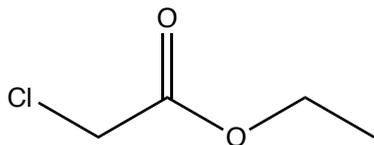


1. a. (2 pts. ea.) Identify the following compounds as esters, carboxylic acids, or amides.  
b. (4 pts. ea.) Provide IUPAC names for the following compounds.

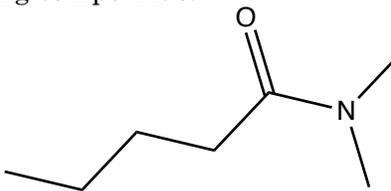
i.



a. \_\_\_\_\_

b. \_\_\_\_\_

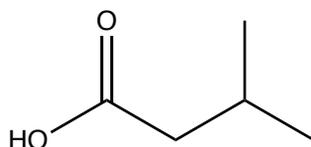
ii.



a. \_\_\_\_\_

b. \_\_\_\_\_

iii.



a. \_\_\_\_\_

b. \_\_\_\_\_

1. \_\_\_\_\_

2. \_\_\_\_\_

3. \_\_\_\_\_

4. \_\_\_\_\_

5. \_\_\_\_\_

6. \_\_\_\_\_

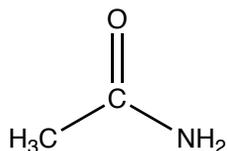
7. \_\_\_\_\_

8. \_\_\_\_\_

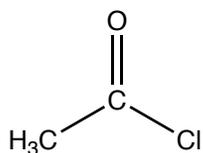
9. \_\_\_\_\_

10. \_\_\_\_\_

2. (8 pts.) Draw a resonance contributor for the compound drawn below.



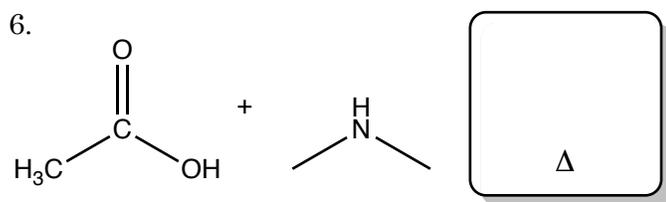
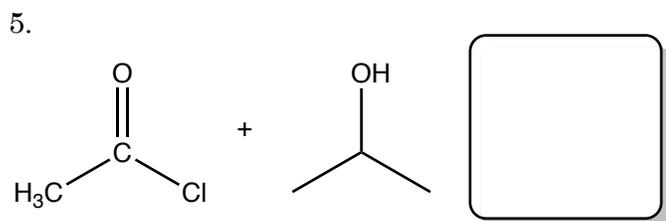
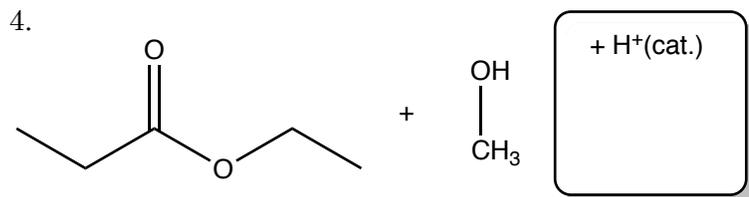
3. (12 pts.) Explain why acid chlorides, like the one drawn below, are more reactive than esters, carboxylic acids, and amides.



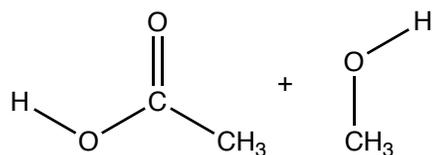
For questions 4 – 6

a. (2 pts. each) For each reaction below draw the appropriate arrow (  $\rightleftharpoons$  or  $\longrightarrow$  ) in the box provided.

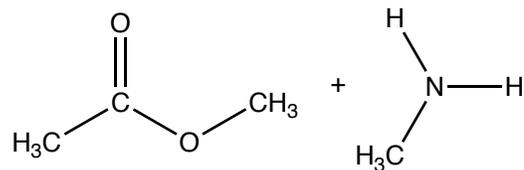
b. (6 pts. each) Predict the products for the following reactions. Make certain to include all products so the equations are balanced chemical equations.



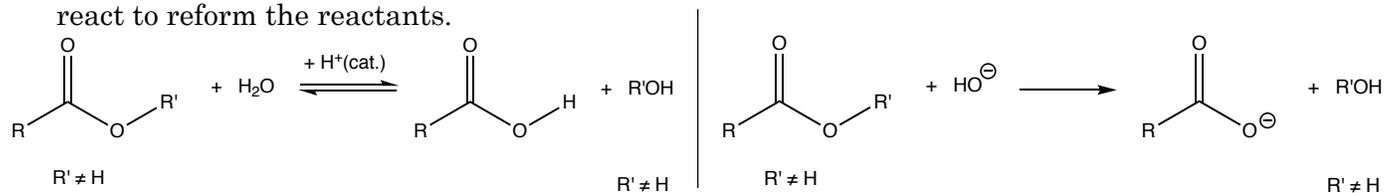
7. Addition of Brønsted-Lowry acids to the reaction of a carboxylic acid and an alcohol increases the rate of the reaction. **a. (4 pts.)** Show where the  $H^+$  adds to increase the rate of the reaction; that is, draw in the  $H^+$  bonded to the proper position. **b. (8 pts.)** Briefly, explain how the  $H^+$  increases the rate of the reaction



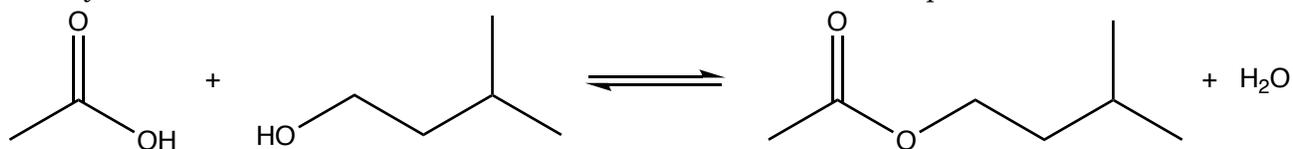
8. (8 pts.) Briefly, explain why adding a Brønsted-Lowry acid to the reaction of an amine and an ester will not increase the rate of the reaction.



9. (8 pts.) The acid-catalyzed hydrolysis of an ester is an equilibrium reaction, but the base-promoted hydrolysis of an ester is not. Briefly explain why the products of the base-promoted reaction do not react to reform the reactants.



10. (12 pts.) Draw the mechanism for the uncatalyzed esterification reaction between acetic acid and isoamyl alcohol. Remember to include electron movement arrows as part of the mechanism.



1	<b>H</b> 1.0079											2	<b>He</b> 4.0026					
3	<b>Li</b> 6.941	<b>Be</b> 9.012											10	<b>Ne</b> 20.1797				
11	<b>Na</b> 22.989	<b>Mg</b> 24.305											17	<b>Cl</b> 35.453				
19	<b>K</b>	<b>Ca</b>	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
37	<b>Cs</b>	<b>Sr</b>	<b>Y</b>	<b>Zr</b>	<b>Nb</b>	<b>Mo</b>	<b>Tc</b>	<b>Ru</b>	<b>Rh</b>	<b>Pd</b>	<b>Ag</b>	<b>Cd</b>	<b>In</b>	<b>Sn</b>	<b>Sb</b>	<b>Te</b>	<b>I</b>	<b>Xe</b>
55	<b>Rb</b>	<b>Ba</b>	<b>La</b>	<b>Hf</b>	<b>Ta</b>	<b>W</b>	<b>Re</b>	<b>Os</b>	<b>Ir</b>	<b>Pt</b>	<b>Au</b>	<b>Hg</b>	<b>Tl</b>	<b>Pb</b>	<b>Bi</b>	<b>Po</b>	<b>At</b>	<b>Rn</b>
87	<b>Fr</b>	<b>Ra</b>	<b>Ac</b>	104	105	106	107	108	109	110	111	112	114			116		118

58	<b>Ce</b>	<b>Pr</b>	<b>Nd</b>	<b>Pm</b>	<b>Sm</b>	<b>Eu</b>	<b>Gd</b>	<b>Tb</b>	<b>Dy</b>	<b>Ho</b>	<b>Er</b>	<b>Tm</b>	<b>Yb</b>	<b>Lu</b>
90	<b>Th</b>	<b>Pa</b>	<b>U</b>	<b>Np</b>	<b>Pu</b>	<b>Am</b>	<b>Cm</b>	<b>Bk</b>	<b>Cf</b>	<b>Es</b>	<b>Fm</b>	<b>Md</b>	<b>No</b>	<b>Lr</b>