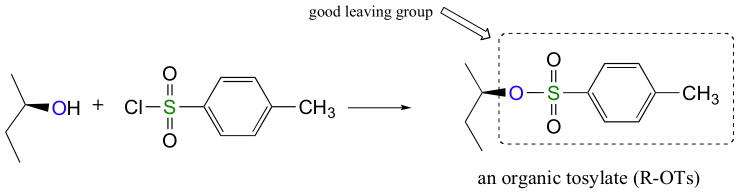
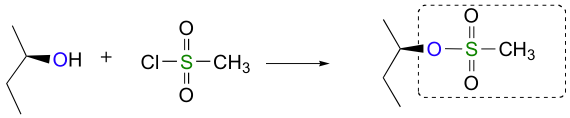
9.4: Tosylate—Another Good Leaving Group

Alternatively, we can transform an alcohol group into sulfonic ester using *para*-toluene sulfonyl chloride (Ts-Cl) or methanesulfonyl chloride (Ms-Cl), creating what is termed an organic **tosylate** or **mesylate:**



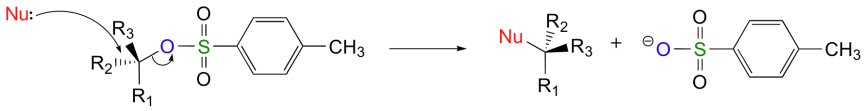
an organic tosylate (R-OTs)



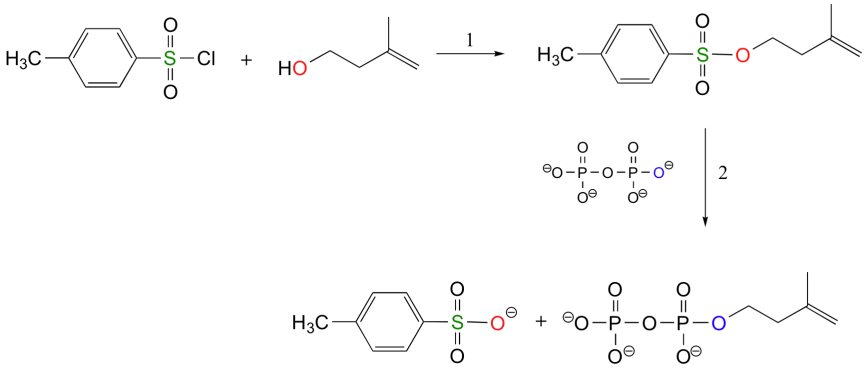
an organic mesylate (R-OMs)

Again, you'll have a chance to work a mechanism for tosylate and mesylate formation in the chapter 12 problems. Notice, though, that unlike the halogenation reactions above, conversion of an alcohol to a tosylate or mesylate proceeds with retention of configuration at the electrophilic carbon.

Chlorides, bromides, and tosylate / mesylate groups are excellent leaving groups in nucleophilic substitution reactions, due to resonance delocalization of the developing negative charge on the leaving oxygen.

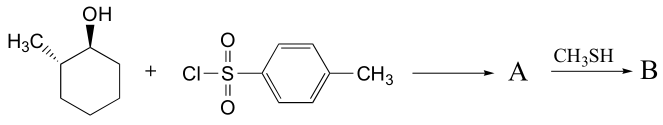


The laboratory synthesis of isopentenyl diphosphate - the 'building block' molecule used by nature for the construction of isoprenoid molecules such as cholesterol and b-carotene - was accomplished by first converting the alcohol into an organic tosylate (step 1), then displacing the tosylate group with an inorganic pyrophosphate nucleophile (step 2) (*J. Org. Chem* **1986**, *51*, 4768).



Example	

Exercise 8.14: Predict the structures of A and B in the following reaction:



Organic Chemistry With a Biological Emphasis by Tim Soderberg (University of Minnesota, Morris)