NAME	
SID	
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CHEM 112B

Midterm 1

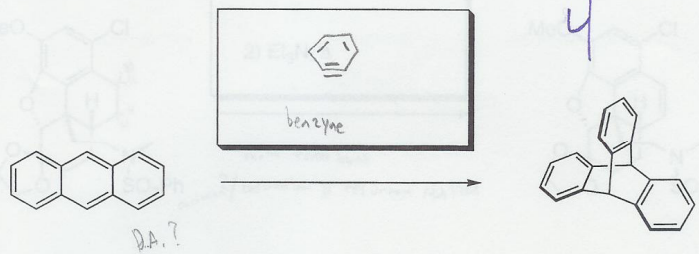
February 22, 2006

Question	Points	Points obtained
1	(20)	13
2	(15)	9
3	(10)	10
4	(15)	14
5	(20)	16
6	(20)	7

Score: 69 / 100

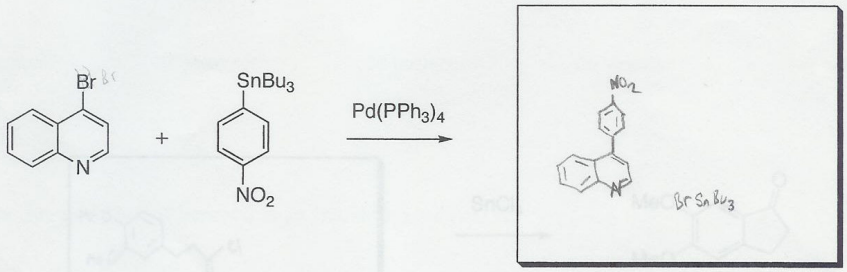
1) Fill in the missing starting materials, reagents or products:

a)



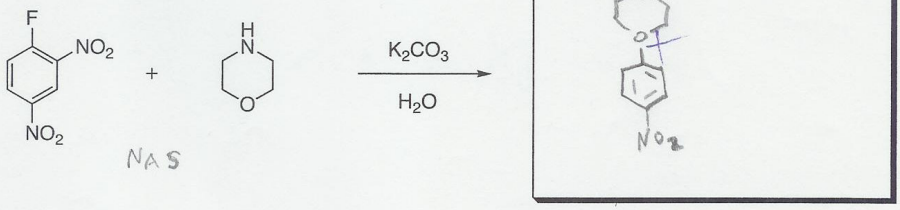
4

b)



4

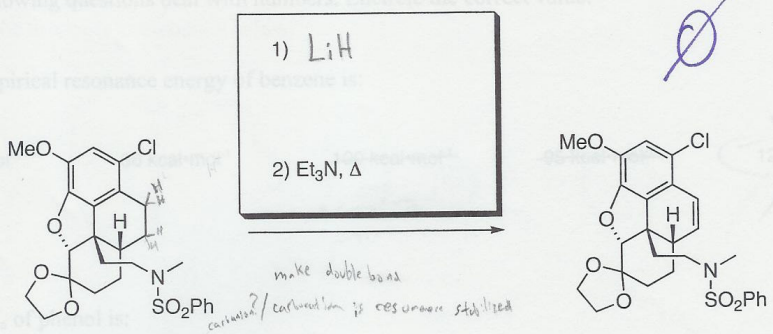
c)



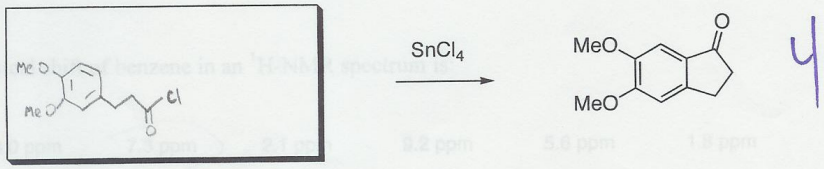
1/4

9

d)


1) LiH
2) Et3N, Δ
MeO
Cl
H
O
O
O
N
SO2Ph
make double bond
carbocation? / carbocation is resonance stabilized

e)


MeO
MeO
Cl
O
SnCl4
MeO
MeO
O

4

4

2) The following questions deal with numbers. Encircle the correct value:

a) The empirical resonance energy of benzene is:

10 kcal•mol^{-1} 36 kcal•mol^{-1} 100 kcal•mol^{-1} 95 kcal•mol^{-1} 12 kcal•mol^{-1}

b) The pK_a of phenol is:

–3 17 10 35 4.6 25

c) The bond dissociation energy (BDE) of an *allylic* CH bond is:

85 kcal•mol^{-1} 12 kcal•mol^{-1} 36 kcal•mol^{-1} 55 kcal•mol^{-1} 105 kcal•mol^{-1}

d) The chemical shift of benzene in an ^{1}H-NMR spectrum is:

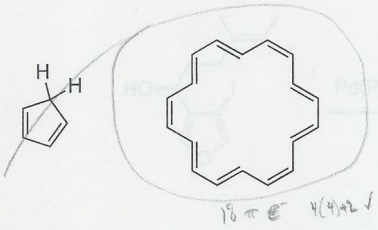
–3.0 ppm 7.3 ppm 2.1 ppm 9.2 ppm 5.6 ppm 1.8 ppm

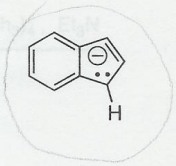
e) The number of possible isomers of dibromo nitrobenzene ($C_6H_3Br_2NO_2$) is:

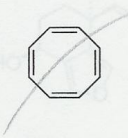
2 4 3 5 7 none of these

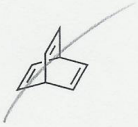
9

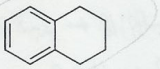
3) Circle the *aromatic* compounds below:

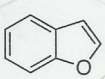


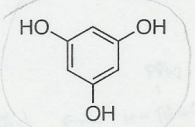


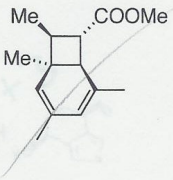






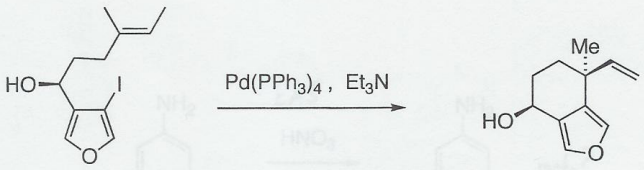




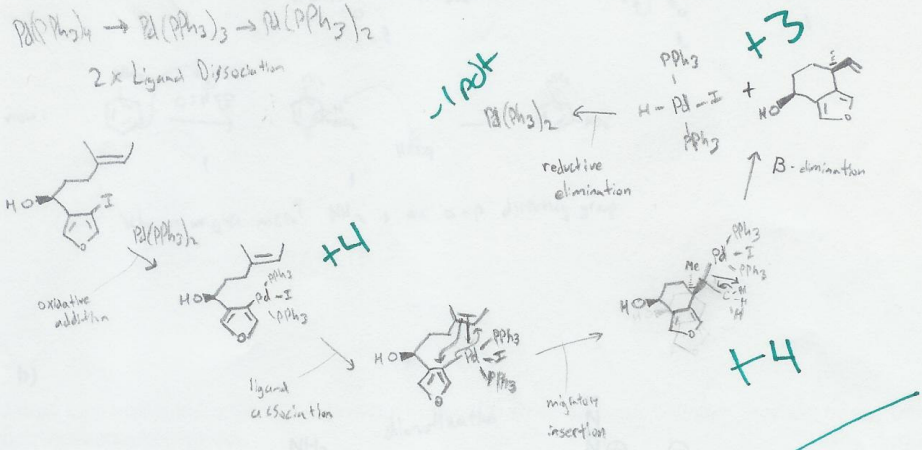


10

4) Provide a detailed mechanism for the following reaction:



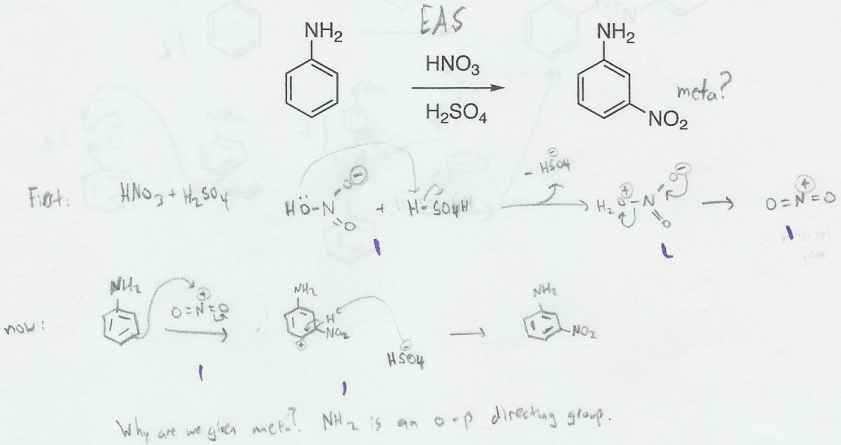
(You don't have to explain the stereochemistry)



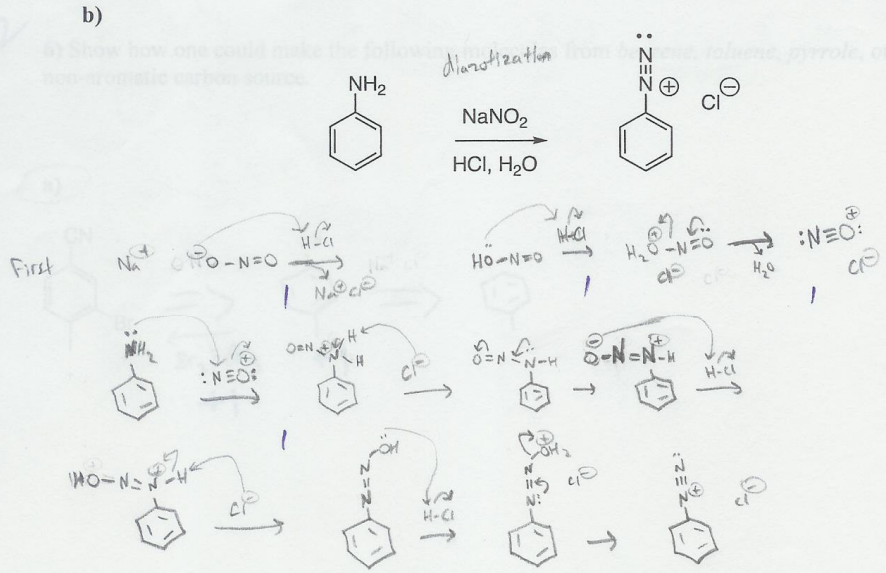
14

5) Aniline reacts with either *nitric* acid and *nitrous* acid in very different ways. Show the *detailed* mechanism of the following reactions:

a)



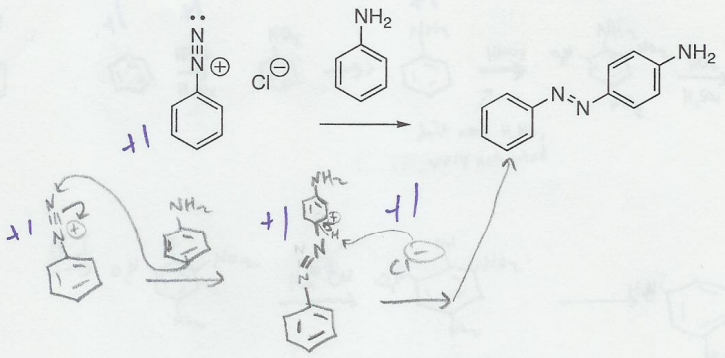
b)



12

+4

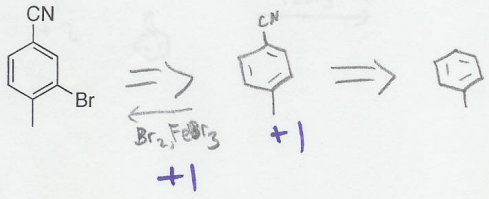
c)



+2

6) Show how one could make the following molecules from *benzene, toluene, pyrrole*, or any other non-aromatic carbon source.

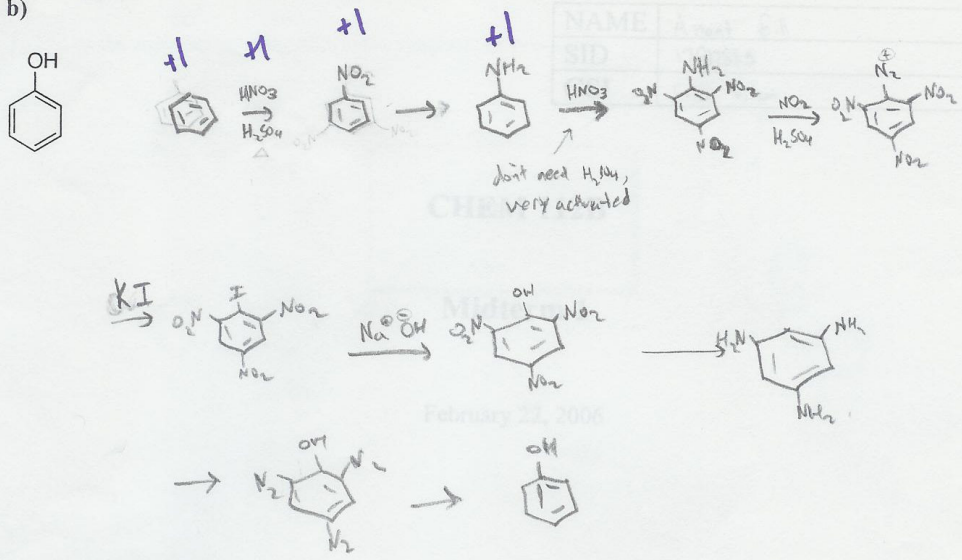
a)



(6)

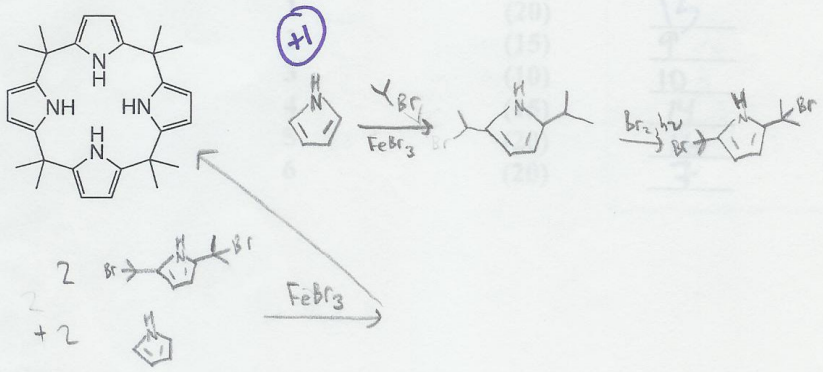
b) NAS?

(4)



(1)

c) F.C Alkylation

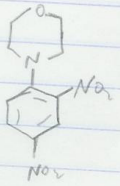


(5)

80 min exam

Corrections to Problems answered wrong

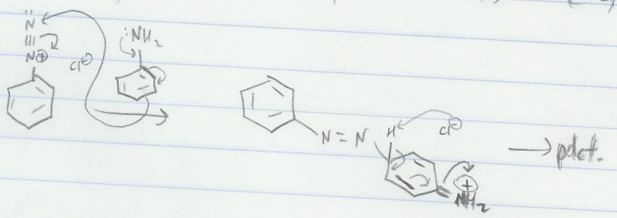
Chem 112 B Midterm I

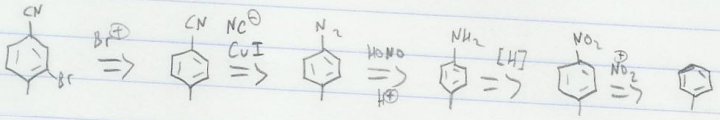
1)c) 

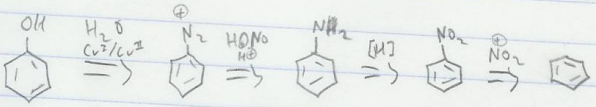
1d) NBS or Br_2 hν or Δ

2) a) 36 2e) none

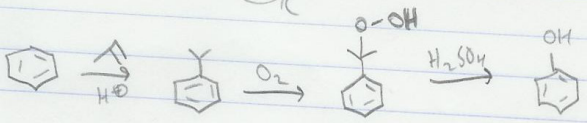
5) a) we get meta because R-$\ddot{N}H_2$ is protonated first

5) c) 

6) a) 

6) b) 

OR



6) c)

Sdct. =>