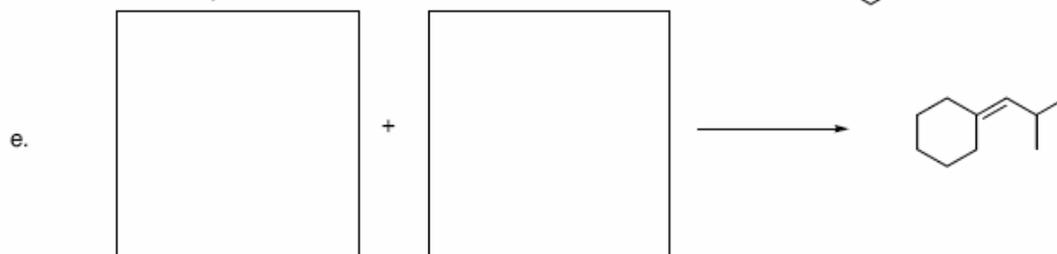
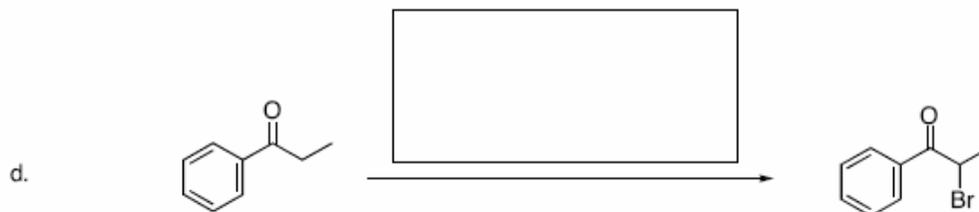
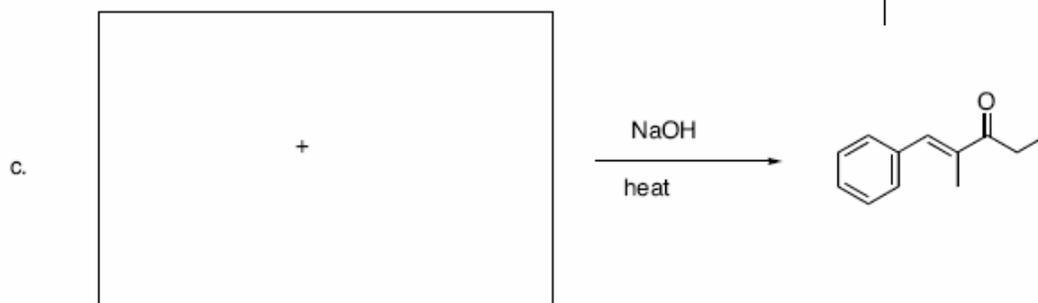
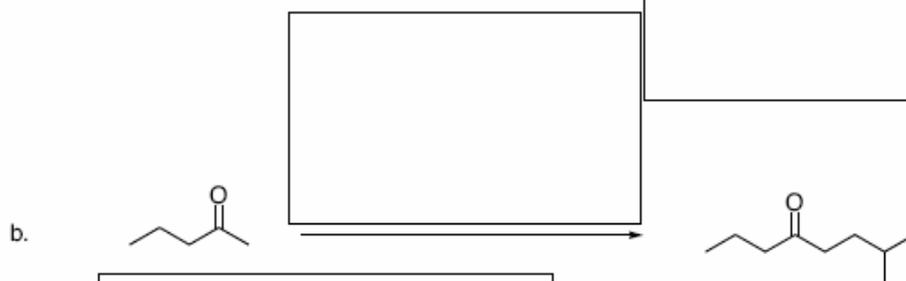
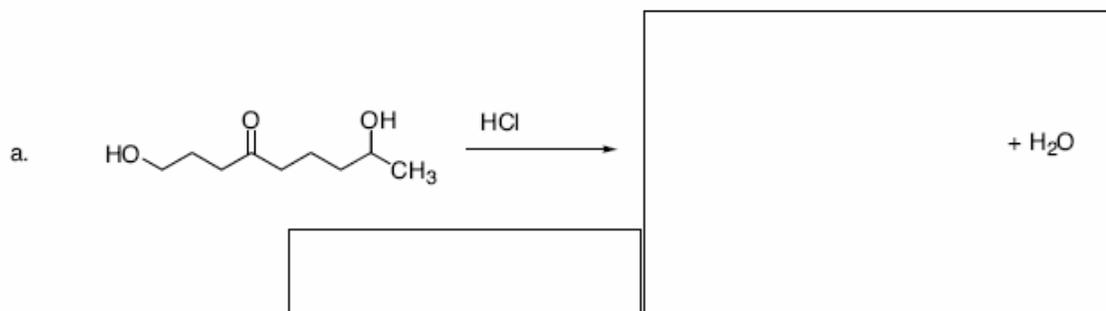
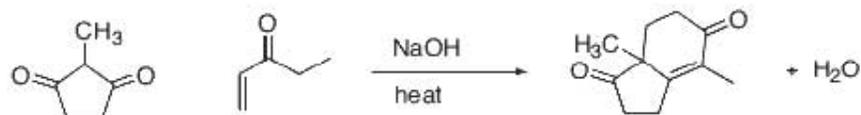


## Drill Problems for Enolate and Enol chemistry

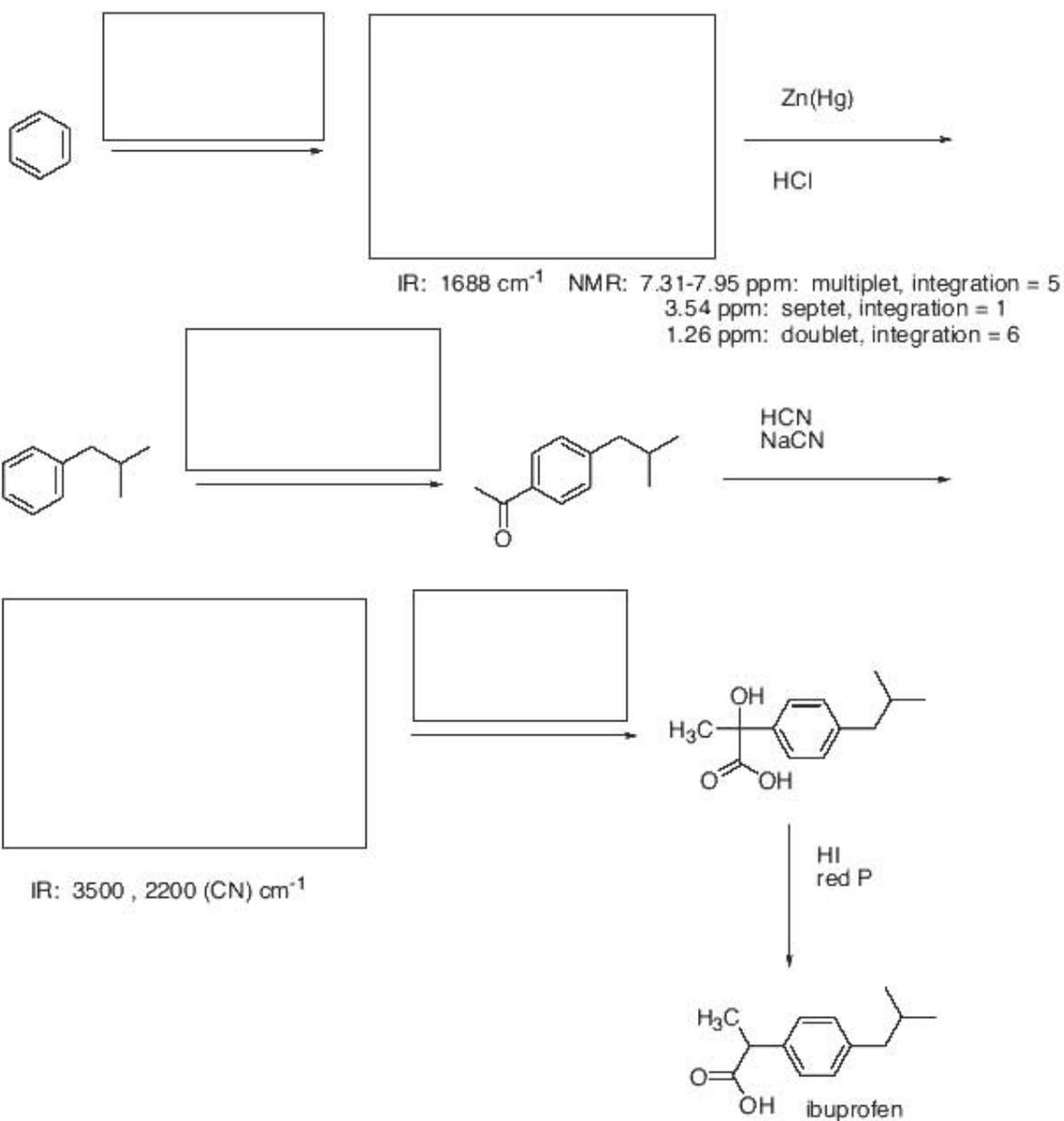
1) Fill in the missing starting material(s), product(s), or reagents for each reaction below.



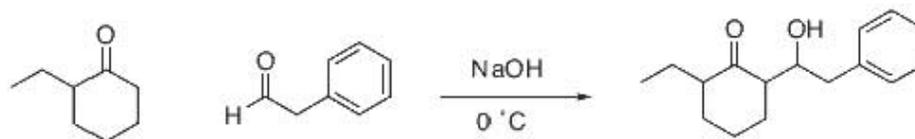
- 2) Provide a detailed mechanism for Robinson annulation shown below. Show each step in the mechanism using arrows to show electron motion. Atoms with formal charges should be clearly indicated.



- 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.



- 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.

