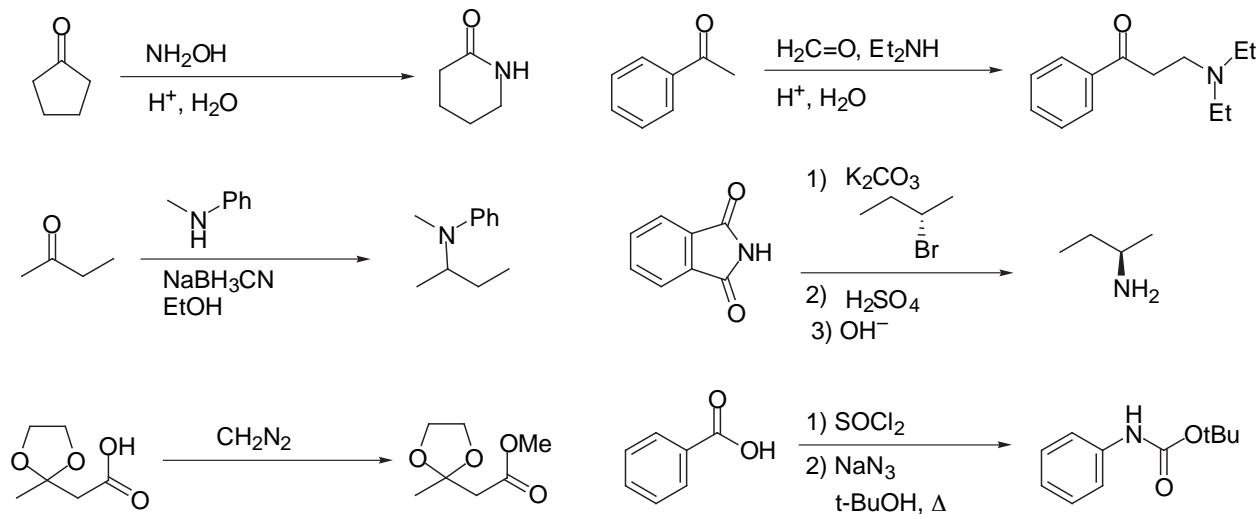
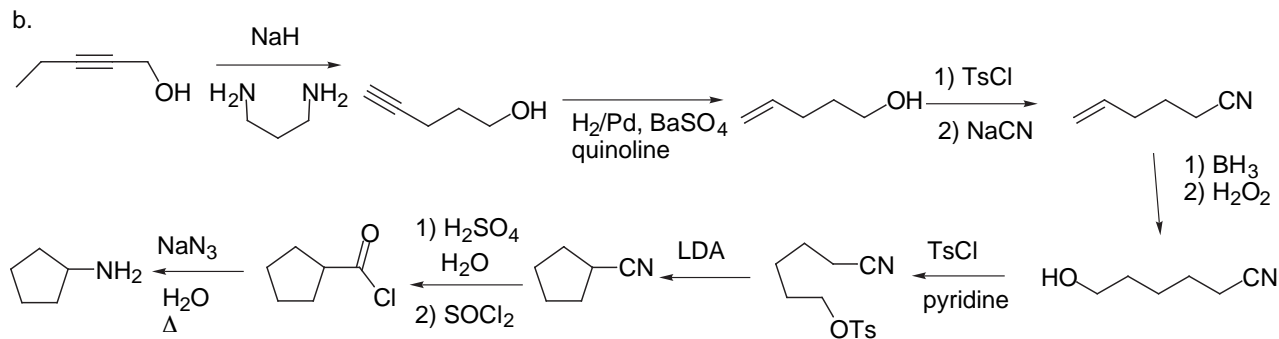
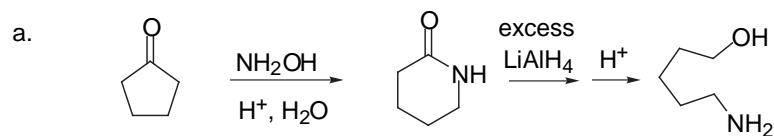


Chem 334, Professor Fox  
Problem Set #3 Use additional paper

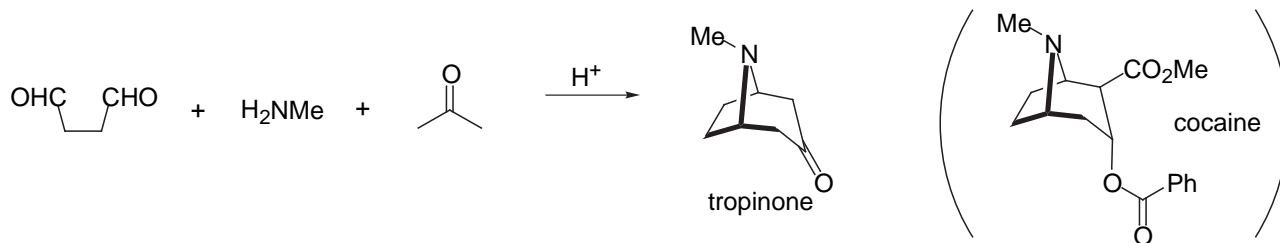
1. Fill in the reaction conditions



2. Provide multistep syntheses using the indicated starting material and any other reagents



3. In 1917, Sir Robert Robinson showed that the alkaloid tropinone (which is structurally similar to cocaine) can be produced simply by combining succinaldehyde, methylamine and acetone. The synthesis is considered the first 'biomimetic' synthesis of a natural product. Propose a mechanism for the formation of tropinone.



#### A double Mannich reaction

