Organic II
Assignment # 9
Spring 2021

Name:_____

1) Write structural formula for each of the following compounds.

a) (R)-2-Phenylbutanoyl chloride

b) (R,S)-2-Phenylbutanoic anhydride

c) (S)-Butyl 2-Phenylbutanoate

d) (R)-2-Phenylbutyl butanoate

e) (S)-2-Phenylbutanamide

f) (S)-N-ethyl-2-Phenylbutanamide

g) (R)-2-Phenylbutanenitrile

2) Suggest an explanation for the fact that N,N-dimethylformamide has signals for THREE nonequivalent carbons (δ 31.3, 36.4, and 162.6) in its ^{13}C NMR spectra.

3) Give the major product obtained by reaction of benzoyl chloride with each of the following.

a) Acetic acid

b) Benzoic acid

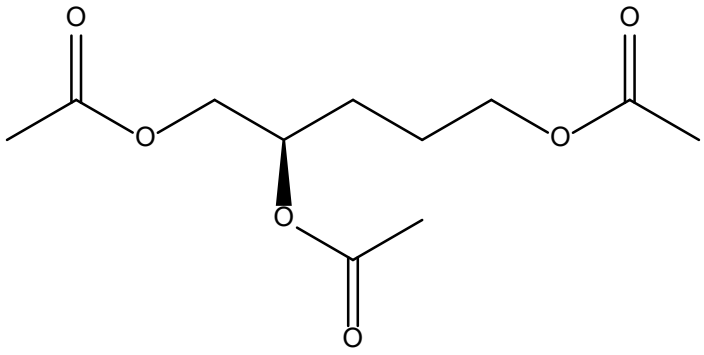
c) Ethanol

d) Methylamine

e) Dimethylamine

f) Water

4) The compound A , below, reacts when heated with dilute sulfuric acid to give two products B and C. B has the molecular formula $C_5H_{12}O_3$. Give the structure of B and C.

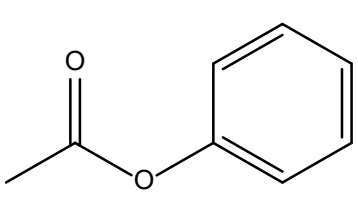


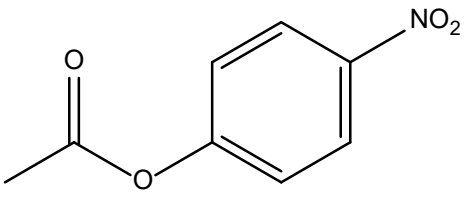
A

5) Trimyristin is obtained from coconut oil and has the molecular formula $C_{45}H_{86}O_6$. On being heated with aqueous sodium hydroxide followed by acidification, trimyristin was converted to glycerol and tetradecanoic acid as the only products. What is the structure of trimyristin?

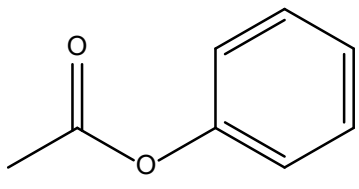
6) Which ester in each pair would be expected to undergo saponification at the faster rate? Give an explanation.

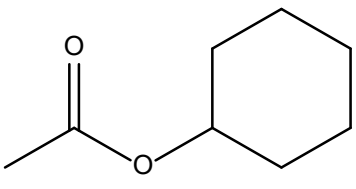
a)



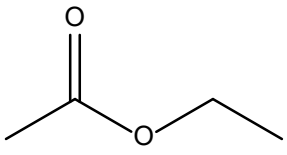


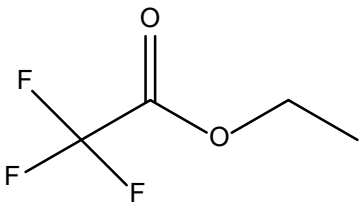
b)





c)





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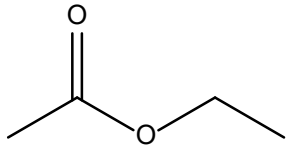
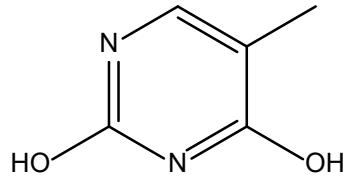
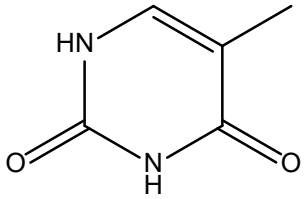


7) The pyrimidine thymine, present in DNA, was once thought to be A because A is analogous to benzene. In fact, thymine is B, which is also aromatic. Explain how B satisfies Huckel's rule, and write a contributing resonance structure for B that has a benzene-like ring.



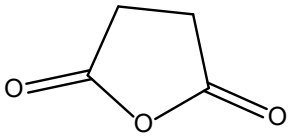
A



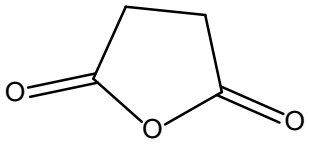
B

8) Unlike esters, which can be prepared by acid-catalyzed condensation of an alcohol and a carboxylic acid, amides cannot be prepared by an acid-catalyzed condensation of an amine and a carboxylic acid. Give an explanation.

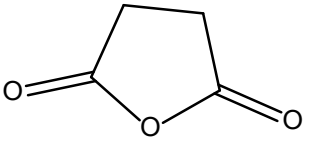
9) Give the structure of the product for the following reactions.

a) 

Water → ??

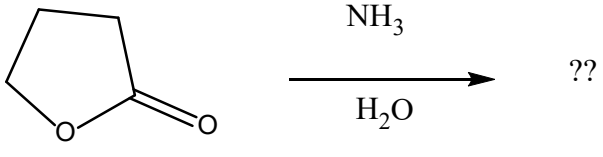
b) 

NaOH, H_2O → ?? $C_4H_4Na_2O_4$

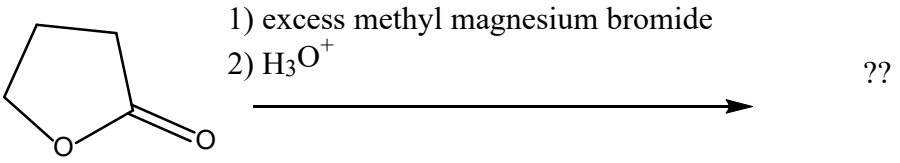
c) 

NH_3, H_2O → ?? $C_4H_{10}N_2O_3$

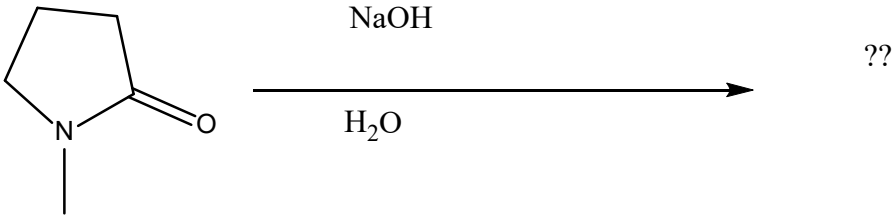
d)



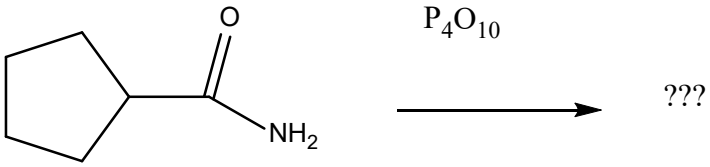
e)



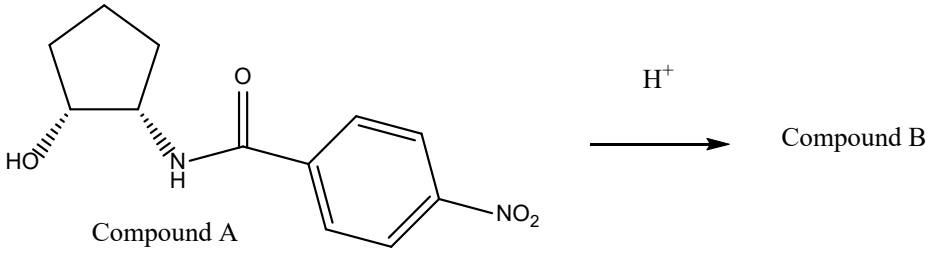
f)



g)



10) In the presence of dilute hydrochloride acid, compound A is converted to a constitutional isomer, compound B.



a) Suggest a reasonable structure for B.

b) The trans isomer of compound A is stable under the reaction conditions. Why does it not rearrange?