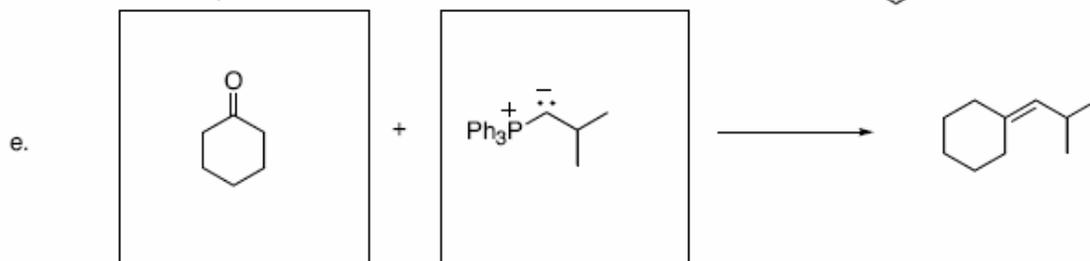
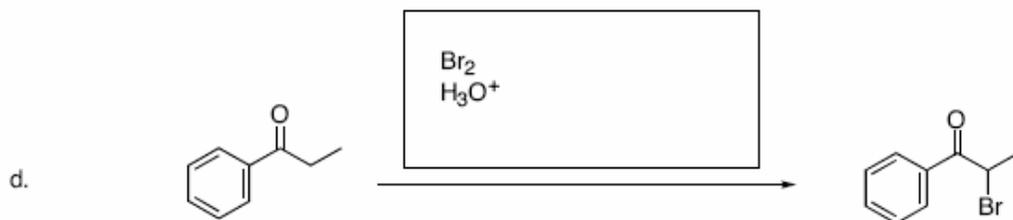
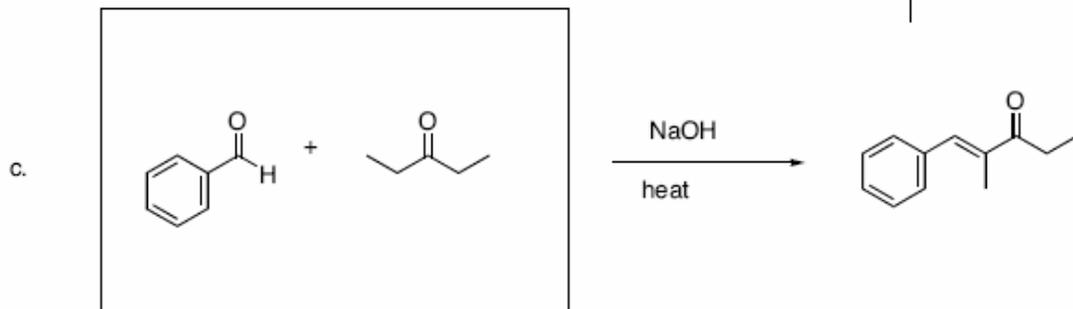
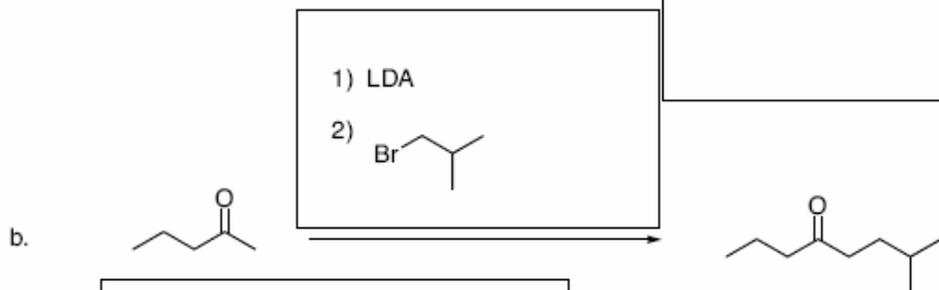
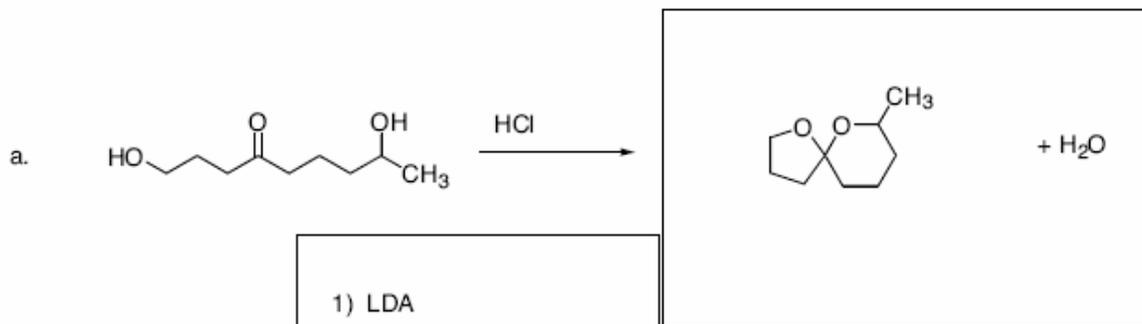
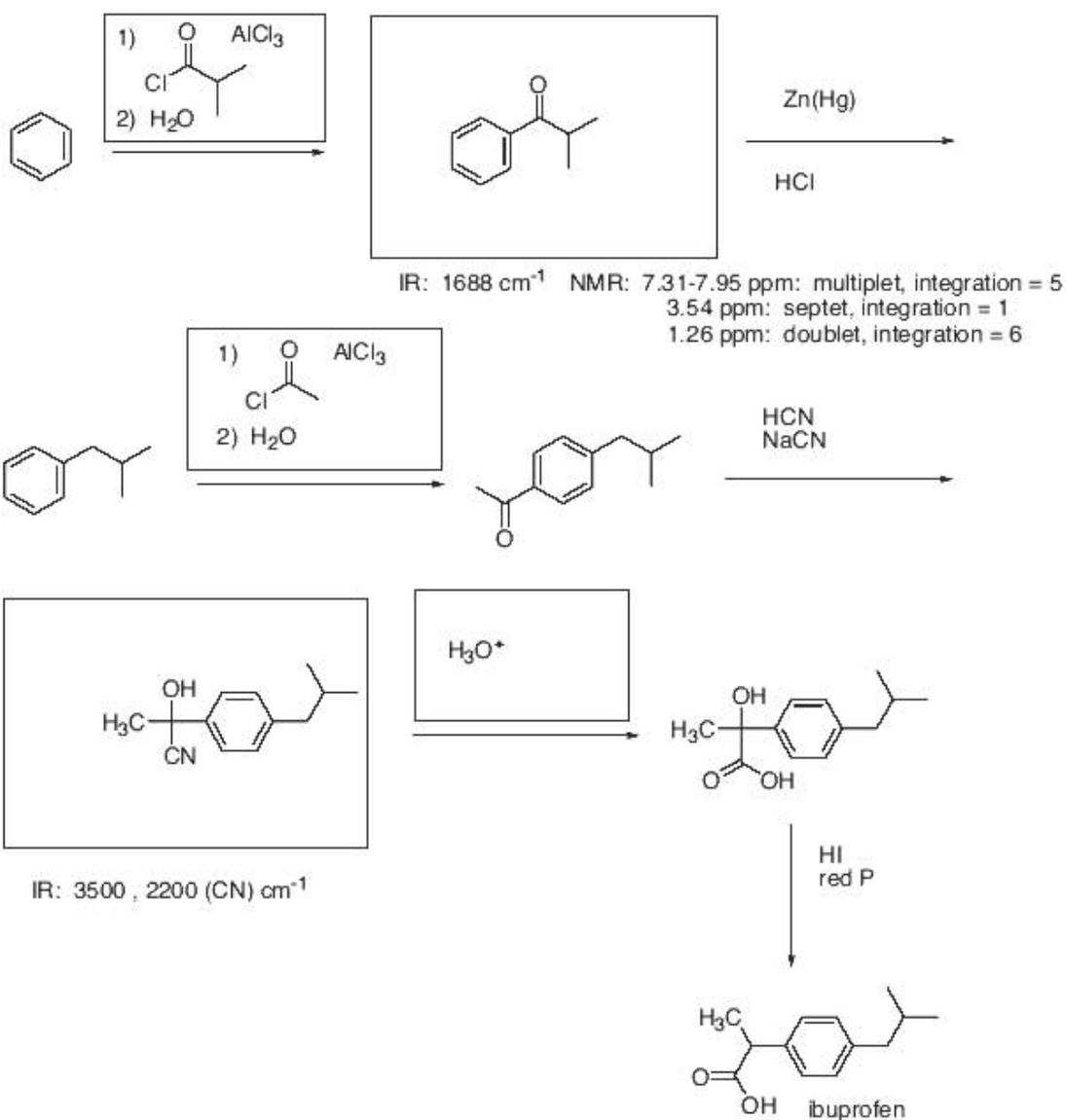


Answer Key

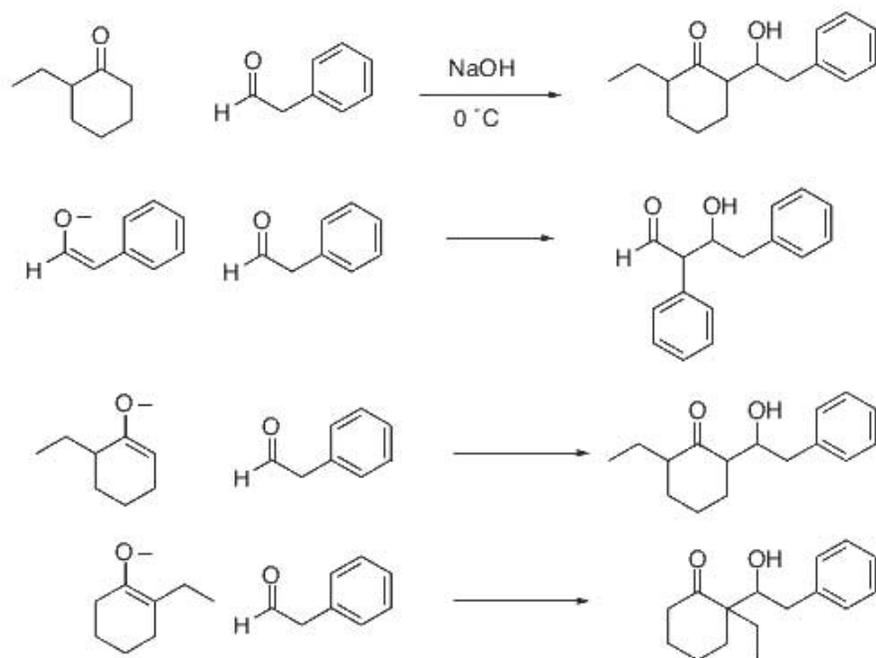
1) Fill in the missing starting material(s), product(s), or reagents for each reaction below.



- 3) The synthesis of ibuprofen, which is the active ingredient in Advil, is outlined below. Fill in each missing reagent or structure. Important IR and NMR data for the missing products are provided as hints.

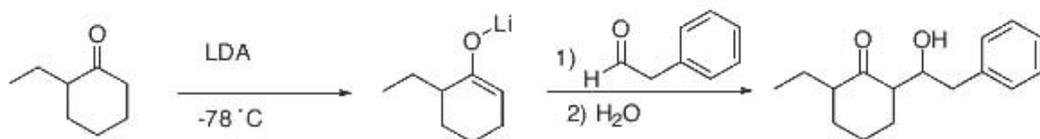


- 4) Joe Bob wants to carry out the synthesis outlined below using a crossed aldol reaction. Draw all of the possible products that could be formed in Joe Bob's reaction. Propose an alternative method that would give the desired aldol product in high yield.



In the presence of hydroxide, three different enolates can form, and each of these could react with the aldehyde. It is also possible that these enolates could react with the ketone, but as we've discussed enolate addition to ketones is usually not favorable.

To get the desired product as the only product, we need to limit ourselves to a single enolate. Fortunately, the product is derived from the kinetic enolate. Treatment of the ketone with LDA will give the desired enolate. This enolate can then be reacted with the aldehyde.



5) Propose a synthesis of the molecules below starting from the indicated starting material. In addition to the molecules below, you may use any inorganic reagent (including triphenylphosphine) and any organic molecule with **< 6 carbons**.

