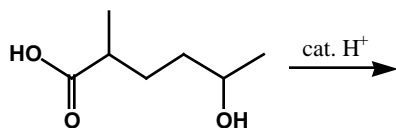
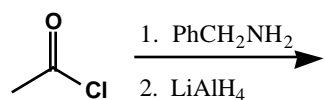
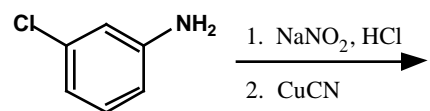
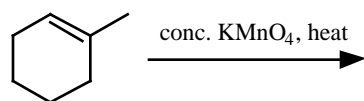
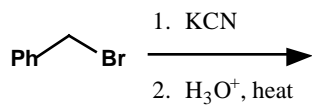
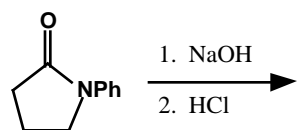
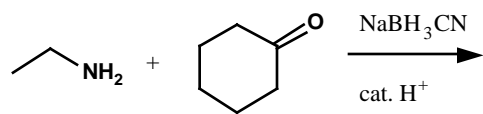
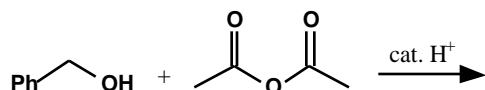
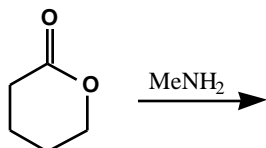
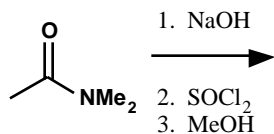
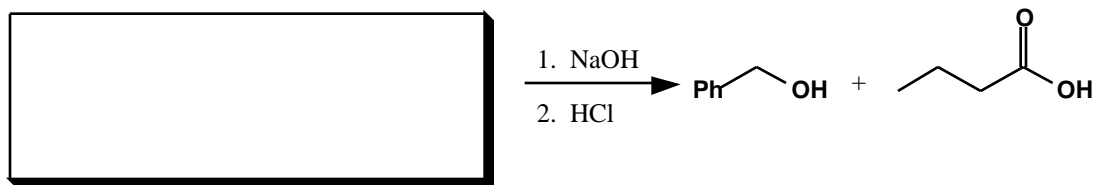
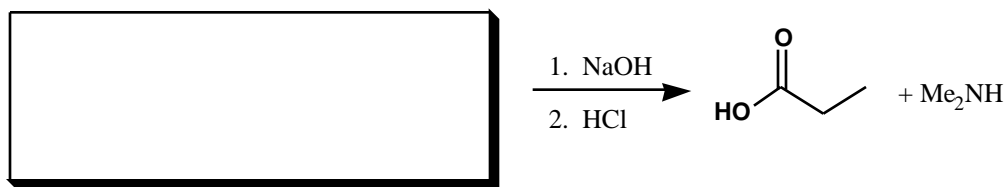


1. Synthesis Reactions. Draw the feature product of the following reactions. (3 pts each)





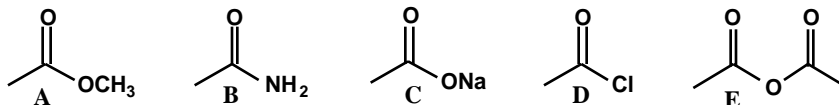
2. Draw the starting materials for the following hydrolysis reactions. (2 pts each)



3. a) Which one(s) of the following will react spontaneously with  $\text{H}_2\text{O}$ ? (2 pts)

b) Which one(s) will react spontaneously with  $\text{Me}_2\text{NH}$ ? (2 pts)

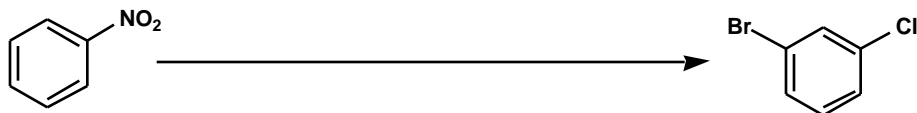
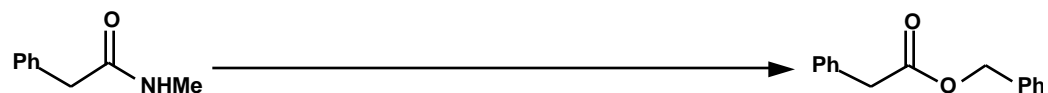
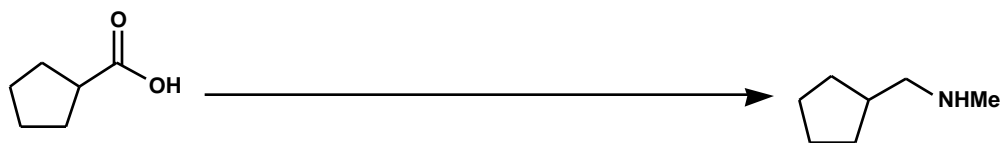
[Note: there may be more than one that reacts.]



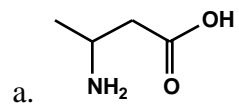
4. Shown are two isomers. Circle the one with the higher boiling point. (2 points)



5. Provide Reagents for the Following Transformations (4 pts each)



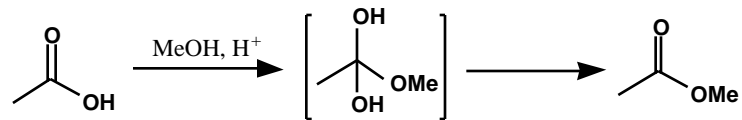
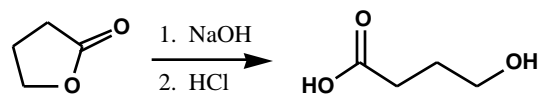
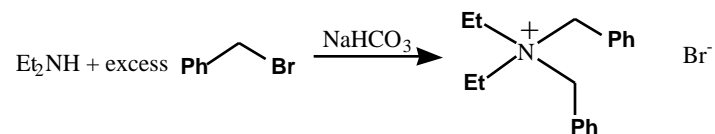
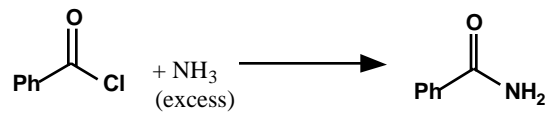
6. Name the Following or Draw the Structure (2 pts each)



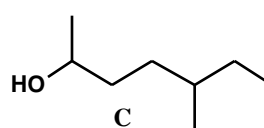
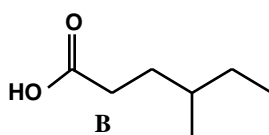
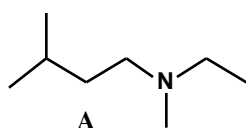
b. N-methyl-N-ethyl-3-hexanamine

c. methyl benzoate

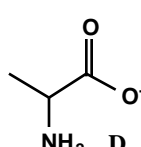
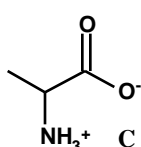
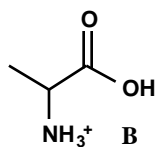
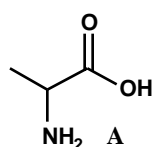
7. Provide Mechanisms for the Following Reactions. (Note: In some cases, these may be “partial” reactions.) (16 points)



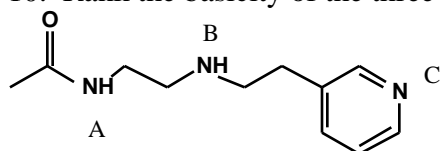
8. Which (if any) after being dissolved in diethyl ether, will: (4 points)
- a) Extract into NaOH/H<sub>2</sub>O?                      b) Extract into HCl/H<sub>2</sub>O?                      c) Extract into neutral water?



9. Of the following, which form would exist at: (4 points)
- a) pH = 2 (acidic)                      b) pH = 7 (neutral)                      c) pH = 12 (basic)

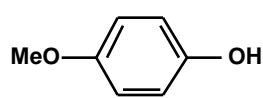
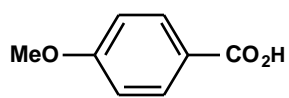
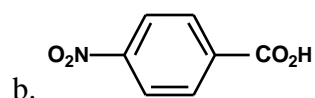


10. Rank the basicity of the three Nitrogen atoms, from most to least (1 most, 3 least). (2 pts)



11. Rank the acidity of the following, 1 being most acidic, 3 being least (2 pts each)

- a.            ethanoic acid                      CH<sub>3</sub>NH<sub>3</sub><sup>+</sup>Cl<sup>-</sup>                      ethanol



12. Rank the following in order of increasing basicity (2 points each)

- a.            NH<sub>3</sub>                      CH<sub>3</sub>NH<sub>2</sub>                      PhNH<sub>2</sub>

- b.            NaOH                      CH<sub>3</sub>NH<sub>2</sub>                      sodium ethanoate

