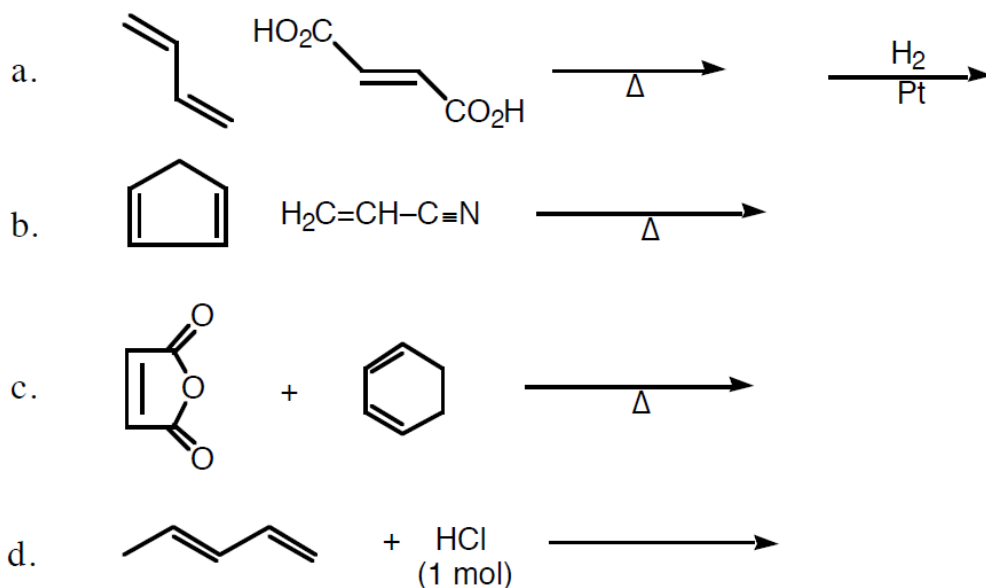
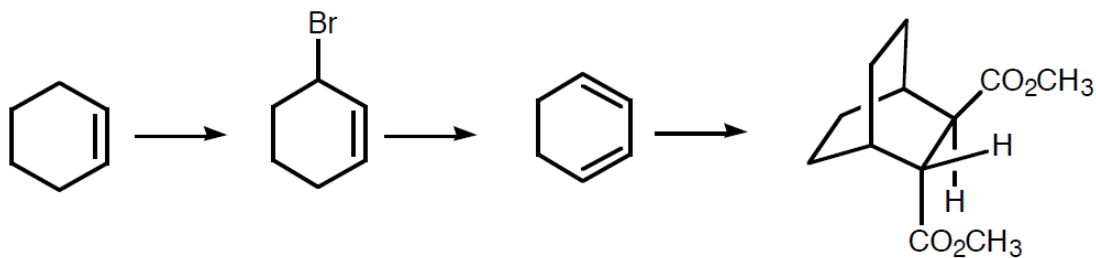


Conjugation, Pericyclic Reactions

1. Give the products of the following reactions:



2. Specify the reagents, reactants and conditions you would use to carry out the following synthetic sequence.



4. In 1980, Professor Grieco's (University of Pittsburgh) laboratory reported a total synthesis of estrone (an estrogenic hormone) using an intramolecular Diels-Alder approach.

Chemical reaction scheme showing the conversion of compound **1** to Estrone:

Compound **1** (a bicyclic molecule with a methoxy group and a cyclopentyl ring) is heated at $200\text{ }^{\circ}\text{C}$ for 7.5 h to form intermediate **2** (a steroid-like molecule). Intermediate **2** then undergoes further transformations (indicated by three arrows) to yield Estrone.

5. a. Draw the complete MO diagram for 1,3-butadiene. Label the HOMO and the LUMO.
b. Draw the complete MO diagram for hexa-1,3,5-triene. Label the HOMO and LUMO.