Time: 2½ hours

Chemistry 212

Feb. 5, 1996

Final Examination

Family Name: _____

First Name: _____

Student Number: _____ Section _____

Question I _____ out of 24

II _____ out of 50

III _____ out of 48

IV _____ out of 20

V _____ out of 15

VI _____ out of 20

VII _____ out of 23

Total _____ out of 200

I (24 pts) Illustrate the use of each of the following in Organic Synthesis. One example per reagent is enough.

a) Zinc Amalgam

b) Phthalimide

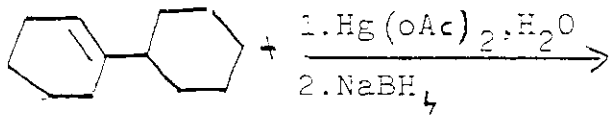
c) Diborane

d) Carbobenzoxychloride

e) Lithium dialkyl copper

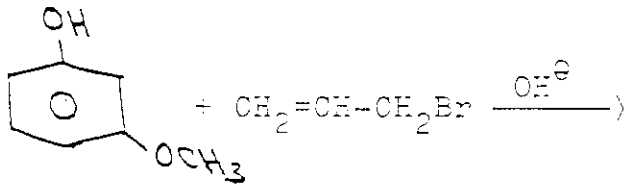
f) Silver oxide

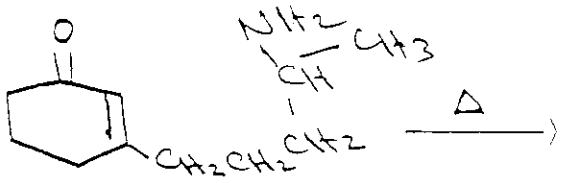
II (50 pts) Complete each of the following reactions specifying the major product where possible. If no reaction takes place write "NO Reaction".

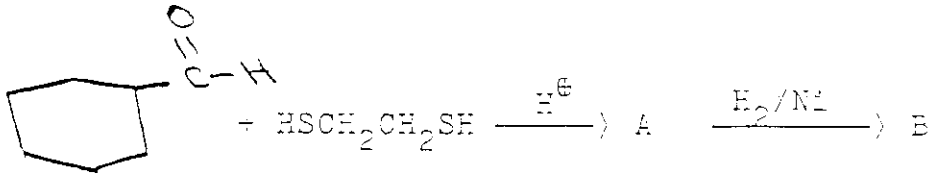
a) 

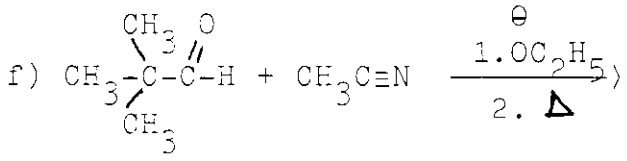
b) D-Mannose + CH_3I $\xrightarrow{Ag_2O}$

Haworth Formula

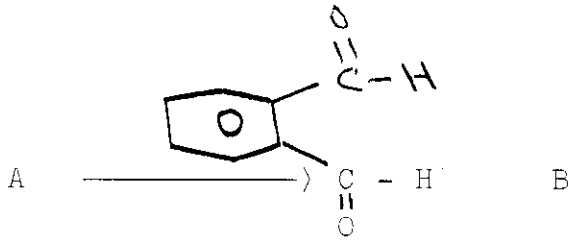
c) 

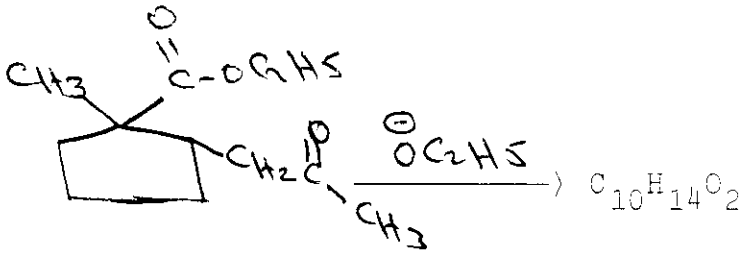
d) 

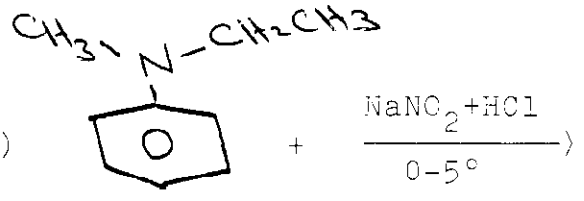
e) 

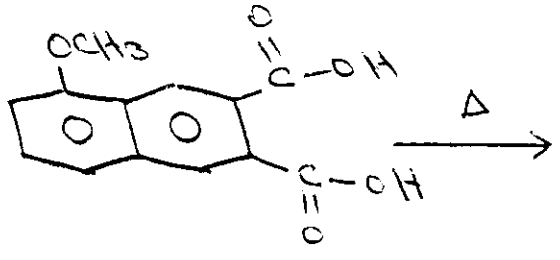
f) 

g) 1,3-Dibromopropane + $\xrightarrow[2.\text{n-BuLi}]{1.\ \Phi_3P \text{ excess}}$ A

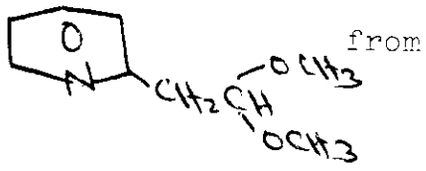
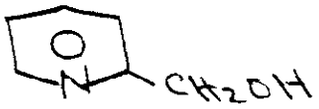


h) 

i) 

j) 

III (48 pts) Sythesize each of the following from the indicated starting material using any organic and/or inorganic reagents needed.

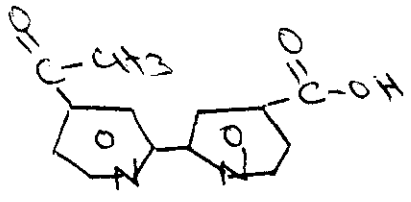
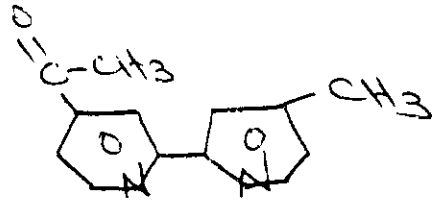
a)  from 

b) p- Bromobenzaldehyde from toluene

c) m-Methoxyacetanilide from o-methoxybromobenzene

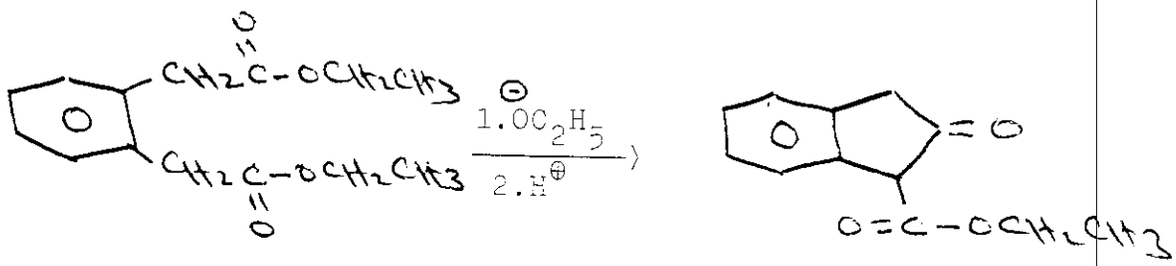
d) $(CH_3)_2-CH-\underset{\underset{NH_2}{|}}{CH}-COOH$ from $(CH_3)_2CH-CH_2OH$

e) 4-amino-3-nitro benzoic acid from toluene

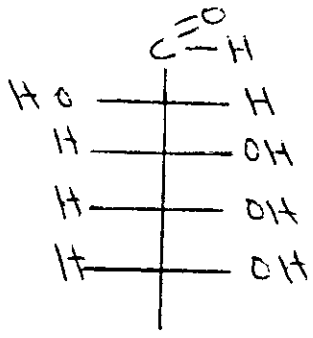
f)  from 

IV (20 pts) Give a reasonable mechanism for each of the following reactions:

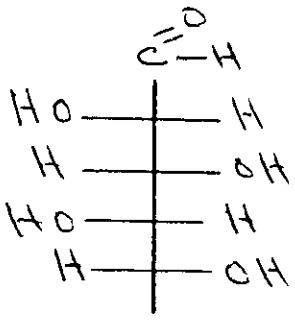
a) Reimer-Tiemann reaction of chloroform and phenol in basic medium.

b) 

V (15 pts) Consider the monosacchanides whose Fischer projection formulas are shown below



D-Altrose



D-Idose

a) Draw the Haworth projections of α-D-Altrose and β-D-Idose.

b) Draw the Haworth projection formula of [4-O-(α-D-Altropyranosyl - β-D- Idopyranose)]

c) Is the disaccharide in b a reducing sugar and why ?

VI (20 pts)

a) A certain peptide shows the following composition: Arg, Cys, gly_2 , glu , leu , Tyr , Val , phe_2 . Upon hydrolysis, the peptide yields the following tripeptides

H - Val - Cys - gly - OH
H - glu - arg - gly - OH
H - Tyr - leu - val - OH
H - gly - phe - phe - OH
H - gly - glu - arg - OH

Propose a structure for the starting peptide.

b) Give a reasonble structure for $C_5H_{11}NO$ that fits the following spectral data:

IR: 3400 , 3000 , 1710 , 1280 cm^{-1}.

NMR: Singlet δ 1.8(3H) , triplet δ 2.0(2H) , triplet δ 2.6(2H), singlet δ 2.2(3H) , singlet δ 3.9(1H)

VII (25 pts)

i) Suggest one simple visual chemical test that would differentiate between the following compounds. Tell exactly what reagent(s) you use and what is the observation. Write chemical equation(s).

a) Acetaldehyde and phenyl acetaldehyde

b) Benzyl amine and

C) Benzyl chloride and Chloro benzene

ii) which of the following is expected to hydrolyze faster under alkaline conditions? Explain why.