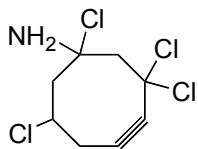


Sample Final Exam A

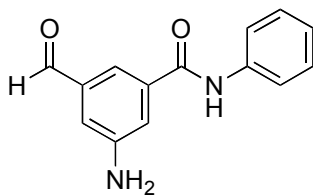
A. Nomenclature (4 points each; 8 total points)

Please provide an acceptable name for each of the following compounds, noting stereochemistry where appropriate.

1.

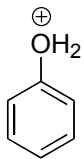


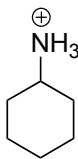
2.

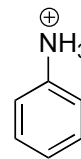


B. Facts (1.5 points each; 9 total points)

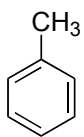
1. Rank the pK_a of the following molecules from lowest (1) to highest (3).

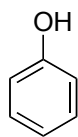


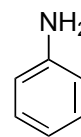




2. Rank the boiling point of the following molecules from lowest (1) to highest (3).



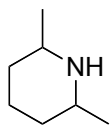




C. Reactions (9 points each; 36 total points)

Please provide the **major** product, or **necessary reagents**, or **starting material** in the **box** provided below. Be sure your drawing indicates stereochemistry if applicable.

1.

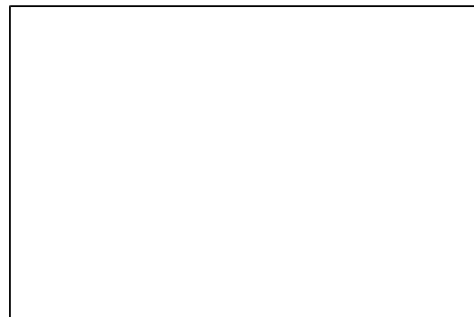


1. CH_3I (xs)

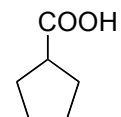
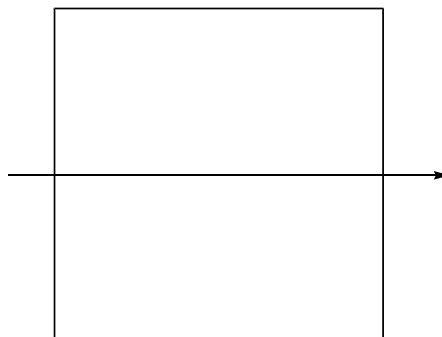
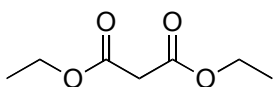
2. Ag_2O , Δ

3. $\text{BH}_3 \cdot \text{THF}$

4. H_2O_2 , HO^-

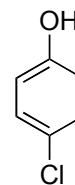
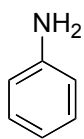


2.

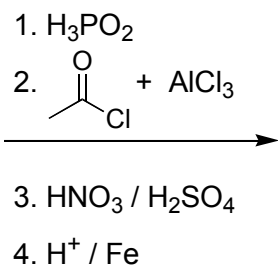
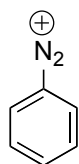


Reactions (continued)

3.

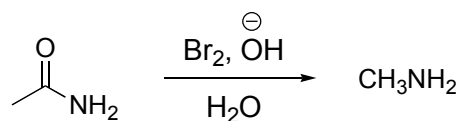


4.



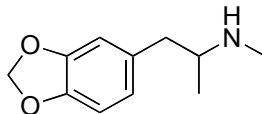
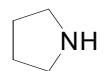
D. Mechanism (17 total points)

Using curved arrows to indicate "electron flow", provide a reasonable mechanism for the following transformation. **Show all intermediates and all formal charges.** If there is more than one resonance structure, you must show the "best" (lowest energy) structure.



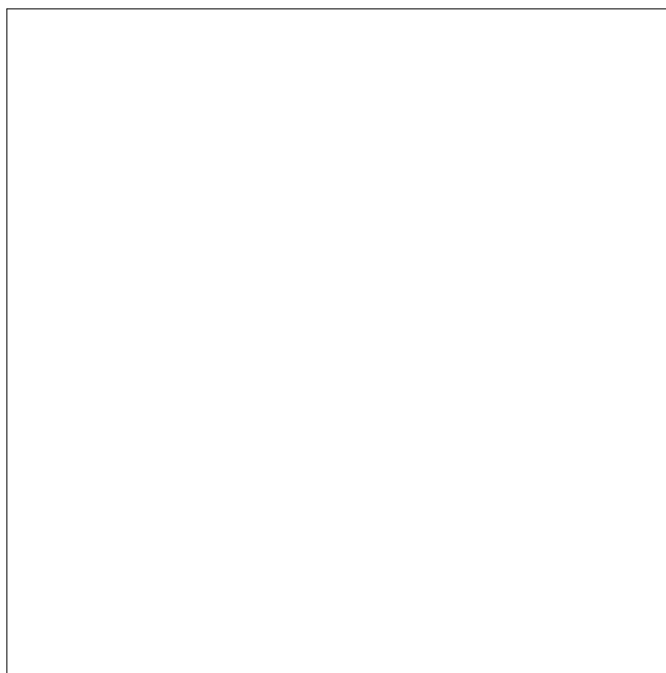
E. Synthesis (20 total points)

Synthesize the compound below, popularly known as "Ecstasy", using any of the following: alkanes, alkenes, alkynes, or alcohols having **no more than two carbon atoms**, benzene, NaCN, CO, CO₂, any inorganic reagents, any oxidizing or reducing agents, and any peroxyacids.



F. Spectroscopy (10 total points)

A compound with the formula $\text{C}_9\text{H}_{13}\text{N}$ exhibits the IR, ^1H NMR, and proton-decoupled ^{13}C NMR spectra shown on the following page. Please identify this compound and draw the correct structure **in the box** provided below.



C₉H₁₃N

