process similar to the Chauvin Mechanism we saw for reaction of a metal alkylidene with an alkene:



One of the key driving forces for this reaction is the formation of a P=O bond in the $\text{Ph}_3\text{P}=\text{O}$ product; the P-O bonds are among the strongest covalent bonds.

Note that alkenes can exhibit *E*-/*Z*- and *cis*-/*trans*- isomers. The major alkene product formed is:

Notes