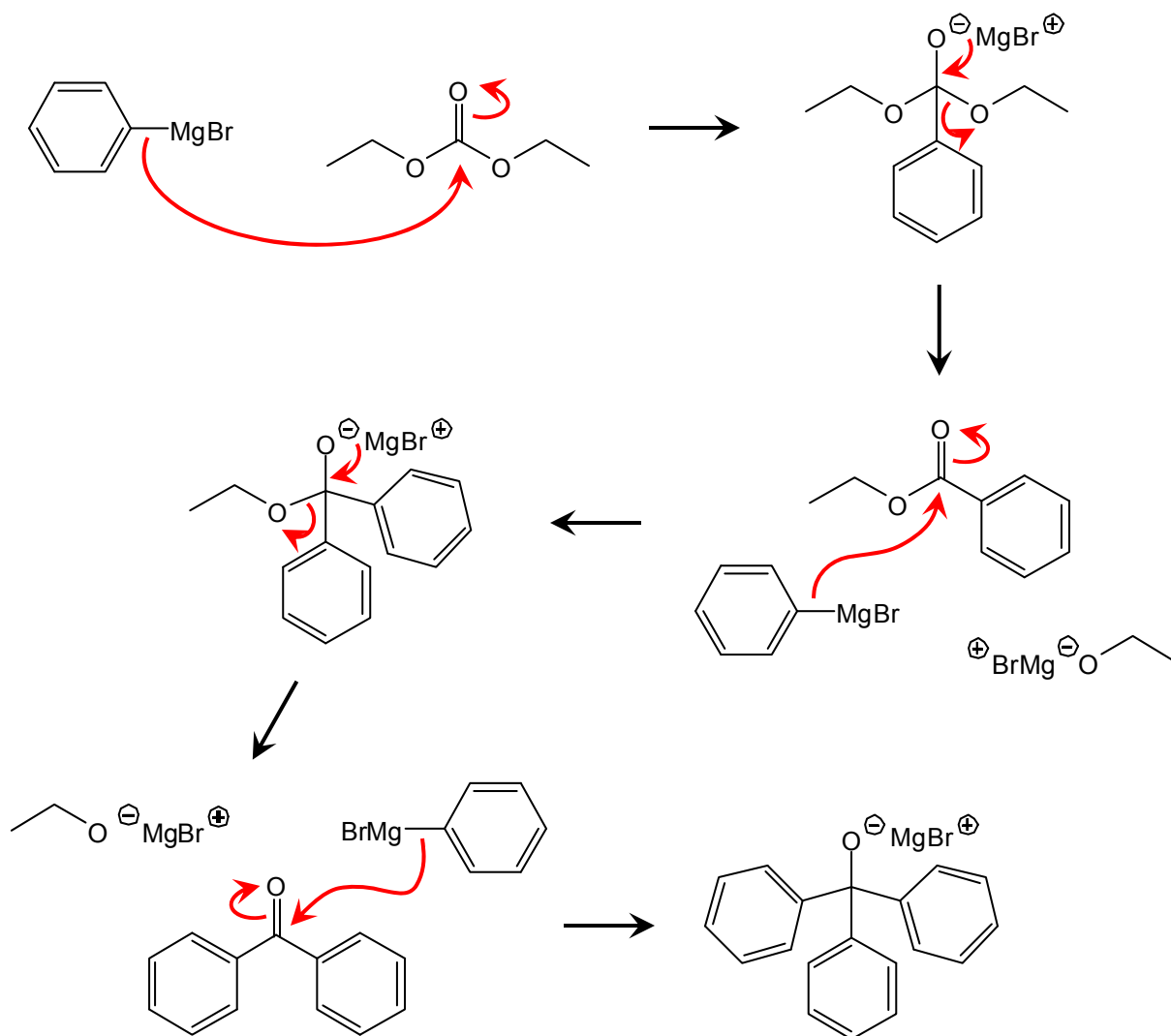
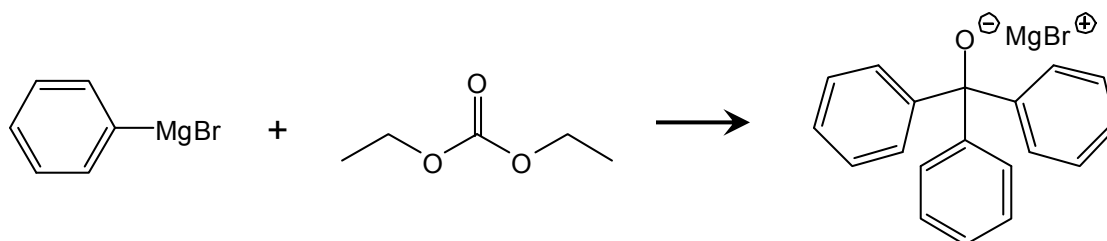
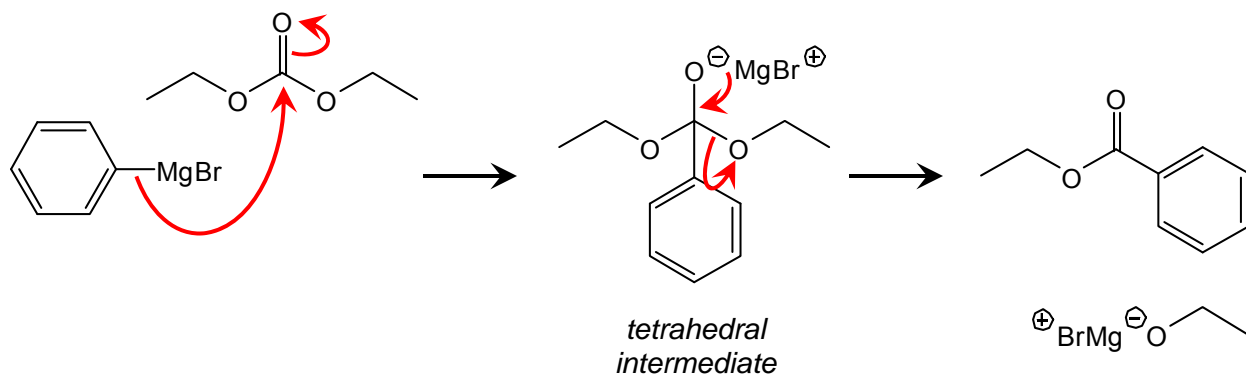


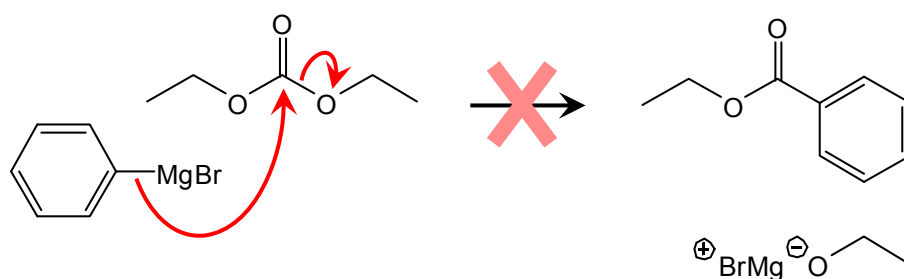
Workshop 10 Solutions  
Mechanisms with Nucleophilic Attack on Carbonyls



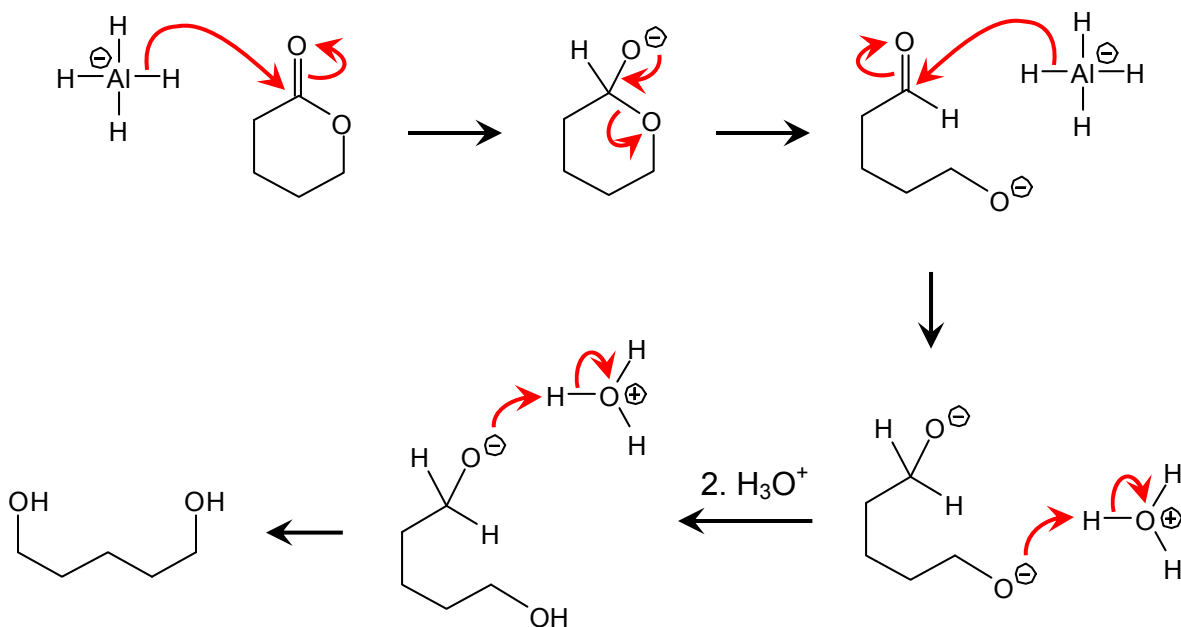
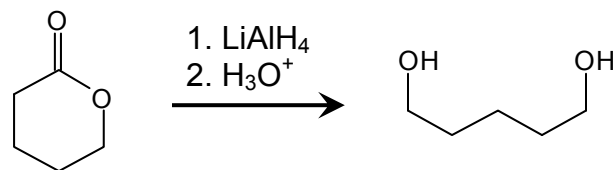
One question you might ask after all this electron pushing is, couldn't we make it easier by combining some steps? Like for example, the first two steps—couldn't they just be one step? In other words, why draw this...



...when you could just draw this?



The answer is that experiments have shown that the tetrahedral intermediate exists, that it is formed in reactions of carbonyl groups with carbanions and hydrides. So chemical evidence tells us that the two-step mechanism is correct.



Here, the problem says that I add  $\text{LiAlH}_4$  first, and then add  $\text{H}_3\text{O}^+$  second. So my mechanism can't use both reagents at the same time; I needed to finish all my  $\text{LiAlH}_4$  work first, and only then could I add  $\text{H}_3\text{O}^+$ .

In this mechanism, I've drawn a number of negatively charged oxygen atoms as free anions. In reality, each of these will be coordinated to aluminum atoms:

