

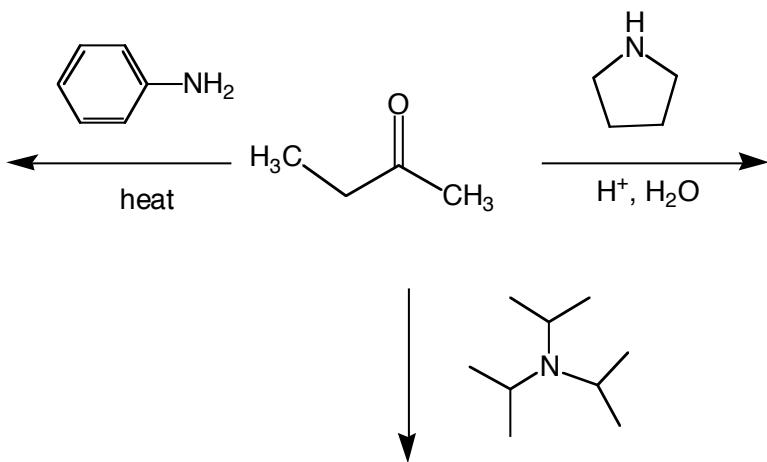
## PRACTICE EXAM QUESTIONS: CARBONYL CHEMISTRY MODULE

Predict the reaction products for the following reactions. You should be able to write curly-arrow mechanisms for each reaction.

$  \begin{array}{c} \text{O} \\ \text{Ph}-\text{C}-\text{H} \\   \\ \text{O} \\ \text{Ph}-\text{C}-\text{H} \end{array} + \xrightarrow[\text{H}_2\text{O}]{\text{NaOH} \text{ (low concentration)}} \text{Ph}-\text{CH}_2-\text{C}(=\text{O})-\text{H}  $	
$  \begin{array}{c} \text{O} \\ \text{Ph}-\text{C}-\text{H} \\   \\ \text{O} \\ \text{Ph}-\text{C}-\text{H} \end{array} + \xrightarrow[\text{H}_2\text{O}]{\text{H}_2\text{SO}_4} \text{Ph}-\text{CH}_2-\text{C}(=\text{O})-\text{H}  $	
$  \begin{array}{c} \text{O} \\ \text{Ph}-\text{C}-\text{OH} \\   \\ \text{O} \\ \text{Ph}-\text{C}-\text{H} \end{array} + \xrightarrow{\text{H}_2\text{C}\text{---}\ddot{\text{N}}\text{---}\text{N}\equiv\text{N}} \text{Ph}-\text{CH}_2-\text{C}(=\text{O})-\text{N}_3  $	
$  \begin{array}{c} \text{O} \\ \text{H}_3\text{C}-\text{C}-\text{OEt} \\   \\ \text{O} \\ \text{H}_3\text{C}-\text{C}-\text{OEt} \end{array} \xrightarrow[\text{2) HCl}]{\text{1) NaOH/H}_2\text{O}} \text{H}_3\text{C}-\text{CH}_2-\text{C}(=\text{O})-\text{OEt}  $	
$  \begin{array}{c} \text{O} \\ \text{EtO}-\text{C}-\text{CH}_2-\text{C}(=\text{O})-\text{OEt} \\   \\ \text{O} \\ \text{EtO}-\text{C}-\text{CH}_2-\text{C}(=\text{O})-\text{OEt} \end{array} \xrightarrow[\text{EtOH}]{\text{1) NaOEt, 2) CH}_3\text{Br}} \text{EtO}-\text{C}-\text{CH}_2-\text{CH}_2-\text{C}(=\text{O})-\text{OEt}  $	

The ketone shown below is subjected to reaction with the amines shown below.

- Which of the three reactions will give a product with an enamine?
- Draw the curved arrow mechanism that results in formation of a neutral tetrahedral intermediate species in the reaction to make an enamine.
- Why won't the other two amines form an enamine?
- What will be the outcome of the other two reactions?



Match the reactants on the right with the products on the left.

