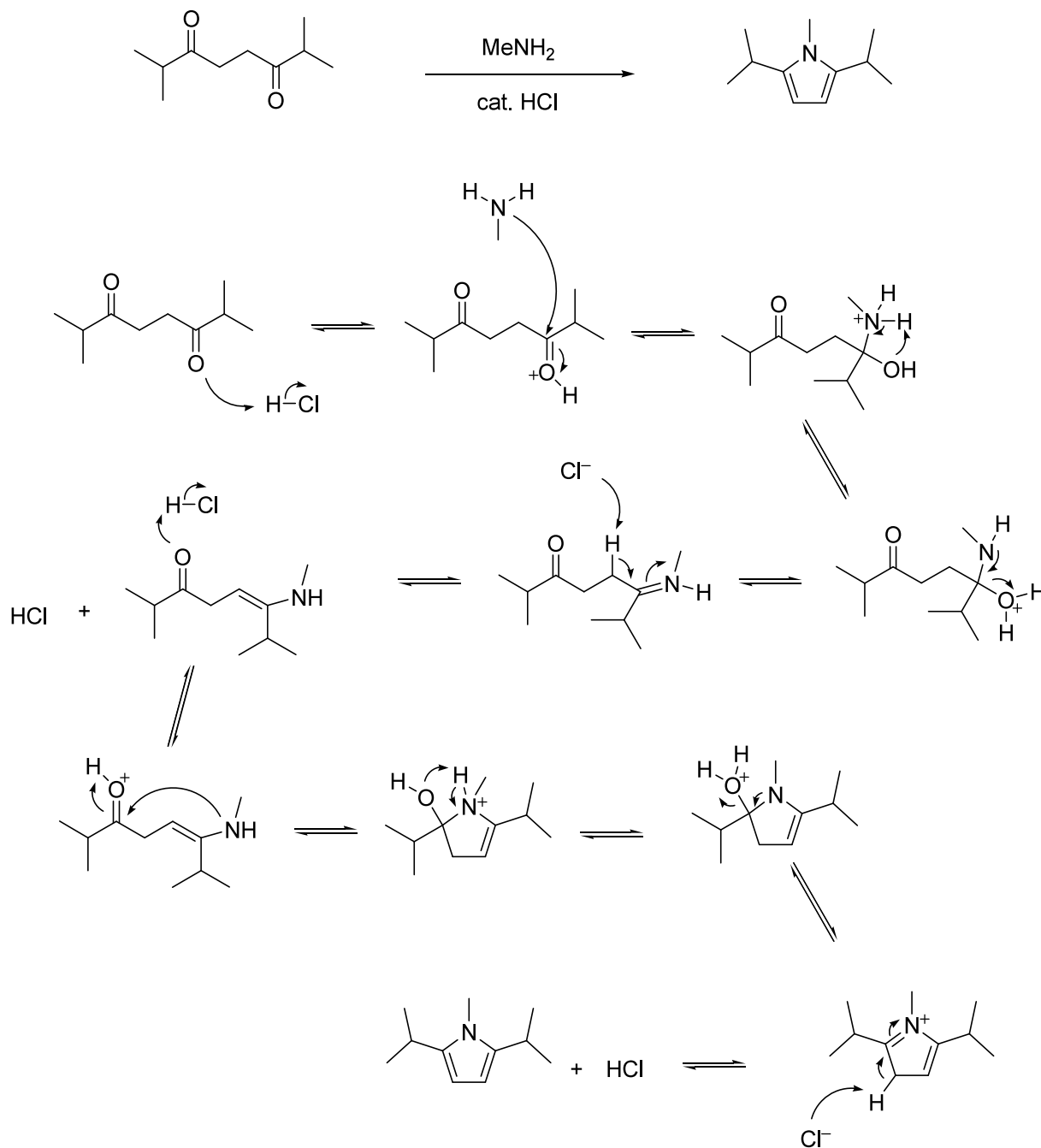
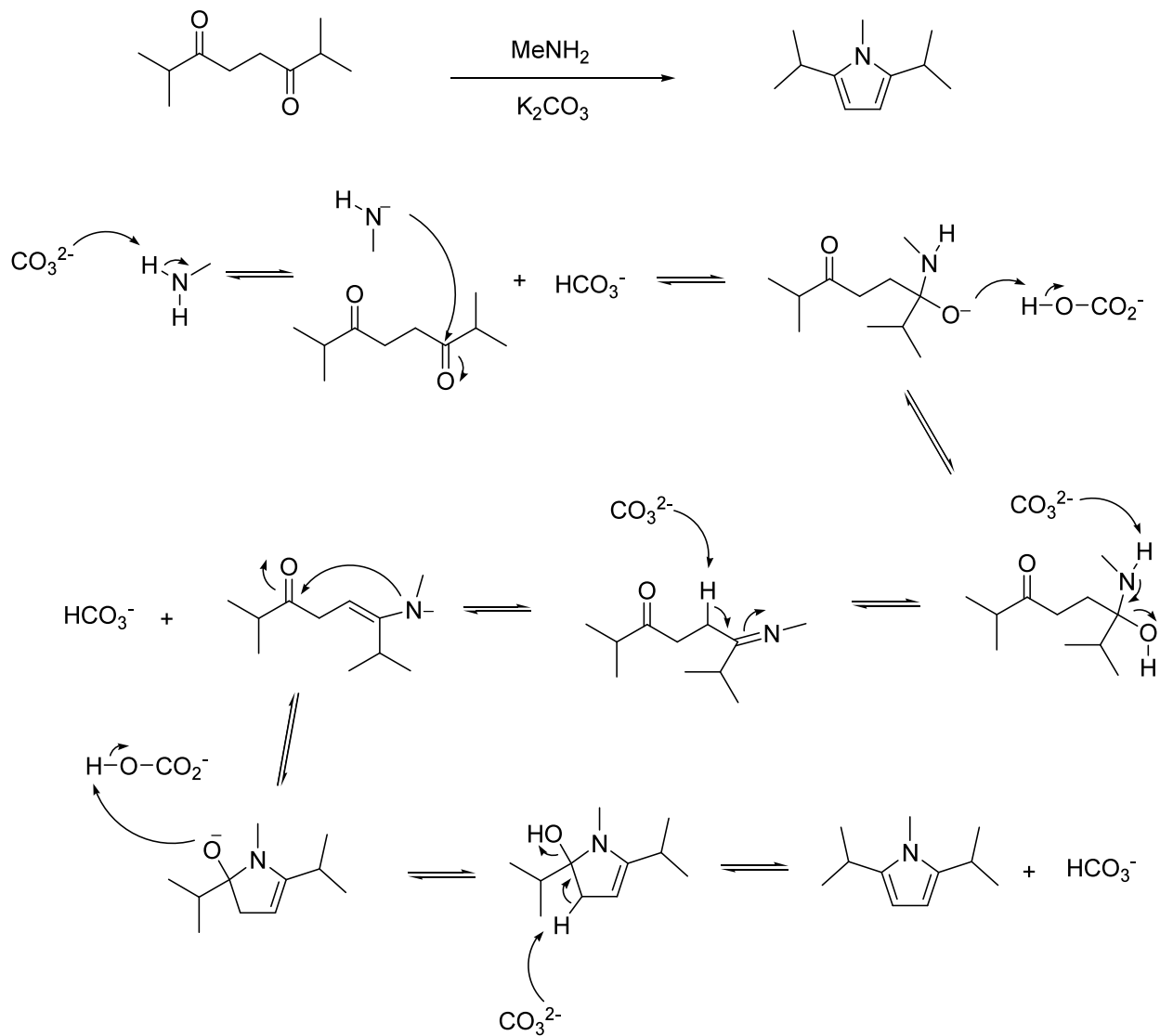


**PS #9 Practice Questions – Synthesis of Aromatic Heterocycles; Condensations and 1,3-Dipolar Cycloadditions**

**Part I.** Pyrrole rings are commonly formed ring by condensing a primary amine (nucleophile) with a 1,4-dicarbonyl compound. Show the detailed mechanism for the acid catalyzed formation of the pyrrole ring (including all proton transfer steps).



**Part II.** Show the detailed mechanism for the base catalyzed formation of the pyrrole ring (including all proton transfer steps).



**Part III.** Complete the following heterocycle forming reactions by filling in the boxes with the appropriate product or reagent(s). Refer to pages 1185 – 1191, 1195 – 1198, and 1202 – 1203 in Clayden and Greeves.

