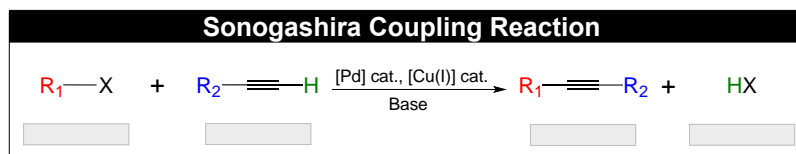
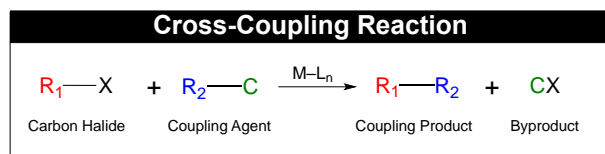


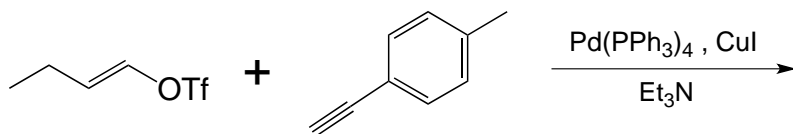
## CONCEPT: SONOGASHIRA COUPLING

- The Sonogashira Coupling reaction involves the coupling between an aryl or vinyl halide and a terminal alkyne.
  - Co-catalysts: A pair of \_\_\_\_\_ catalysts that improve each others' catalytic performance.
  - Generally, the reaction uses a Pd catalyst and a Cu co-catalyst to form a \_\_\_\_\_ or \_\_\_\_\_ alkynyl product.



- The  $R_1$  group of the carbon halide is represented by a(n) *vinyl* or *aryl* group.
- The  $R_2$  group of the alkyne is represented by a(n) *vinyl* or *aryl* group.
- The  $C$  group = \_\_\_\_\_.
- The  $X$  group of the carbon halide is represented by a Cl, Br, I or OTf group.
- The Base group = \_\_\_\_\_.

**EXAMPLE:** Determine the product from the following Sonogashira Coupling Reaction.



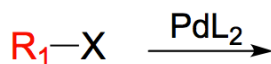
### Coupling Mechanism

- The Sonogashira Coupling is a Pd-catalyzed reaction of a Cu(I)-alkynyl complex with a vinyl or aryl halide.

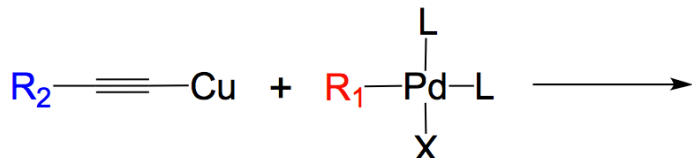
0) **Co-catalyst Formation:** Created by the reaction of a terminal alkyne with CuI and an amine.



1) **Oxidative Addition:** Involves the addition of the carbon halide to the transition metal complex.



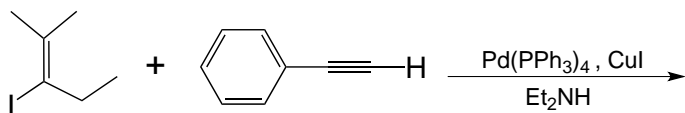
2) **Transmetallation:** The alkynyl group of the Cu(I)-alkynyl compound transfers from Cu to the Pd complex.



3) **Reductive Elimination:** This step forms the coupling product.

## CONCEPT: SONOGASHIRA COUPLING

**PRACTICE:** Determine the product from the following Sonogashira Reaction.



**PRACTICE:** Determine compounds **A**, **B**, and **C** from the following reaction sequence.

