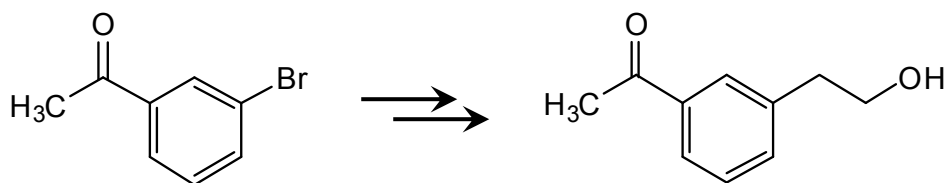
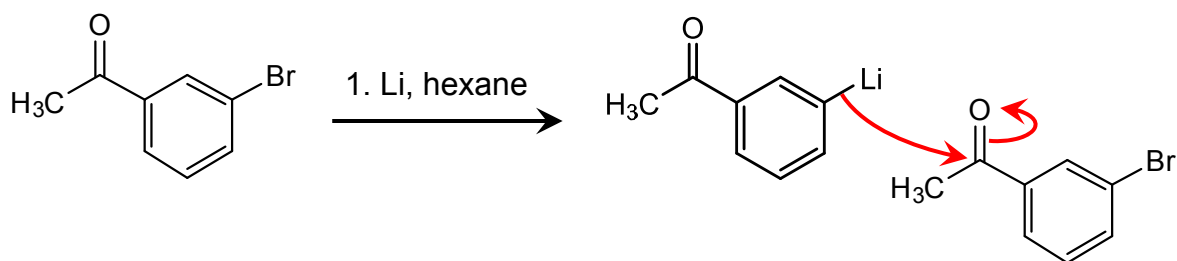


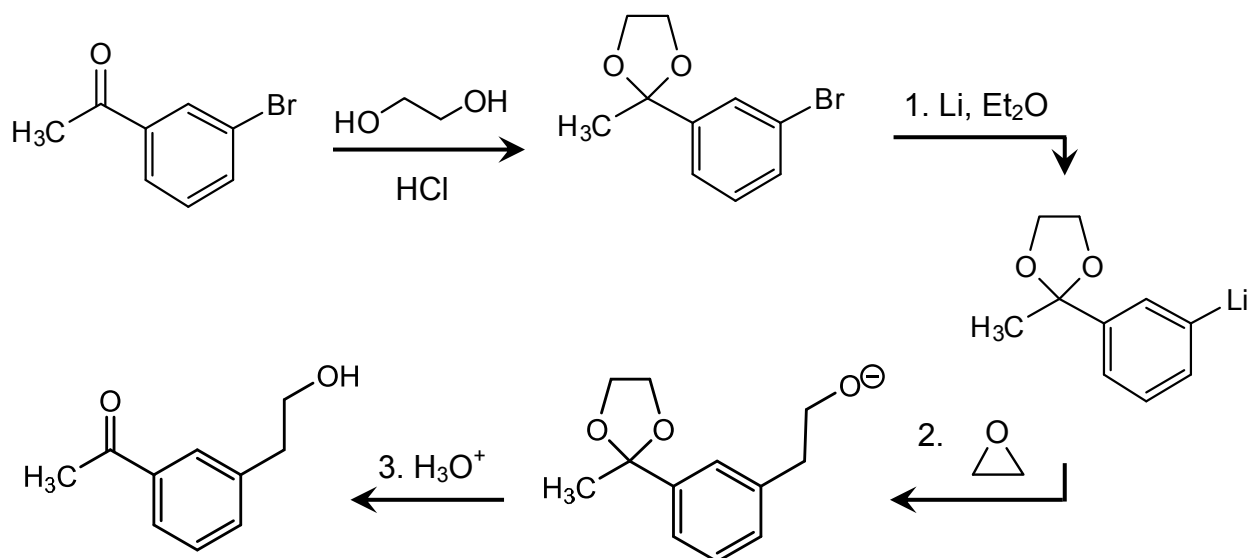
Workshop 11 Solutions
Protecting Groups in Organic Synthesis



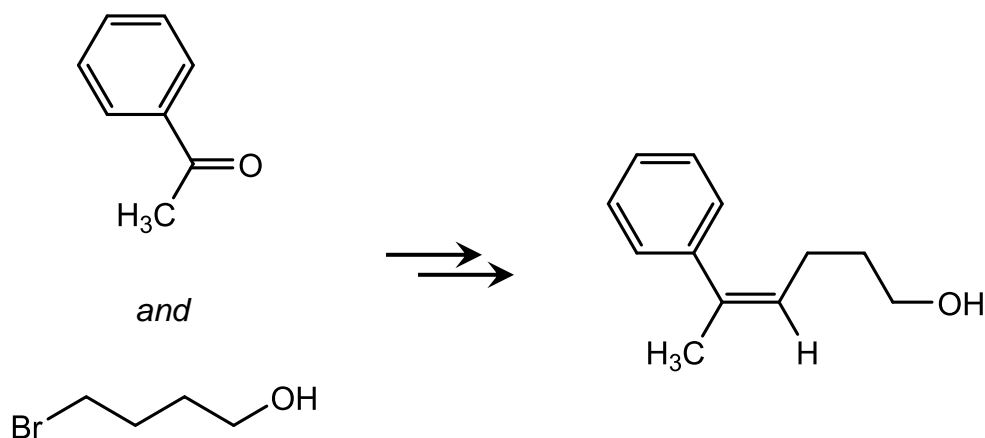
We can make a new carbon-carbon bond by metalating the halogen, and then adding the resulting alkyllithium or Grignard reagent to an epoxide. (We can't add the alkylmetal to a carbonyl—it won't insert the right number of carbons in between the benzene ring and the OH.) However, the alkylmetal functionality on the right won't be compatible with the ketone on the left, in that one molecule of alkylmetal will attack another molecule's ketone as soon as the alkylmetal is made:



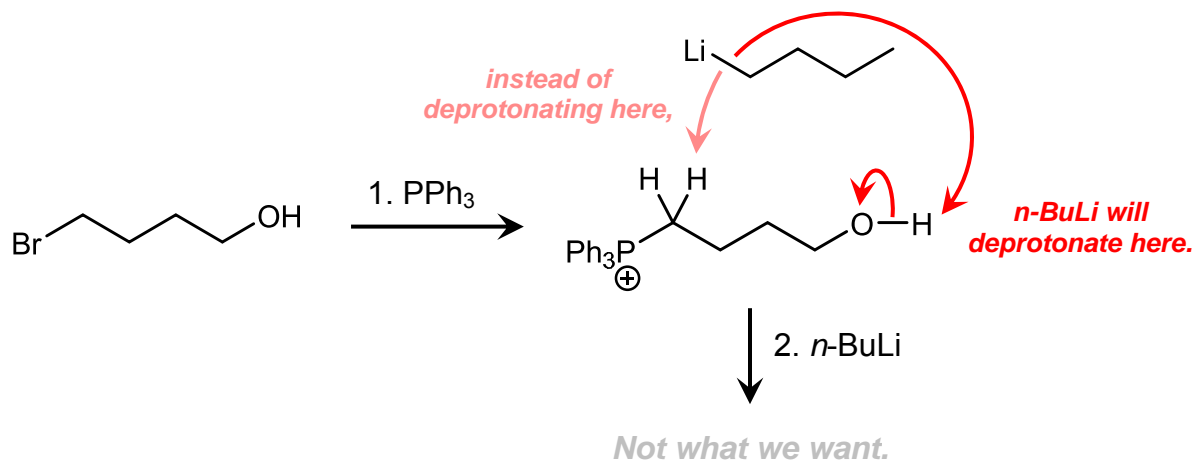
And that's definitely not what we want. So we need to protect the ketone:



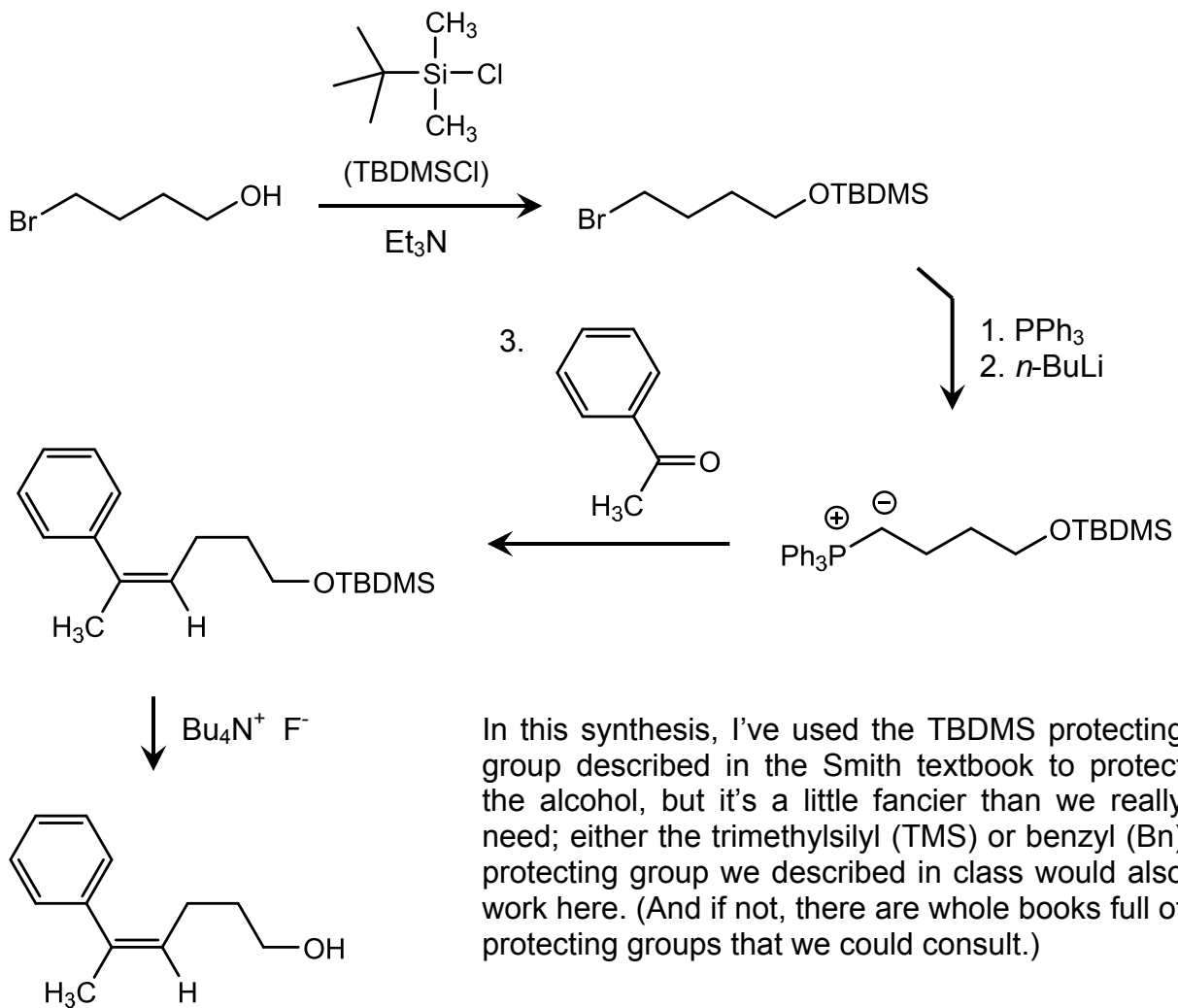
I've drawn the last three steps numbered, because an organic chemist would probably do them all in the same container, without isolating each intermediate product. (The alkyllithium from step 1 would be too dangerous and reactive to isolate, and all that needs to be done to the product from step 2 is add a little acid, so that also probably wouldn't be isolated.) But, if on an exam you were to draw out each step individually, without numbers, that's just fine.



This is the scheme for a Wittig reaction—a reaction that makes an alkene from the combination of a C=O bond and an alkyl halide. But the -OH group will interfere with the standard protocol:



So we need to protect the alcohol:



In this synthesis, I've used the TBDMS protecting group described in the Smith textbook to protect the alcohol, but it's a little fancier than we really need; either the trimethylsilyl (TMS) or benzyl (Bn) protecting group we described in class would also work here. (And if not, there are whole books full of protecting groups that we could consult.)