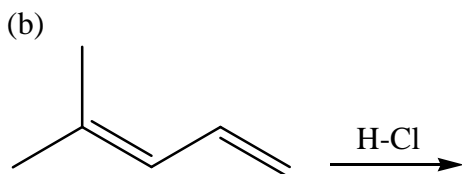
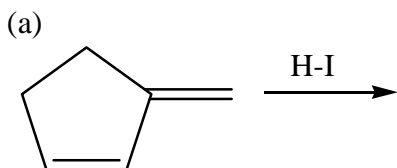


Chapter 15 Worksheet

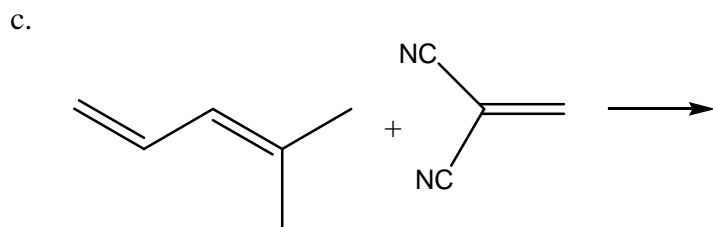
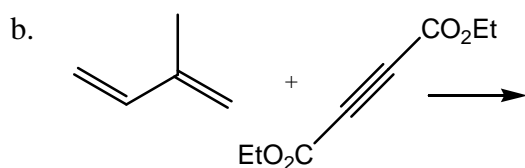
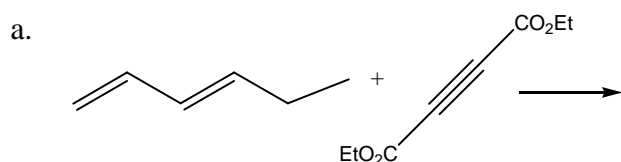
1. For each of the following reactions, write a complete mechanism, including all resonance structures of the carbocation intermediates, and draw the products. Assume one molar equivalent of hydrogen halide in every case. (Remember, these reactions generally go via the one most stable cation *only*!) Show the stereochemistry of the products.



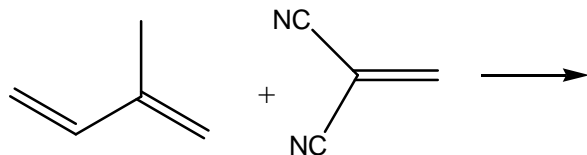
(c) One of the dienes above does a Diels-Alder reaction with tetracyanoethylene, $(\text{NC})_2\text{C}=\text{C}(\text{CN})_2$; the other does not. Draw the product of the D-A reaction that works, and explain (in 5 words or fewer!) why the other diene fails to react.

(d) Of the products that formed which would be the thermodynamic product(s) and which would be the kinetic product(s)?

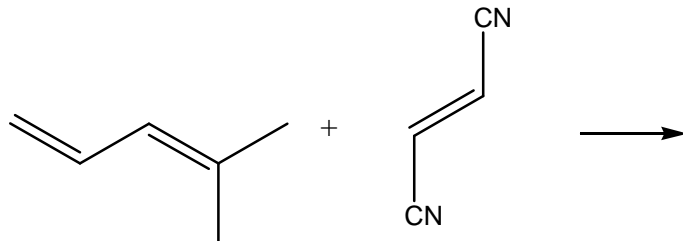
2. Draw all the products of the following Diels-Alder reactions. If two or more products are formed, draw them all, but don't worry about trying to predict their relative amounts. Show stereochemistry clearly, and indicate whether your products are enantiomers, diastereomers, or structural isomers.



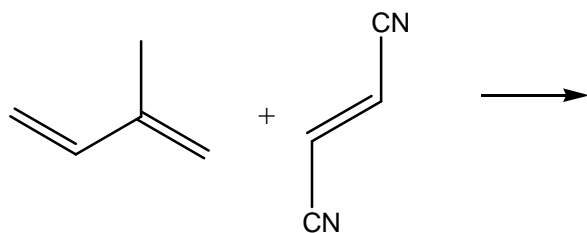
d.



e.

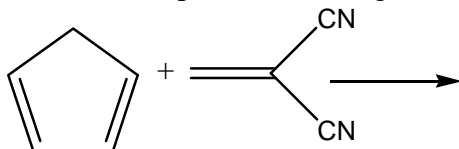


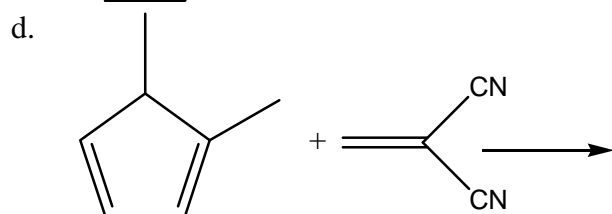
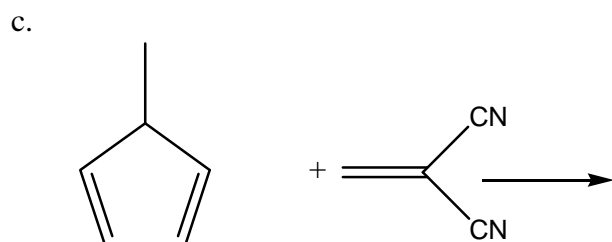
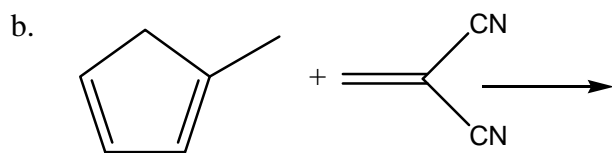
f.



3. Draw *all* the products of the following Diels-Alder reactions. All the reactions produce more than one product. Indicate which products are enantiomers and which are diastereomers. (In part c, don't forget to draw that methyl with the correct geometry!)

a.

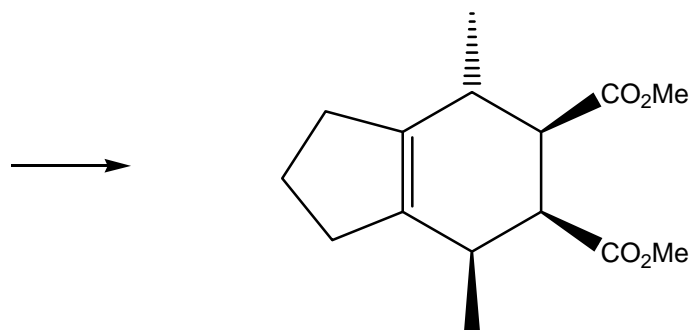




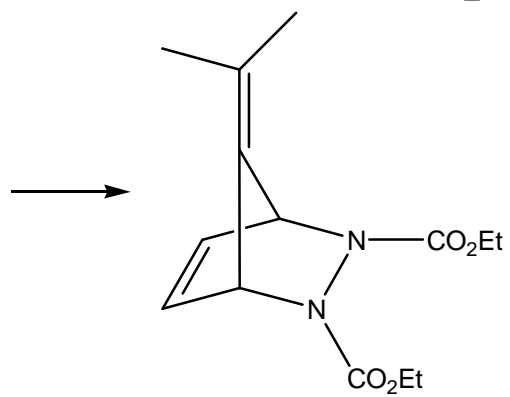
4. The compounds below can all be made via Diels-Alder reactions. Draw the diene and dienophile that would react to produce these compounds. Pay attention to stereochemistry. All chiral products are racemic, or course.



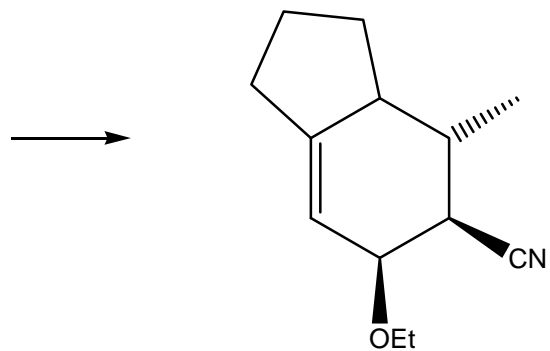
c.



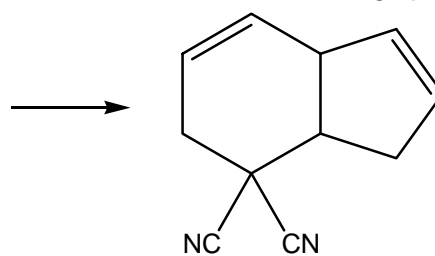
d.



e.



f.



5. Draw the major product of each Diels-Alder reaction below.

