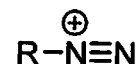
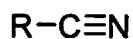
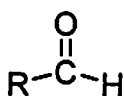
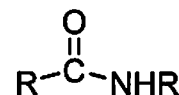
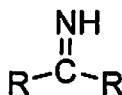
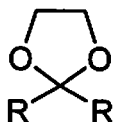
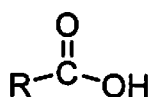


Name \_\_\_\_\_

If you do not want your graded exam placed in the box outside my office, then check here 

1) Identify the class of compounds (functional group) each of the following molecules belongs to. (10pts)



2) Put a **cross** through the molecule (above) that can serve as a *protecting group* for carbonyl compounds. (1pt)

3) Define the following terms. (4x2= 8pts)

(a) Kinetic Control

(b) Nucleophile

(c) Acyl Group

(d) Substitution Reaction.

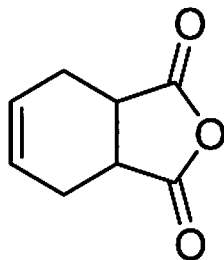
4) What is the definition of a “*Carboxylic Acid Derivative*”?

Provide one of the factors that influence the relative rates of *Nucleophilic Acyl Substitution* reactions for carboxylic acid derivatives (e.g. esters more reactive than amides).

Write the mechanism (*i.e. curly arrows*) and products for the reaction of an Acid Chloride with Water. (1+1+5pts)

5) Write the mechanism (*i.e. curly arrows*) for the base catalyzed *nucleophilic addition* of water to acetone (propanone), producing the ketone hydrate. (5pts)

6) (1+2+2+2=7pts) The following molecule was produced in a [4+2] cycloaddition (Diels-Alder) reaction.

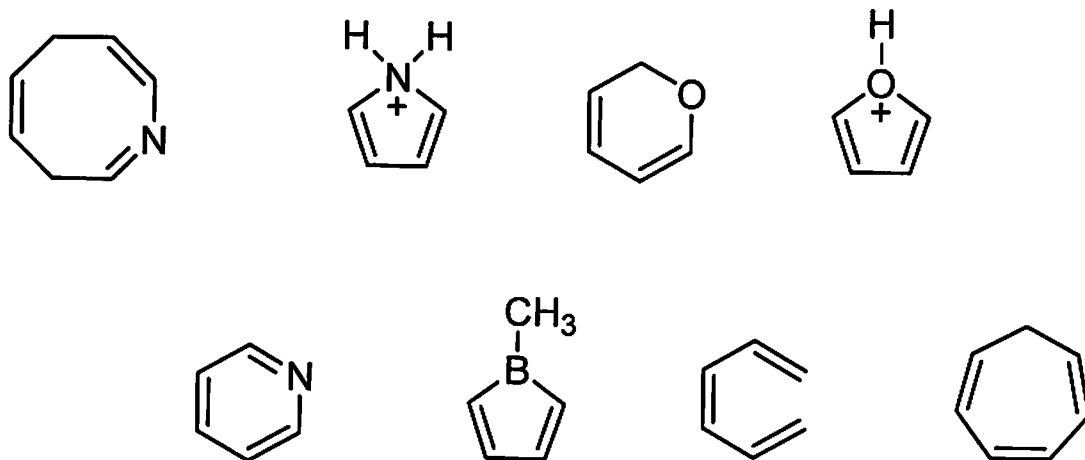


a) The right hand side ring contains a cyclic version of what type of functional group?

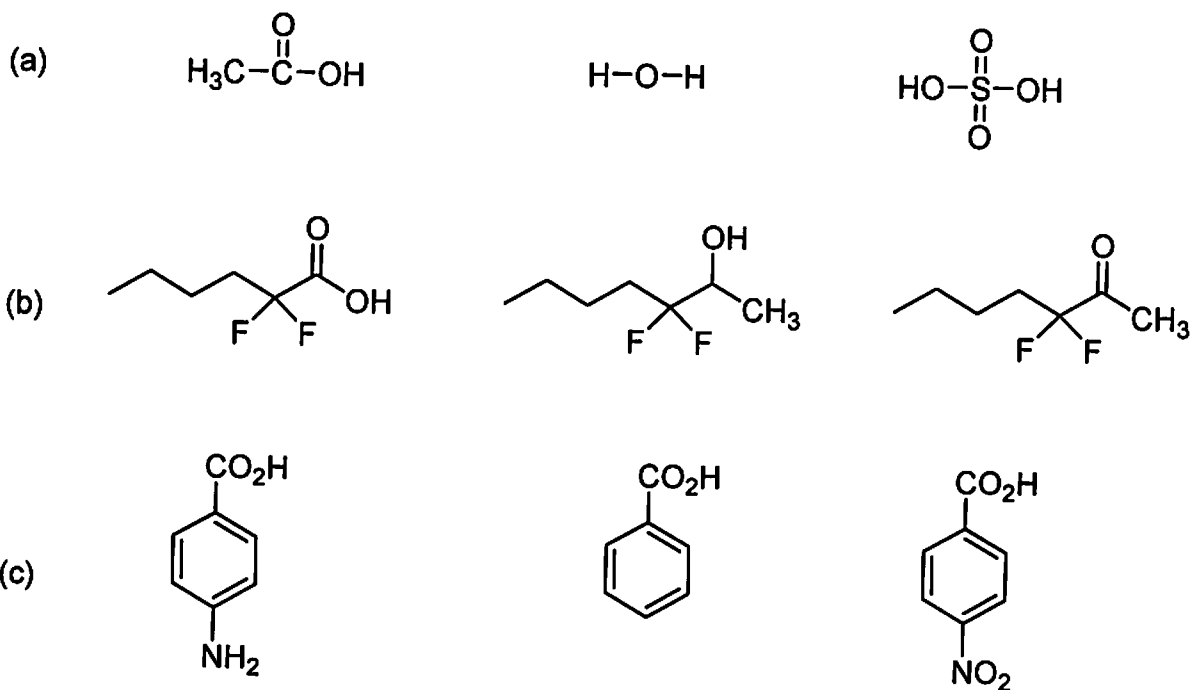
b) Draw the *diene* and *dienophile* which would react together to give this product, and then draw the mechanism (*i.e. curly arrows*) for this reaction.

c) Draw the molecule produced if the above molecule reacted with an excess of water.

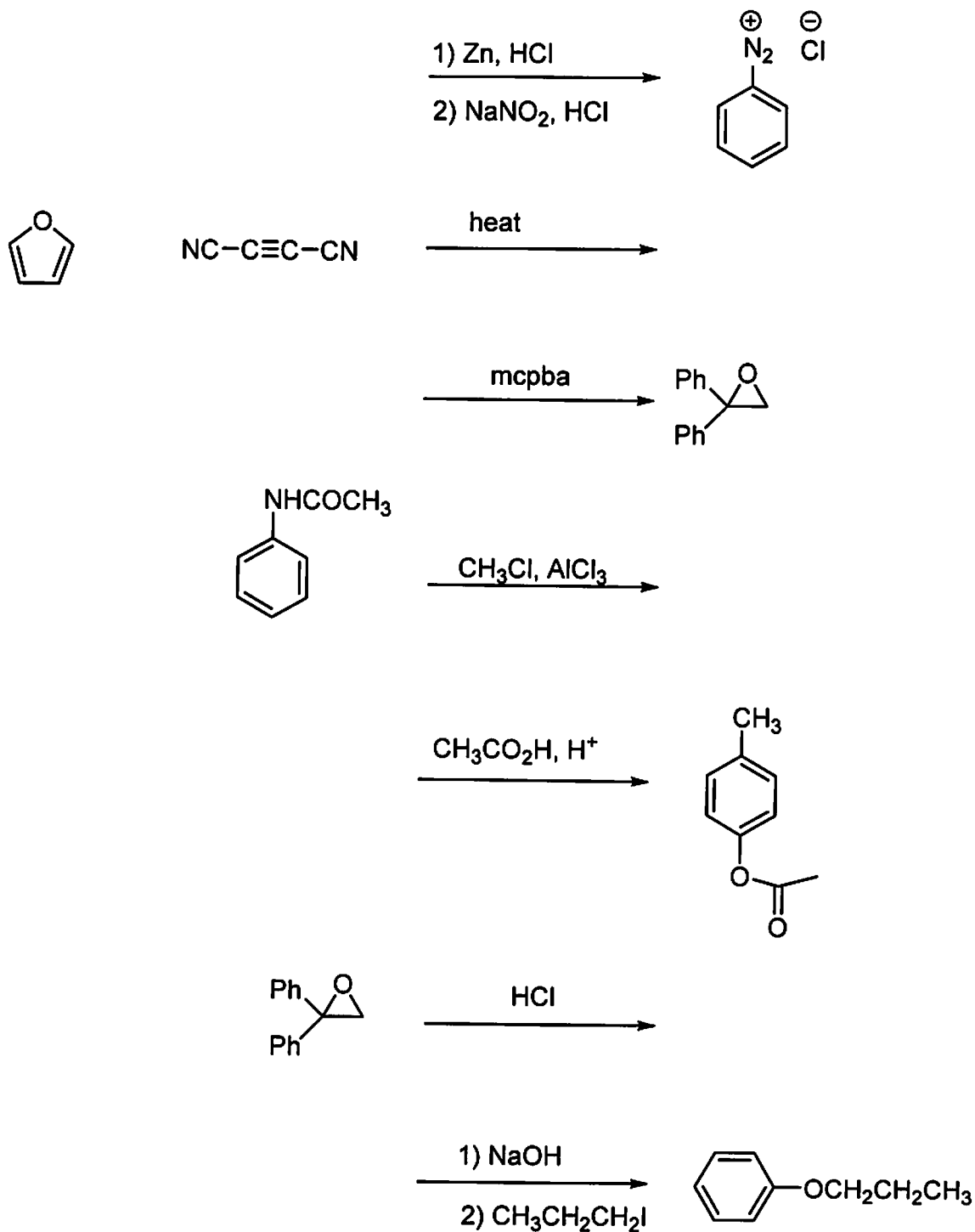
7) Indicate which of the following molecules are *aromatic*, *non-aromatic* or *anti-aromatic*. (Assume all the molecules are planar). (8pts)



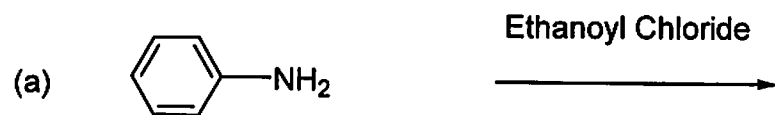
8) Circle the *strongest* acid (proton donor) in the following threesomes. (3pts)



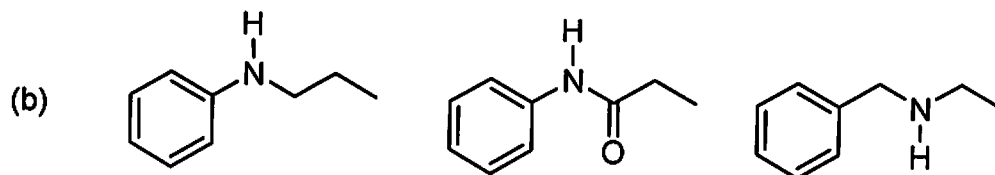
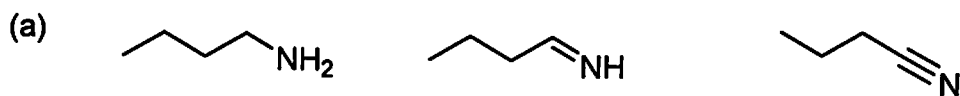
9) Fill in the blanks (either SM/products) for six of the following reactions.  
(6x2=12pts)



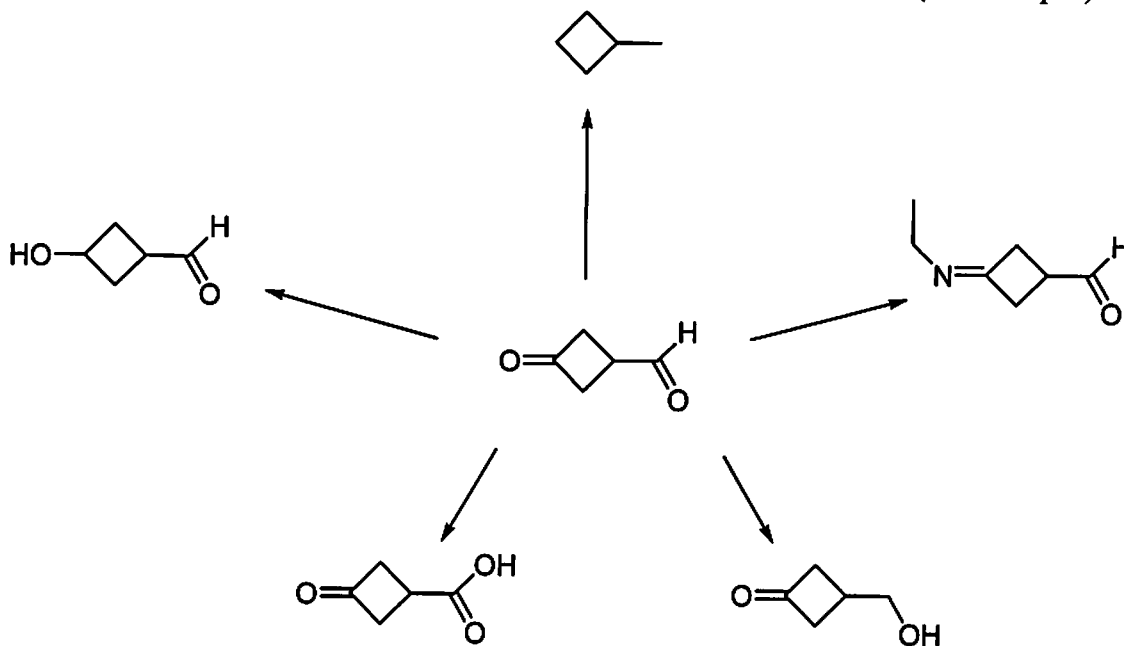
10) Give the products in **four** of the following transformations. (8pts)



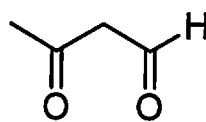
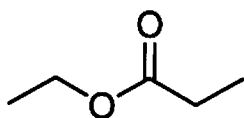
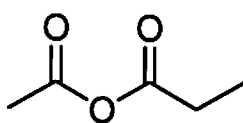
11) Circle the *strongest* base in the following threesomes. (3pts)



12) Give reagents for **four** of the following transformations. (4x3=12pts)



13) Name **two** of the following compounds in IUPAC form. (6pts)



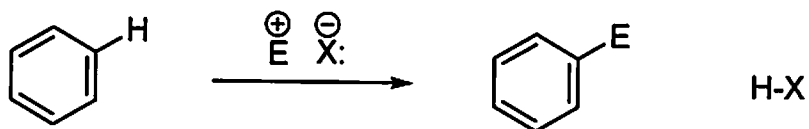
14) Draw in line angle (stick figure) form, two of the following named molecules. (6pts)

*N, N- Diethylpropanamide*

*2-Fluoropropanoyl Bromide*

*2-Chloro-3-hydroxybutanoic acid*

15) Write the mechanism (*i.e. curly arrows*) for this generic *Electrophilic Aromatic Substitution* of Benzene. (4pts)





**\*\*\*\*Bonus question\*\*\*\* (up to 4 points)**

In the context of Organic Chemistry, what do the following abbreviations stand for?

IUPAC

PCC

S<sub>N</sub>1

EAS



Spring 2019 Organic II Final Exam

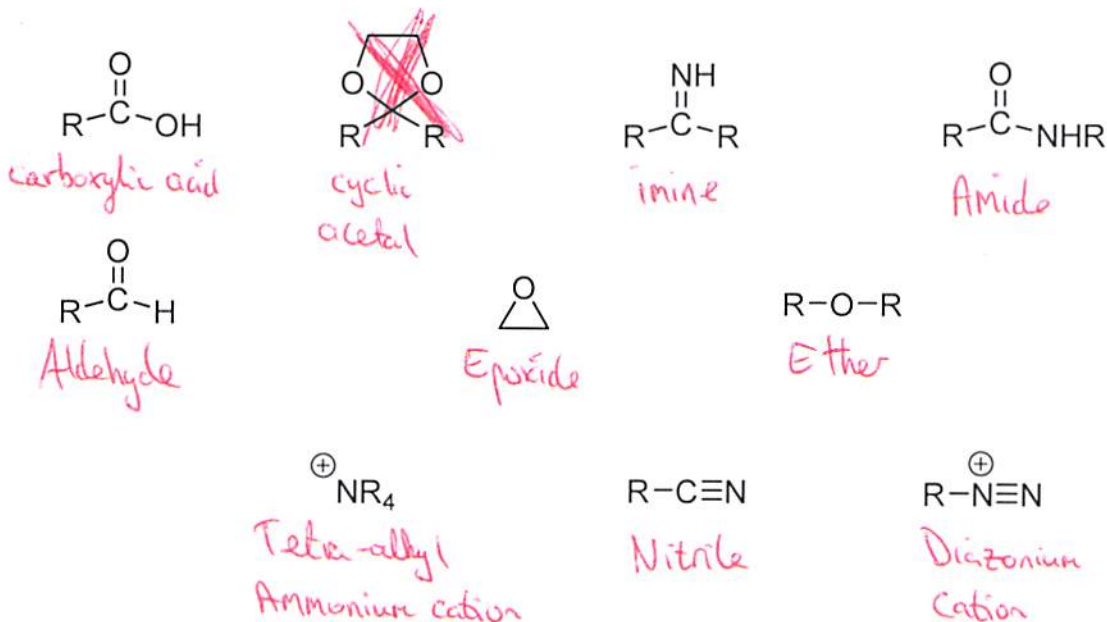
100pts (graded as 150pts)

Name How Do You CATCH ROR?

use the Ethernet!!!

If you do **not** want your graded exam placed in the box outside my office, then check here

1) Identify the class of compounds (functional group) each of the following molecules belongs to. (10pts)



2) Put a **cross** through the molecule (above) that can serve as a *protecting group* for carbonyl compounds. (1pt)

✓

3) Define the following terms. (4x2= 8pts)

(a) Kinetic Control *The speed of reaction controls the formation of major products.*

(b) Nucleophile *A two electron donor.*

(c) Acyl Group *The  $\begin{array}{c} \text{O} \\ \parallel \\ -\text{C}- \end{array}$  group.*

(d) Substitution Reaction. *Where 1 atom or group is exchanged for another atom or group.*

4) What is the definition of a "Carboxylic Acid Derivative"?

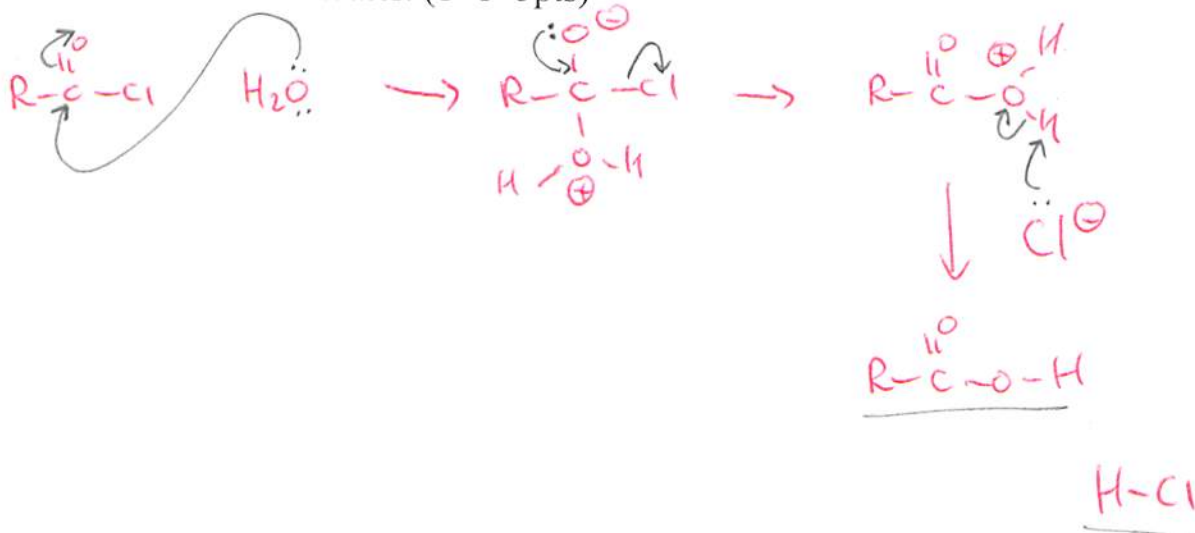
A species that can be hydrolyzed into a carboxylic acid.

Provide one of the factors that influence the relative rates of *Nucleophilic Acyl Substitution* reactions for carboxylic acid derivatives (e.g. esters more reactive than amides).

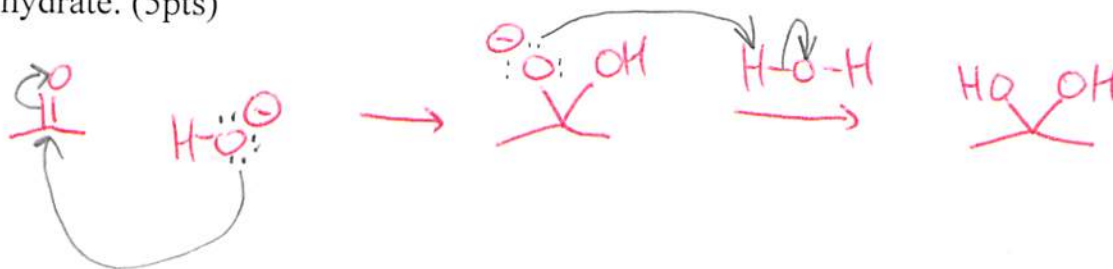
- Leaving group ability

- Amount of resonance in the fractional group.

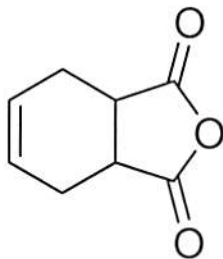
Write the mechanism (i.e. curly arrows) and products for the reaction of an Acid Chloride with Water. (1+1+5pts)



5) Write the mechanism (i.e. curly arrows) for the base catalyzed nucleophilic addition of water to acetone (propanone), producing the ketone hydrate. (5pts)



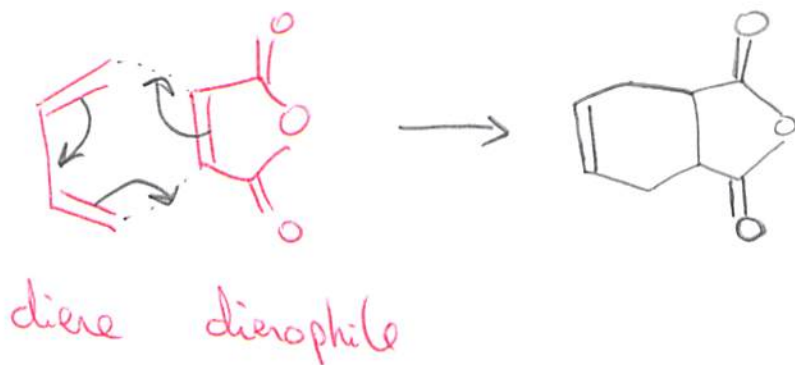
6) (1+2+2+2=7pts) The following molecule was produced in a [4+2] cycloaddition (Diels-Alder) reaction.



a) The right hand side ring contains a cyclic version of what type of functional group?

Anhydride

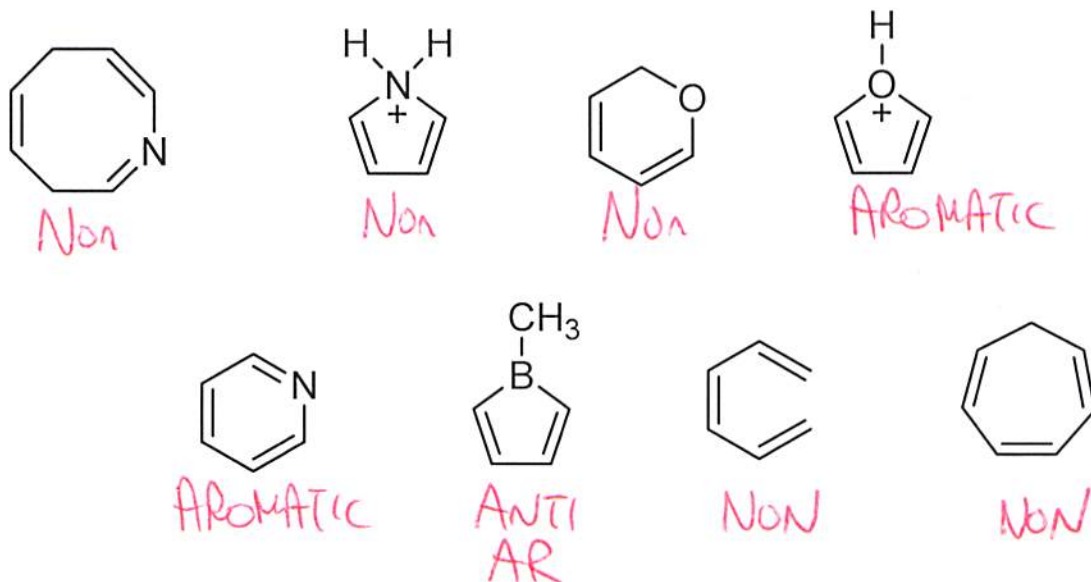
b) Draw the *diene* and *dienophile* which would react together to give this product, and then draw the mechanism (*i.e. curly arrows*) for this reaction.



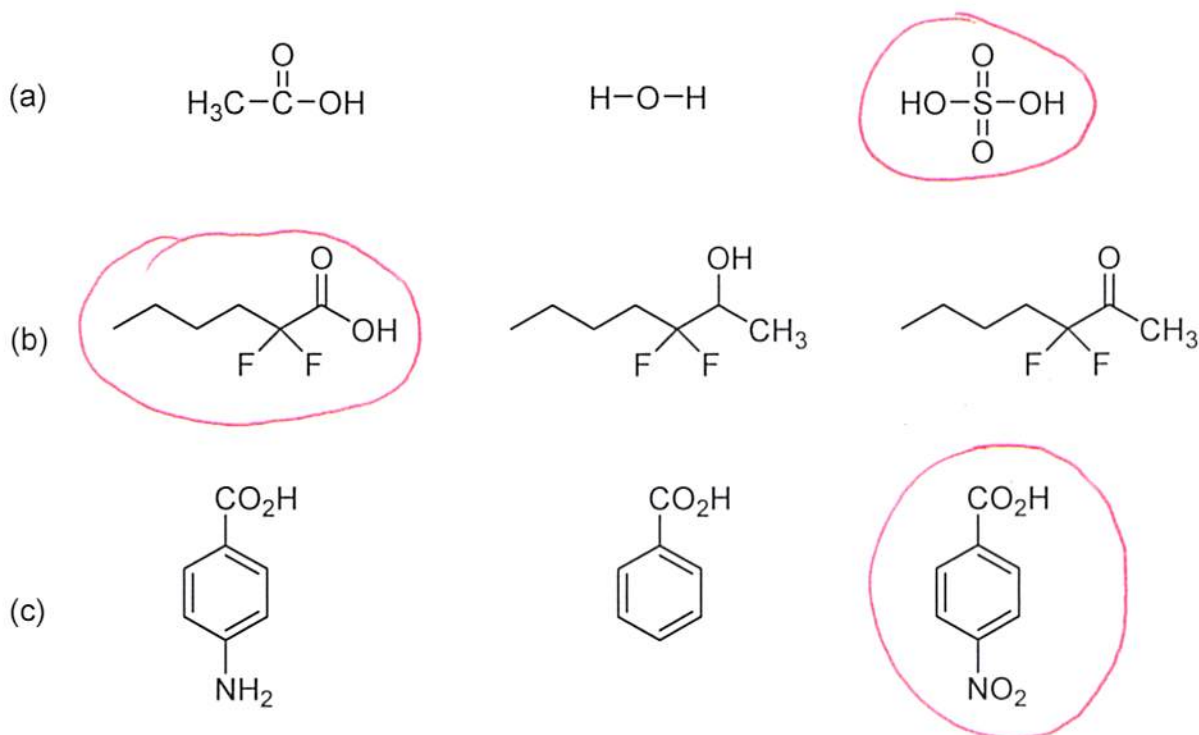
c) Draw the molecule produced if the above molecule reacted with an excess of water.



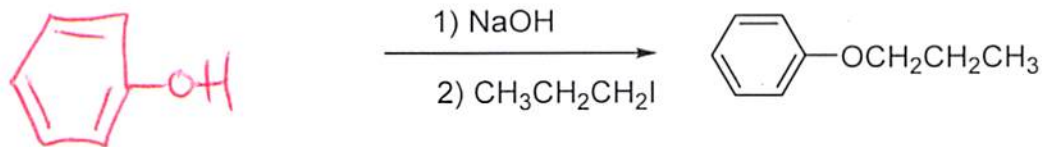
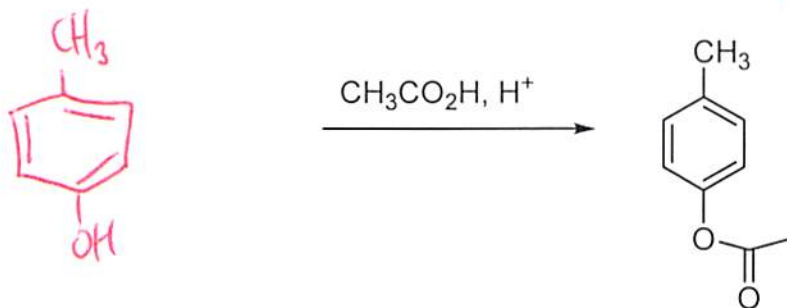
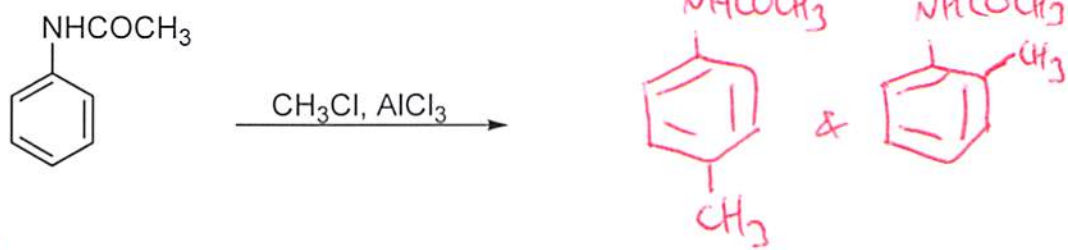
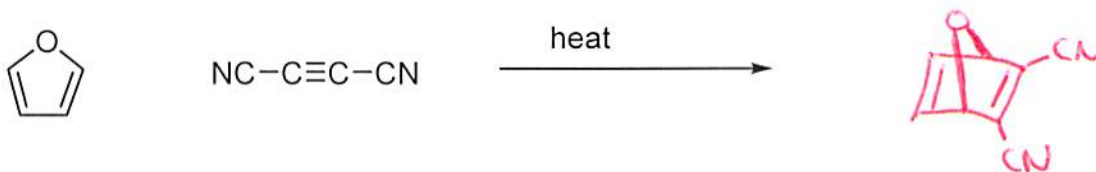
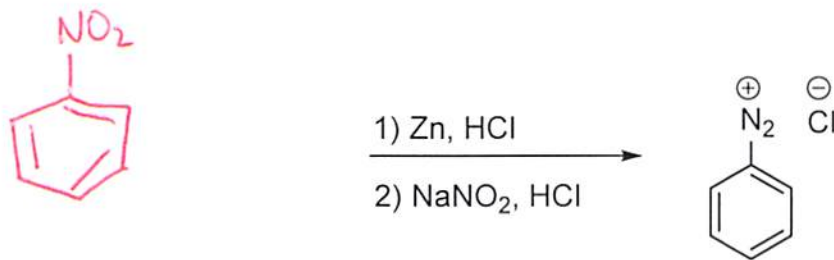
7) Indicate which of the following molecules are *aromatic*, *non-aromatic* or *anti-aromatic*. (Assume all the molecules are planar). (8pts)



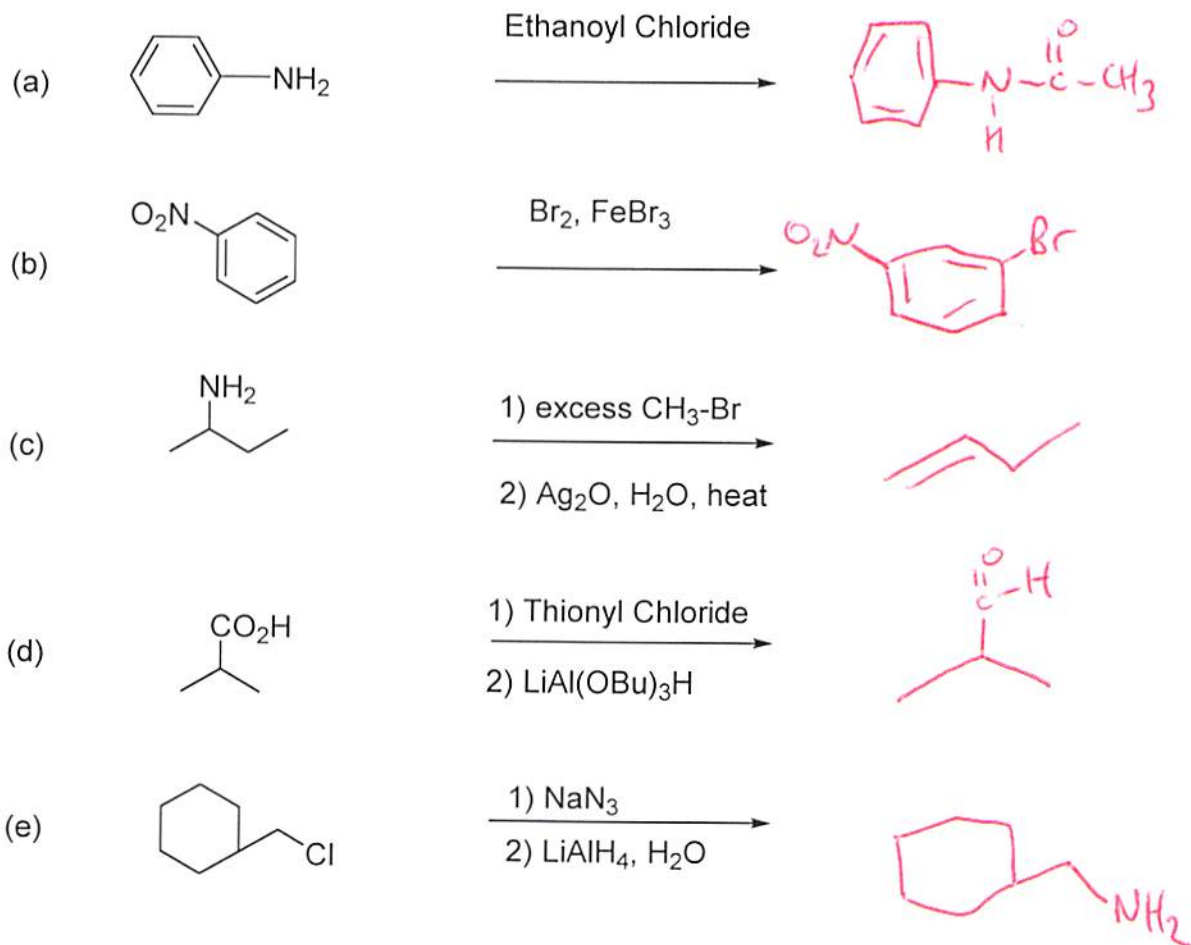
8) Circle the *strongest* acid (proton donor) in the following threesomes. (3pts)



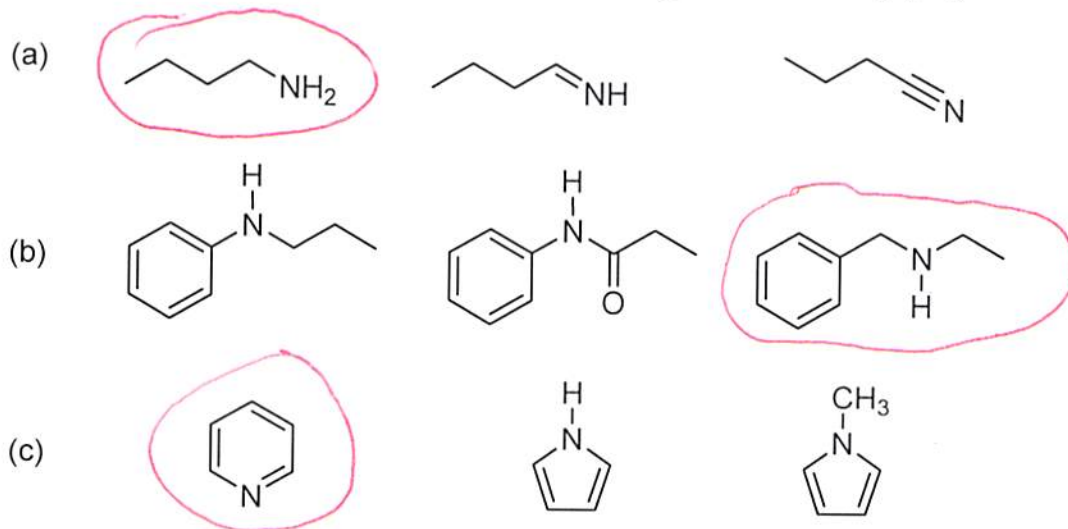
9) Fill in the blanks (either SM/products) for six of the following reactions.  
 (6x2=12pts)



10) Give the products in **four** of the following transformations. (8pts)

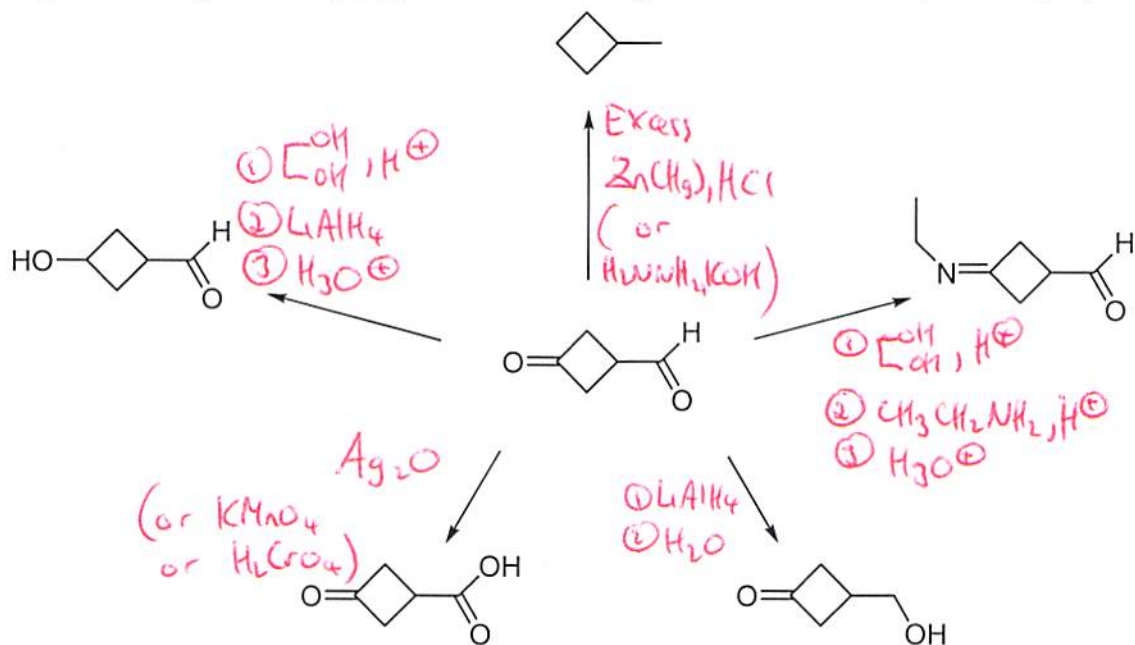


11) Circle the *strongest* base in the following threesomes. (3pts)

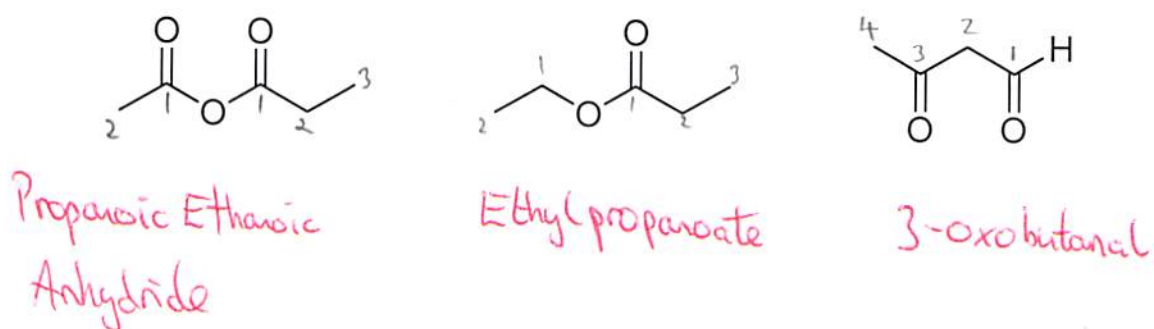




12) Give reagents for **four** of the following transformations. (4x3=12pts)

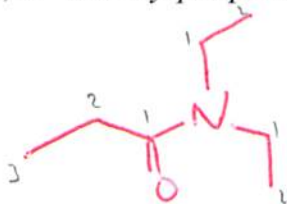


13) Name **two** of the following compounds in IUPAC form. (6pts)

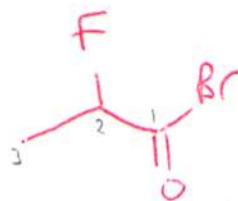


14) Draw in line angle (stick figure) form, **two** of the following named molecules. (6pts)

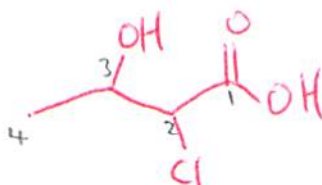
*N, N*-Diethylpropanamide



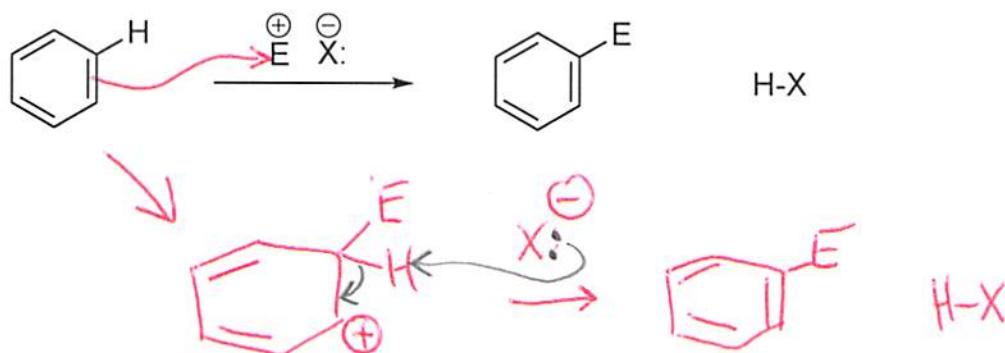
2-Fluoropropanoyl Bromide



2-Chloro-3-hydroxybutanoic acid



15) Write the mechanism (i.e. curly arrows) for this generic *Electrophilic Aromatic Substitution* of Benzene. (4pts)



\*\*\*\***Bonus question**\*\*\*\* (up to 4 points)

In the context of Organic Chemistry, what do the following abbreviations stand for?

IUPAC International Union of Pure and Applied Chemistry

PCC Pyridinium Chloro Chromate

S<sub>N</sub>1 Substitution Nucleophilic Unimolecular

EAS Electrophilic Aromatic Substitution