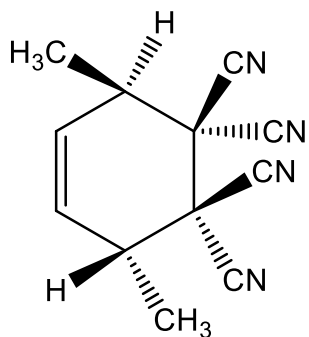
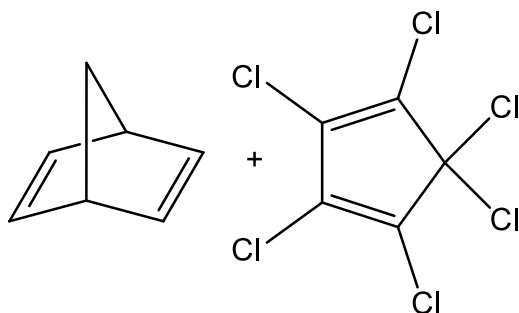


## Problem Set 2 – Conjugated Systems

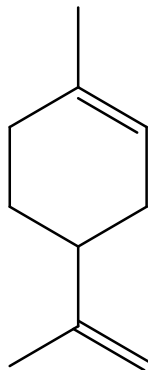
- 3-Buten-2-ol reacts with cold HBr to give 15% 1-bromo-2-butene and 85% 3-bromo-1-butene. After heating, the major product is 1-bromo-2-butene.
  - Propose a mechanism to explain the formation of the two products.
  - Identify the main product obtained in the reaction that is under thermodynamic control.
  - Identify the main product obtained in the reaction that is under kinetic control.
- Identify the diene and the dienophile that you would use to synthesize the following compound:



- Draw the structure of the following Diels-Alder reaction:



- Treatment of isoprene (2-methyl-1,3-butadiene) with catalytic amounts of acid leads to a variety of oligomeric products, one of which is limonene:



limonene

- a. Devise a detailed mechanism for the acid-catalyzed conversion of two molecules of isoprene into limonene.
- b. Two molecules of isoprene may also be converted into limonene by a completely different mechanism, which takes place in the strict absence of catalysts of any kind. Describe this mechanism.
- c. What is the name of the reaction?