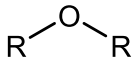
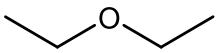
Ethers



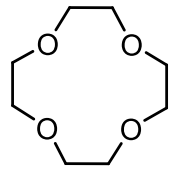


diethyl ether

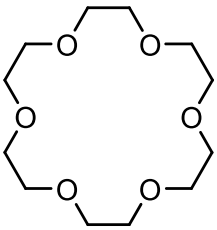
an epoxide
(a cyclic ether)

Ethers are good Lewis bases/electron donors.
Example: BH_3•THF (hydroboration reagent):

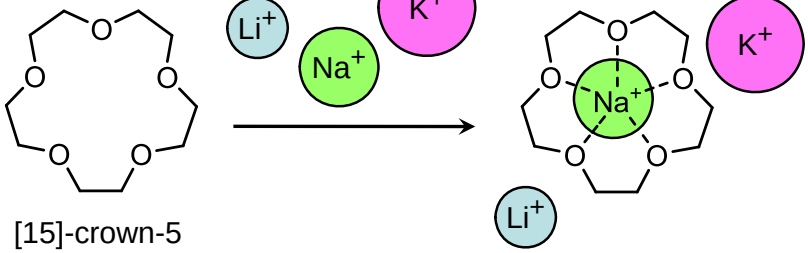
Crown Ethers



[12]-crown-4



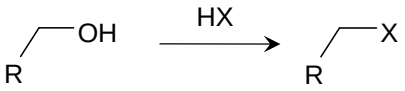
[18]-crown-6



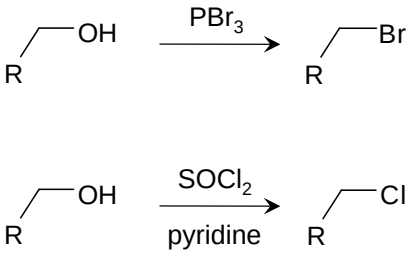
[15]-crown-5

ion	ionic diameter	recognized by
Li^+	1.20 Å	[12]-crown-4
Na^+	1.80 Å	**[15]-crown-5**
K^+	2.66 Å	[18]-crown-6

Direct Conversion of Alcohols to Halides



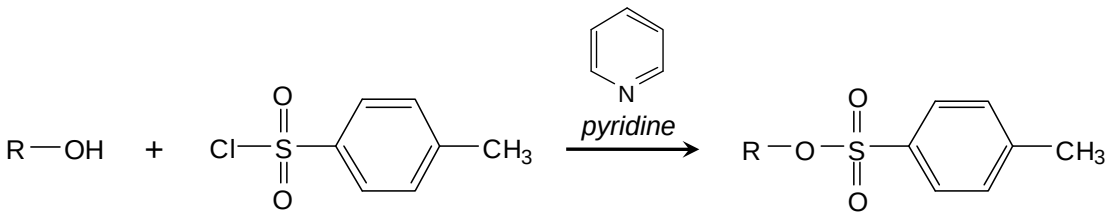
Not so great. E1/E2 compete with substitution.



These reactions:
- convert –OH into a good leaving group
- invert stereochemistry at carbon.

In the absence of pyridine, this reaction can retain *stereochemistry.*

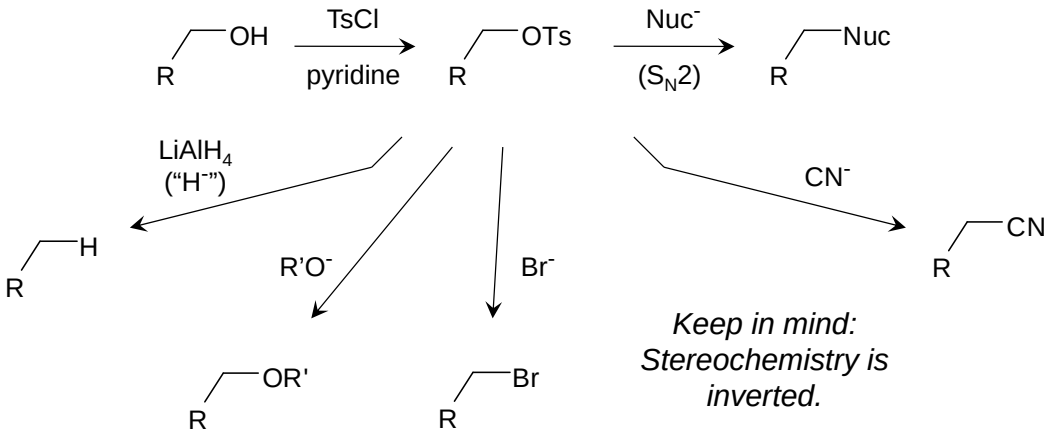
Tosylation of Alcohols



p-toluenesulfonyl chloride
(TsCl, or tosyl chloride)

or "ROTs"
a tosylate

Tosylation Turns –OH Into an Excellent Leaving Group

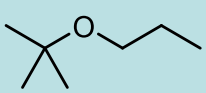


Williamson Ether Synthesis

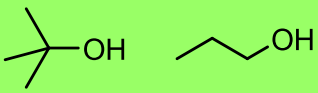
Ethers (though not epoxides) can be synthesized by reacting an alkoxide nucleophile with a good alkyl electrophile.

Example—From two alcohols:

How might we make this

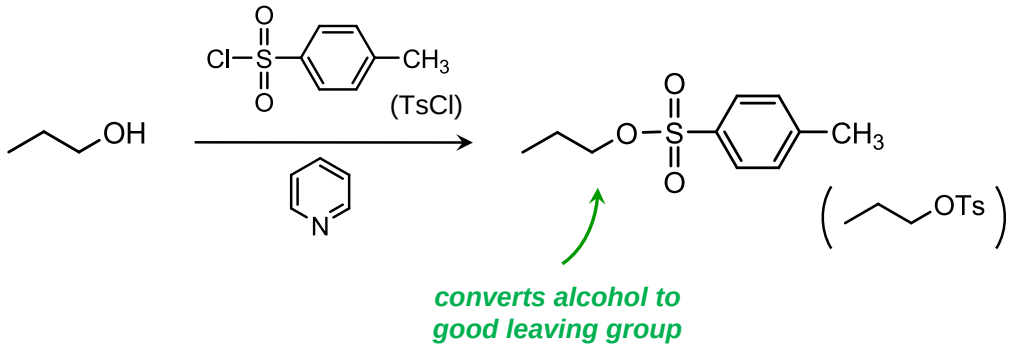


from these?



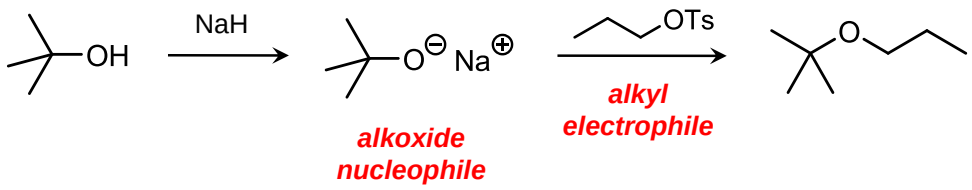
Williamson Ether Synthesis

First, convert one alcohol to a good leaving group:



Williamson Ether Synthesis

Second, combine tosylate with reactive alkoxide:



- Works well with a primary (1°) halide/tosylate;
- Not so well with 2° or 3° leaving groups; too much competing E2 elimination.