1. Complete the following acid-base reaction and predict the direction of equilibrium (to the right or to the left) for each. (Acetic acid: pKa = 4.76, Pyridinium cation: pKa = 5.21)

\[
\text{CO}_2\text{H} + \text{C}_5\text{H}_4\text{N}^+ \xrightleftharpoons{4.76}{5.25} \text{CO}_2^- + \text{C}_5\text{H}_4\text{N}^+\text{H}
\]

2. Name the following using common nomenclature:

\[
\text{Cyclohexylethylamine}
\]

3. Provide the compound for each transformation:
4. Propose a detailed mechanism to explain the following reaction:

5. Devise a reasonable synthesis for the following compounds from reagents you are familiar with and the starting material provided.

   a. 

   b.