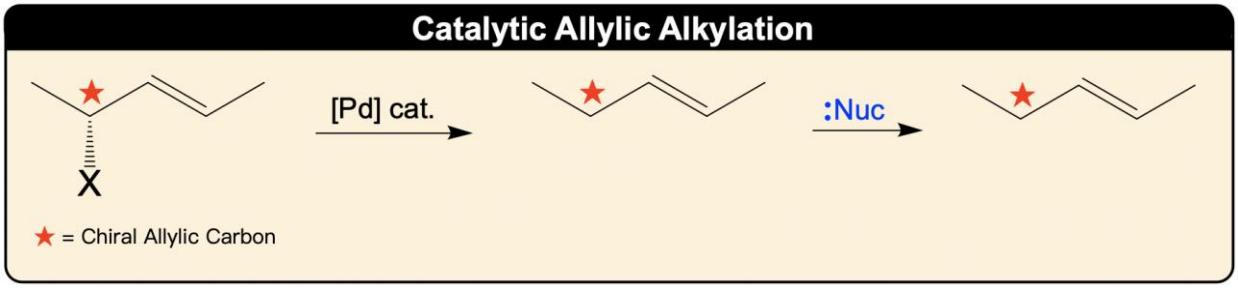
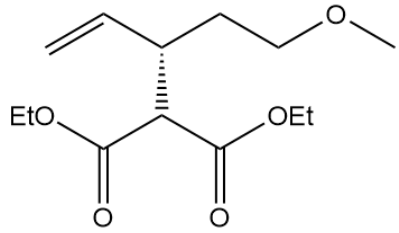
CONCEPT: CATALYTIC ALLYLIC ALKYLATION

- Involves the coupling between an allylic carbon and an _____.
  - □ The reaction is highly _____selective in producing one enantiomer over another.
    - The reaction occurs by double S_N2 with the _____ of the R/S configuration.



- □ The **X** group is an _____, Cl, Br, or I group.
  - **Recall:** Many catalytic reactions allow _____ to be ideal leaving groups.
- □ The Pd catalyst is _____ and _____.
- □ The **nucleophile** is an _____ group.

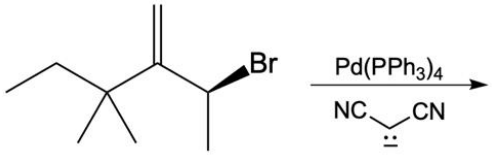
EXAMPLE: The human body can be highly stereoselective in the types of drugs used to treat illnesses. If a researcher develops a cancer fighting drug displayed below, determine which of the following methods would be best in creating it after reacting with $Pd(PPh_3)_4$, diethyl malonate and sodium ethoxide.



diethyl (*S*)-2-(5-methoxypent-1-en-3-yl)malonate

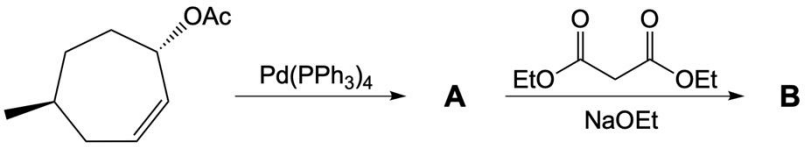
a) (*R*)-3-chloro-5-methoxypent-1-ene
b) (*S*)-3-chloro-5-methoxypent-1-ene
c) (*S*)-5-methoxypent-1-en-3-ol
d) (*R*)-5-methoxypent-1-en-3-ol

PRACTICE: Determine the product from the following catalytic allylic alkylation reaction.

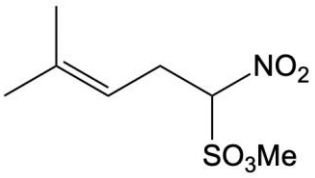


CONCEPT: CATALYTIC ALLYLIC ALKYLATION

PRACTICE: Predict the structures of organopalladium compound **A** and coupling product **B** in the following reaction sequence.

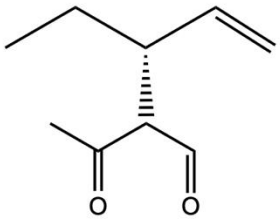


PRACTICE: Determine the allylic halide and enolate used to create the following product via a catalytic allylic alkylation reaction.

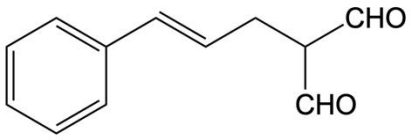


CONCEPT: CATALYTIC ALLYLIC ALKYLATION

PRACTICE: Beginning from 1-pentyne, synthesize the following compound via a catalytic allylic alkylation reaction.



PRACTICE: Outline the synthetic pathway for the creation of 2-cinnamylmalonaldehyde from propylbenzene.



2-cinnamylmalonaldehyde