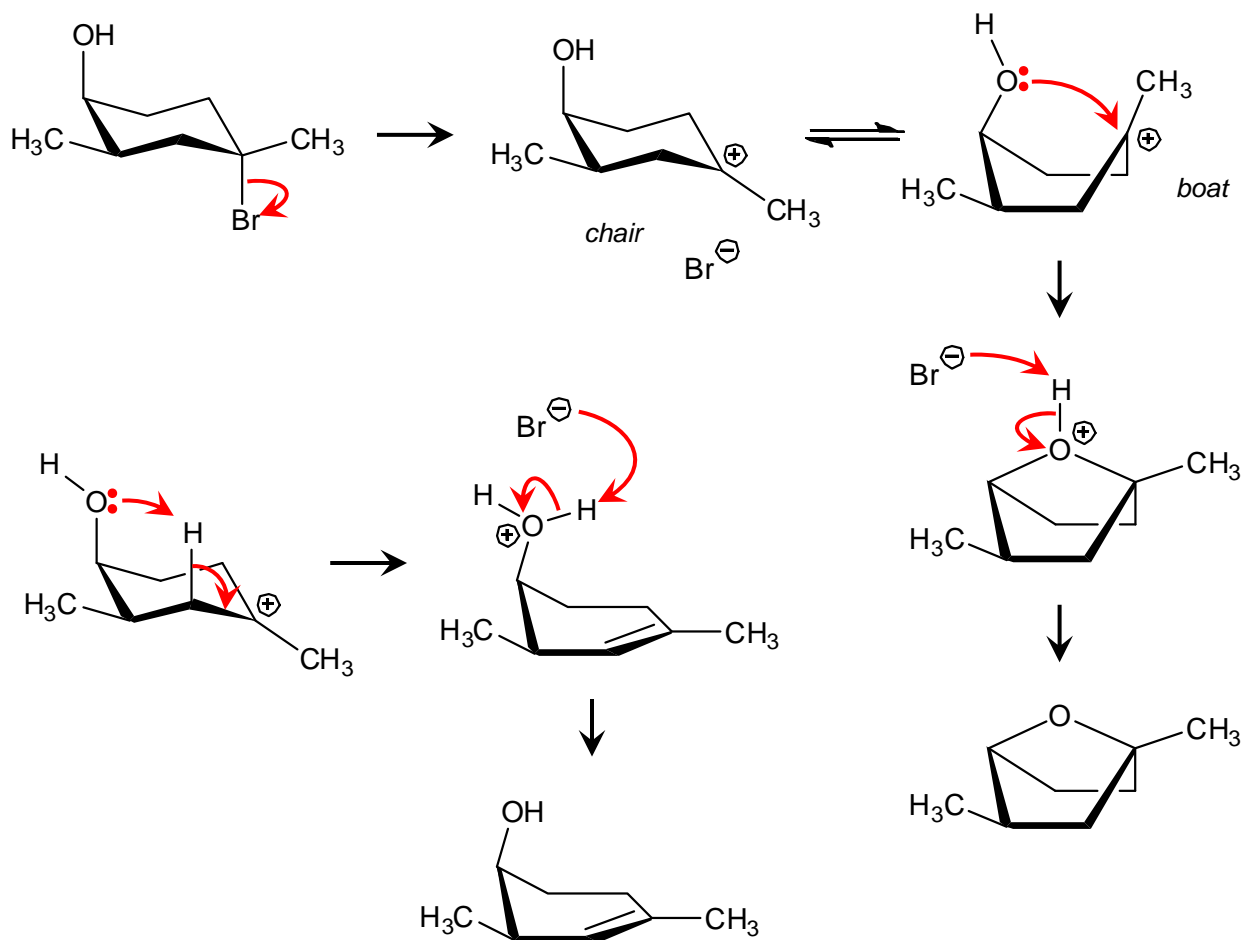
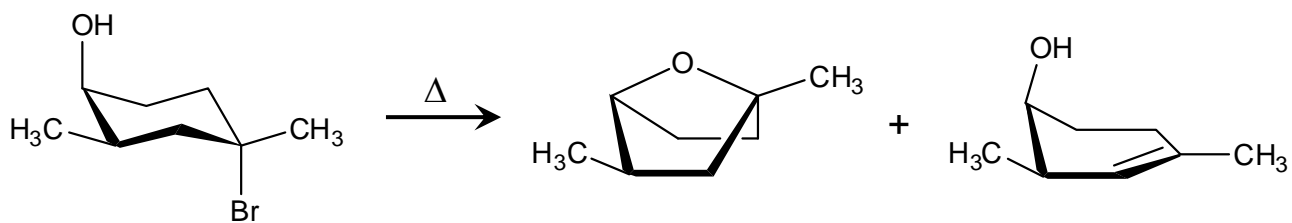
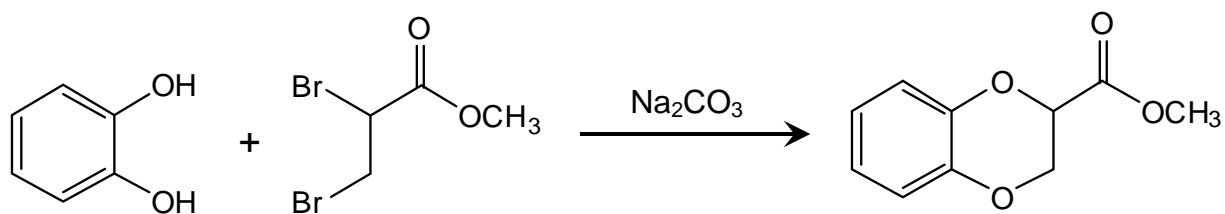
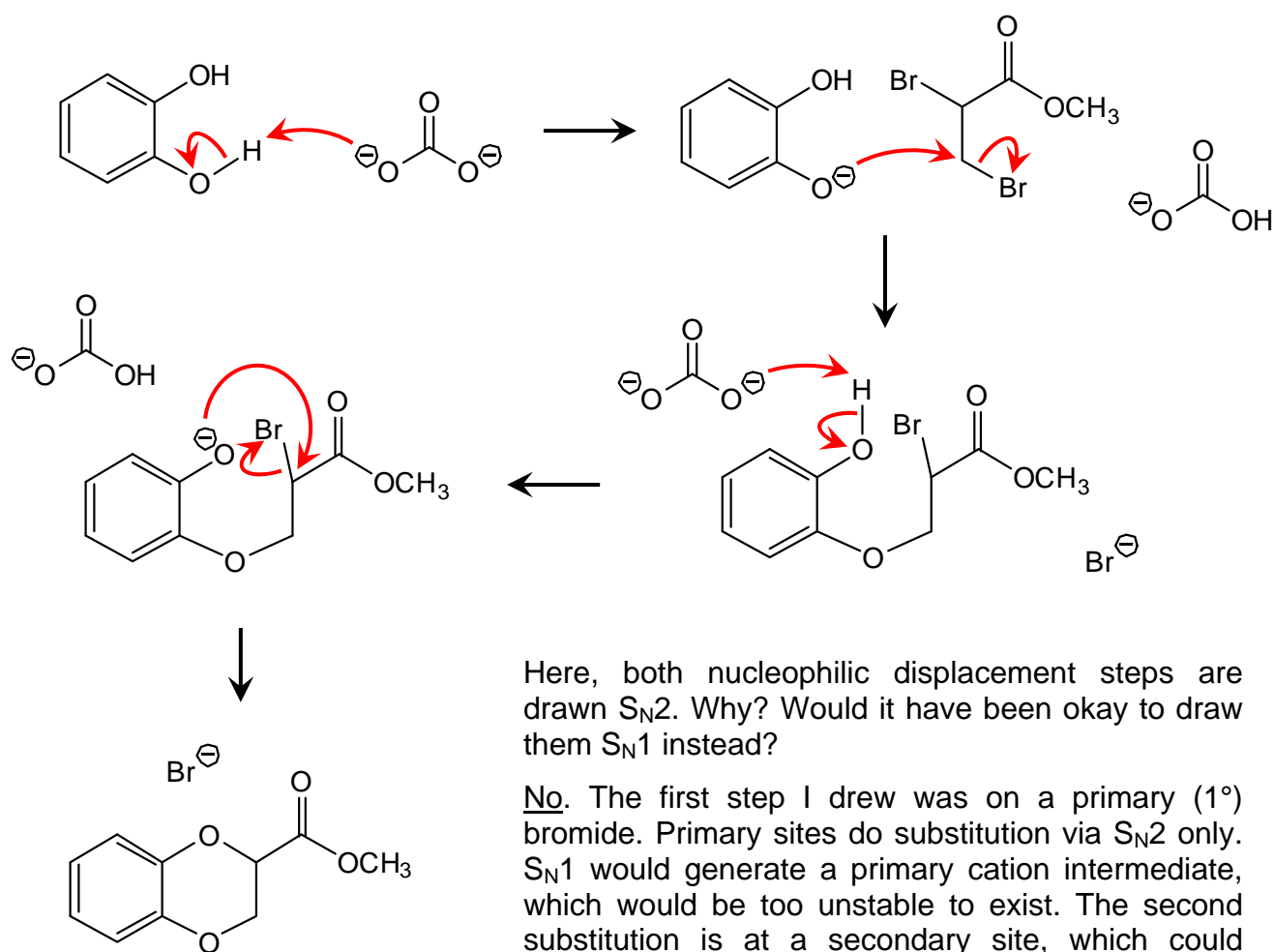


At-Home Solutions:  
Mechanism Practice Problems

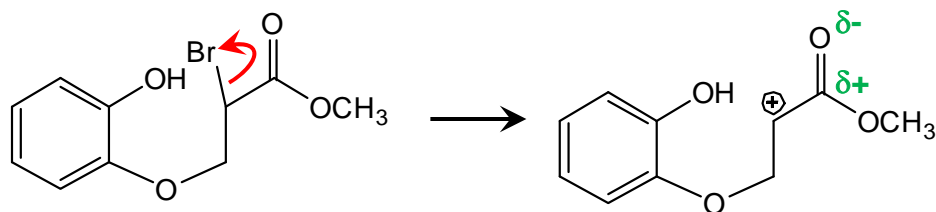


The sodium carbonate base is strong enough to deprotonate the alcohol starting material; that wouldn't happen with an alcohol like ethanol ( $pK_a = 16$ ), but it's possible in this case because of resonance stabilization of the conjugate base:



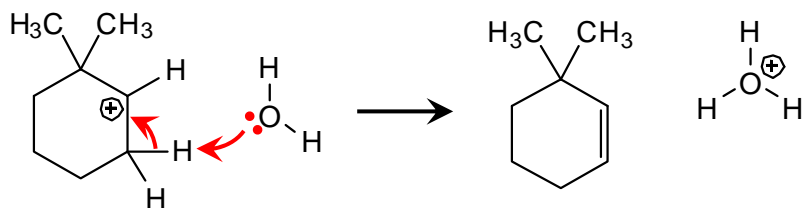
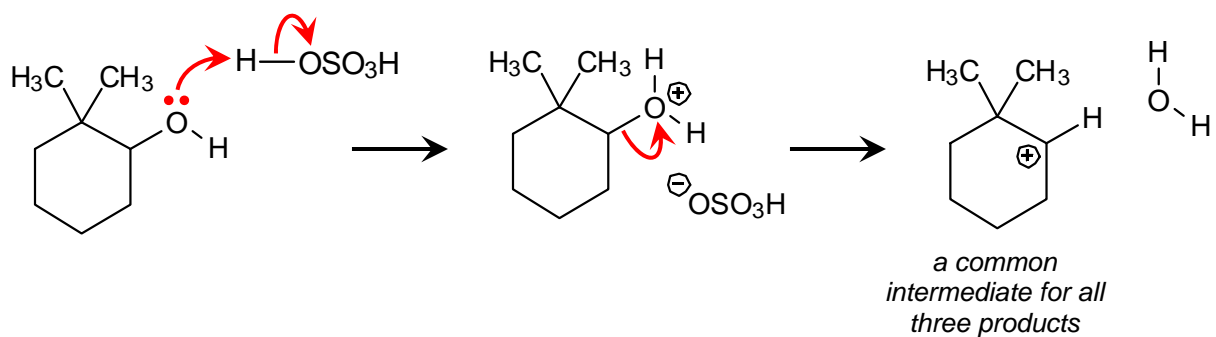
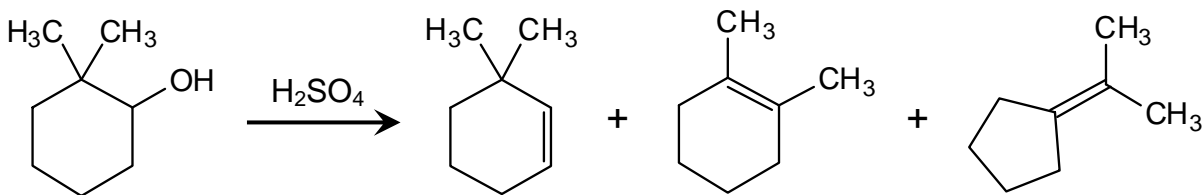
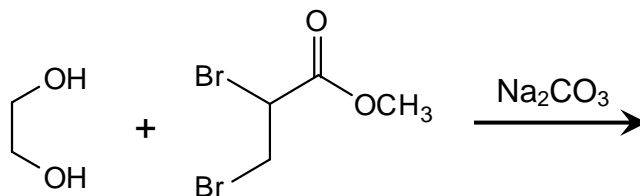
Here, both nucleophilic displacement steps are drawn  $S_N2$ . Why? Would it have been okay to draw them  $S_N1$  instead?

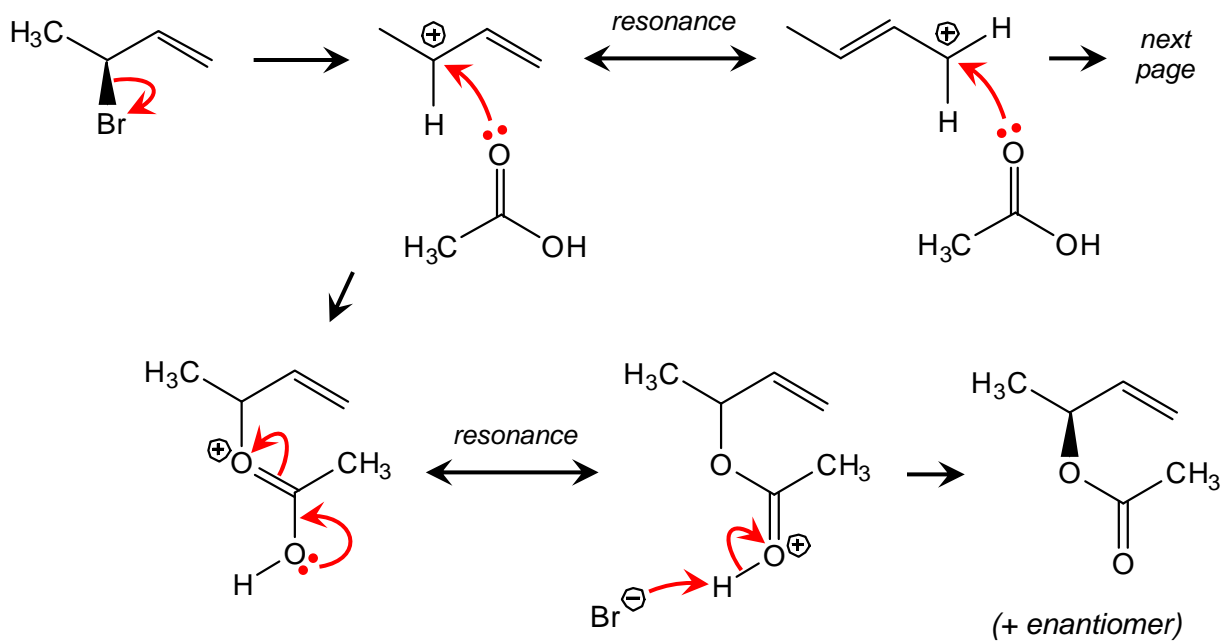
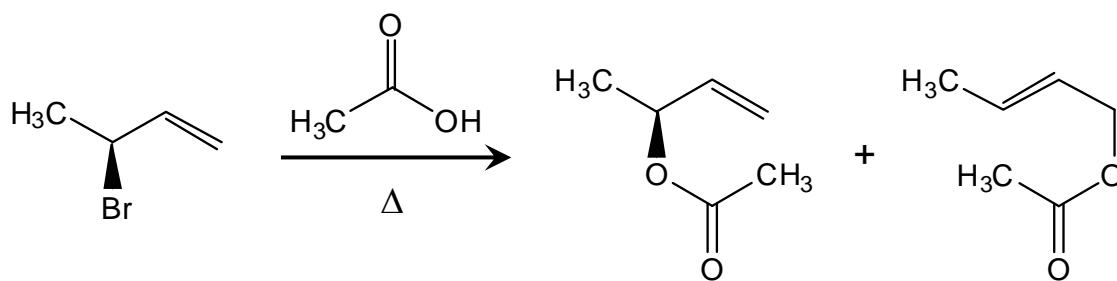
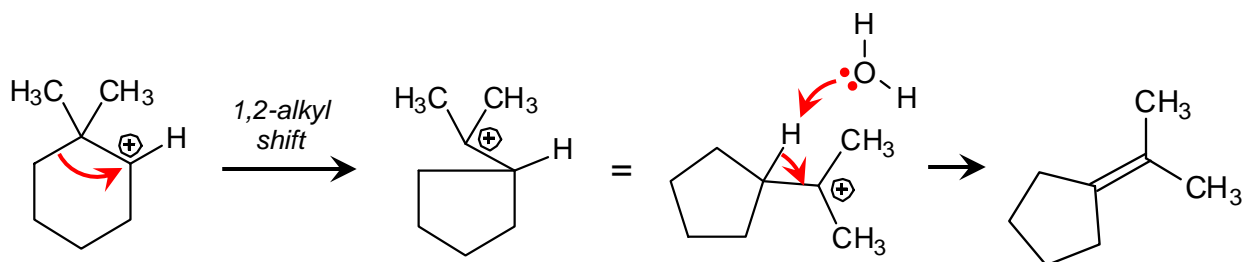
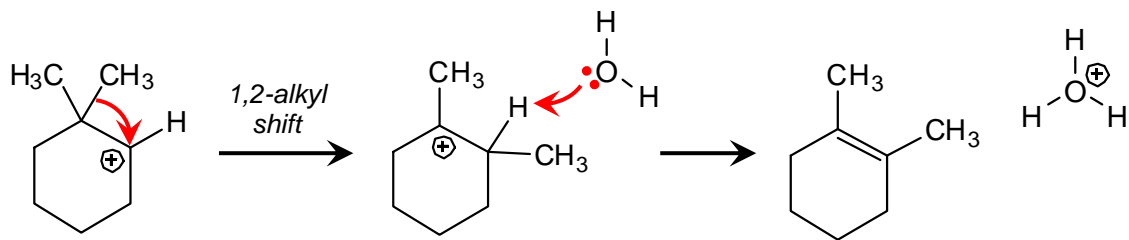
**No.** The first step I drew was on a primary ( $1^\circ$ ) bromide. Primary sites do substitution via  $S_N2$  only.  $S_N1$  would generate a primary carbocation intermediate, which would be too unstable to exist. The second substitution is at a secondary site, which could generate a secondary carbocation, but I don't like that carbocation very much (next page):



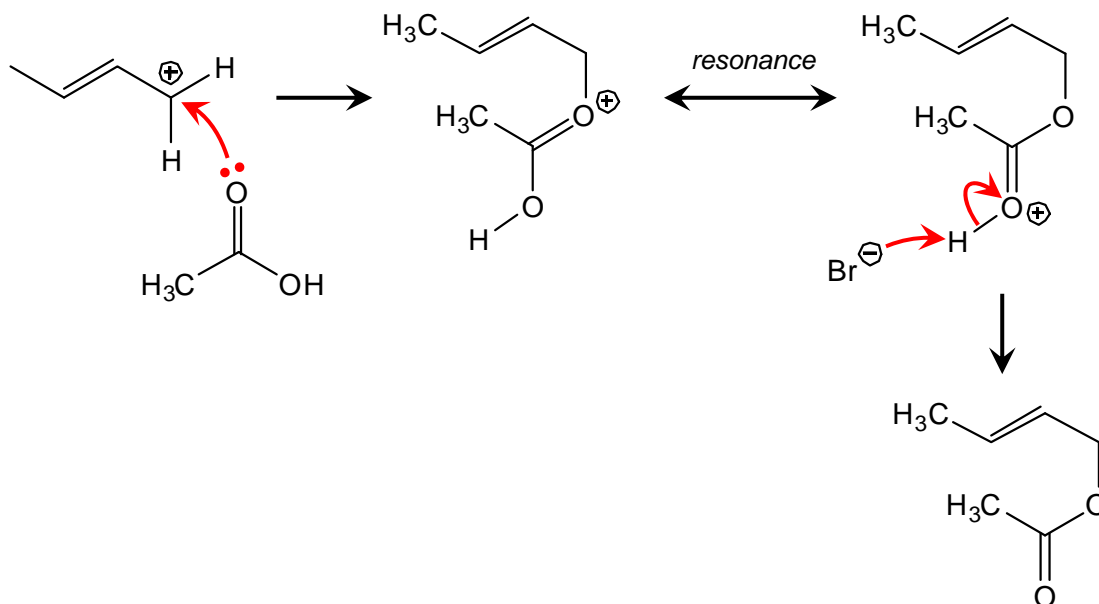
The carbocation ends up next to a partial positive charge from the carbonyl—**not good**. This wouldn't happen.

So, a bonus question—how might this mechanism be different if ethylene glycol ( $pK_a = 16$ ) was used as the diol instead of catechol? (Answer at the end of this answer key.)

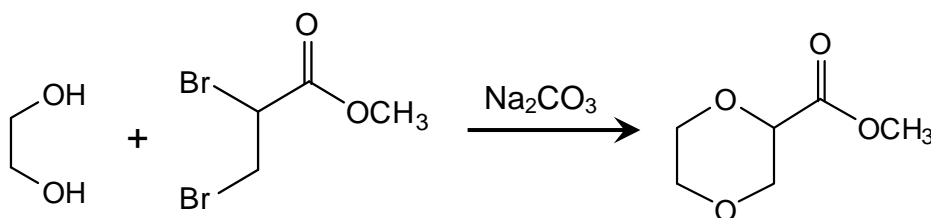




Same process with the other resonance adduct...



So earlier in this answer key I asked—how would ethylene glycol react differently from catechol in the second problem?



Sodium carbonate isn't basic enough to deprotonate ethylene glycol, so nucleophilic attack comes first:

