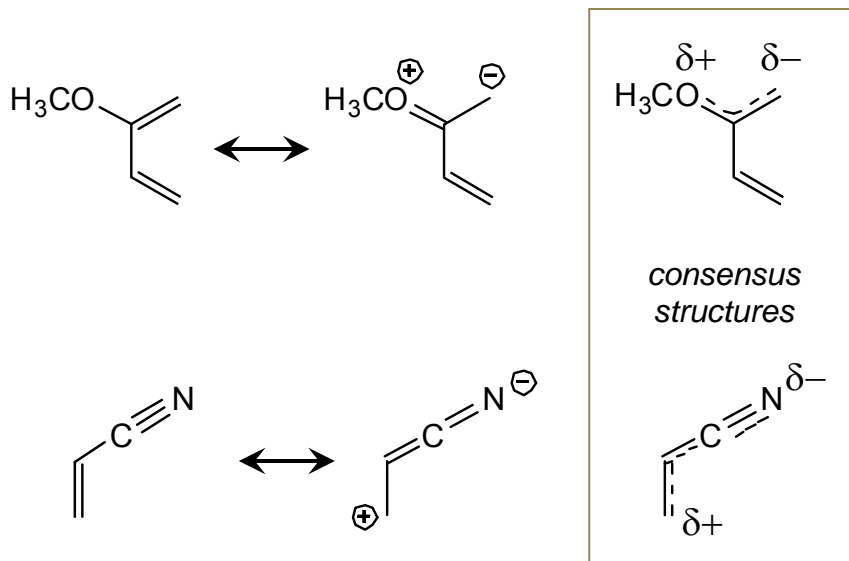


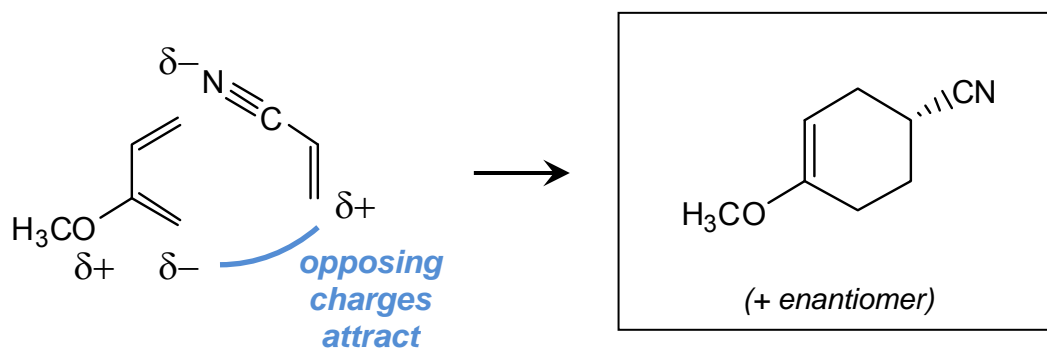
In-Class Exercise Solutions
Regio- and Stereochemistry in the Diels-Alder Reaction

For each of these problems, we need to consider both regiochemistry, which is determined by partial charges, and stereochemistry, which is determined by exo- or endo-approach.

a.



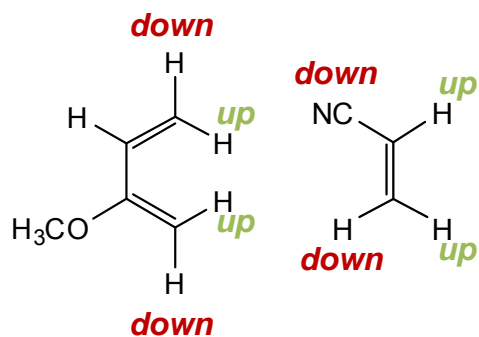
So,



substituents on
right side of each
 starting material
 point **up** in the product;

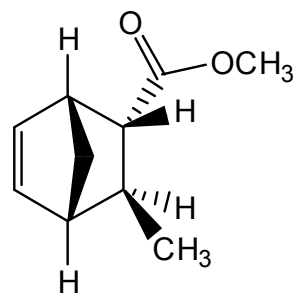
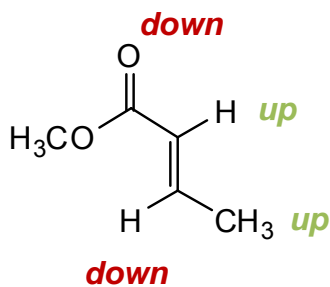
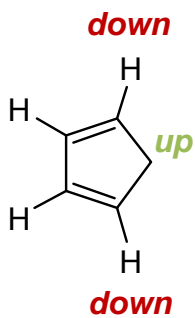
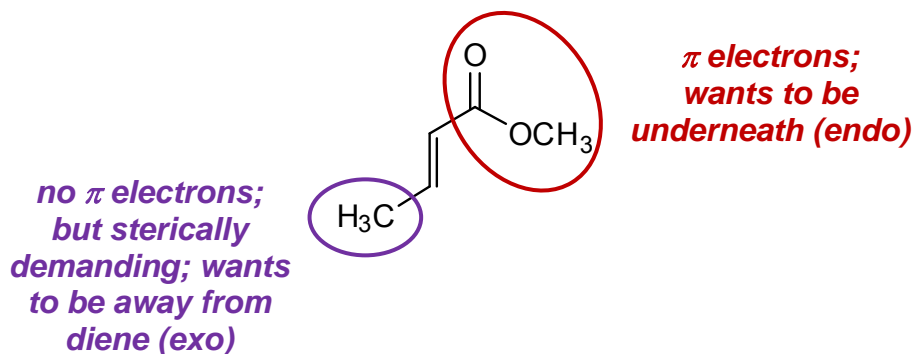
substituents on **left** side
 point **down**

(or vice-versa)



Actually, in this specific example, the up/down analysis doesn't matter; there is only one stereocenter in the product, and it can be up or down (because the product is a racemic mixture; the "up" enantiomer is produced when the dienophile approaches from the top rather than the bottom).

- b. No regiochemistry in this one; cyclopentadiene is symmetric, and doesn't have partial charges. So we need only look at stereochemistry (from *endo*-approach of π substituents).



(+ enantiomer)

Or, illustrating this a little more in three dimensions,

