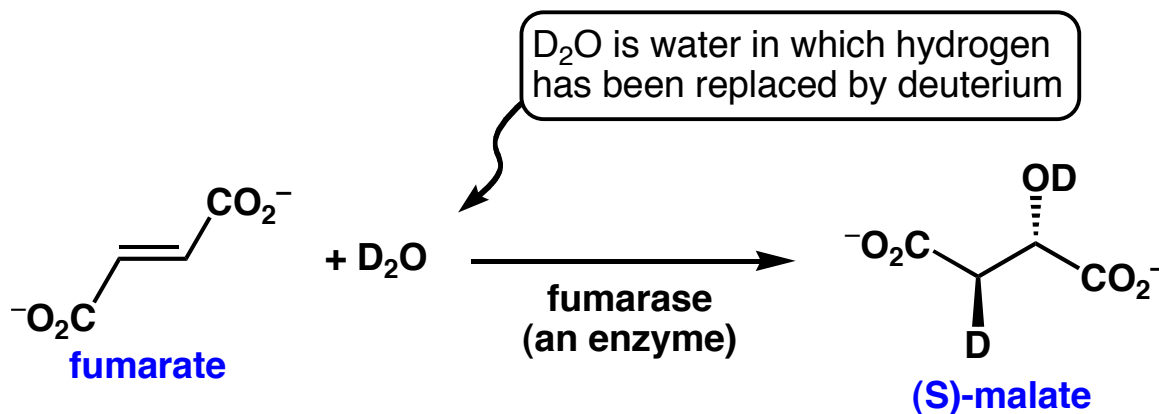


# Discussion Problem: Biological Addition Reactions Occur with Remarkably High Stereoselectivity

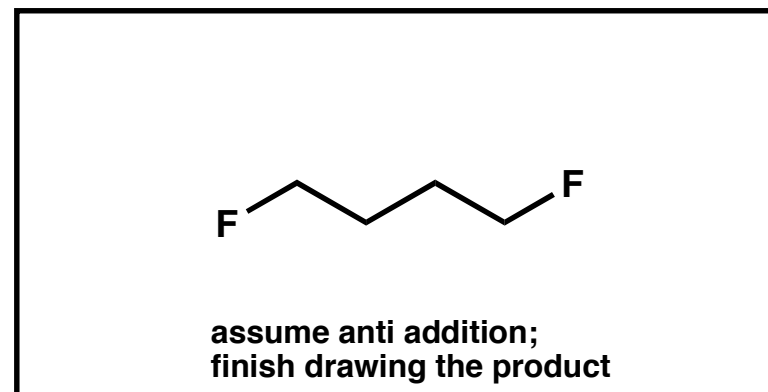
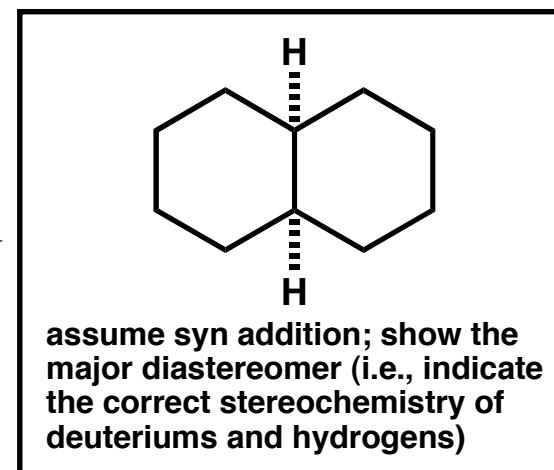
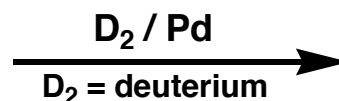
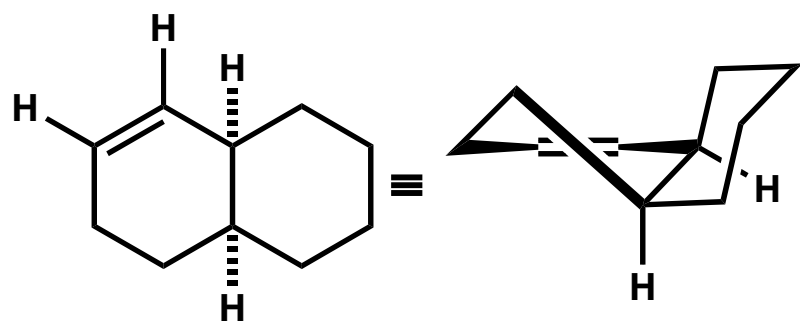
When fumarate reacts with  $D_2O$  in the presence of the enzyme fumarase, only one isomer of the product is obtained. Its structure is shown. **Is the enzyme catalyzing a syn or anti addition of  $D_2O$ ?** (Note that  $D_2O$  is used for the purpose of tracking the stereochemical course of the reaction. If  $H_2O$  were used instead, the experimentalist would have no way of knowing which hydrogen was originally present in fumarate and which came from water).



# Discussion Problems

Exam II, Fall 03

Give the major product for each reaction. Show stereochemistry as necessary.



# Discussion Problem

15) [12 pts.] When the 3-bromo-2-butanol having the stereochemical structure **A** is treated with concentrated HBr, it yields *meso*-2,3-dibromobutane; a similar reaction of the 3-bromo-2-butanol **B** yields a racemic mixture of 2,3-dibromobutanes. Propose structures for the key intermediates (i.e., one derived from **A** and one from **B**) that account for these stereochemical observations. Thinking through the mechanism will help you solve this problem. However, credit will only be given for the intermediates that rationalize the indicated stereochemistry.

