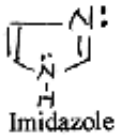
Chemistry 3331-100
Organic Chemistry/Dr. Barney Ellison
Thursday: Sept. 24 @ 19:00 → 20:30/1st Exam/Ramaley C250

Name: Key (please print)

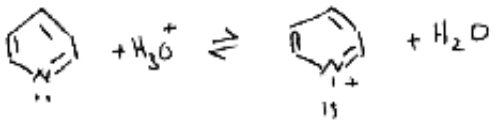
1. (10 pts) Pyridine and imidazole are modest Bønsted bases at nitrogen, whereas pyrrole is not.

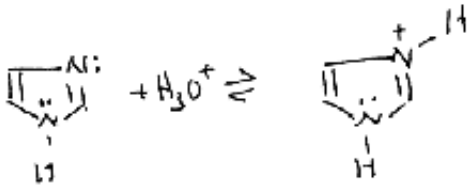

Pyridine

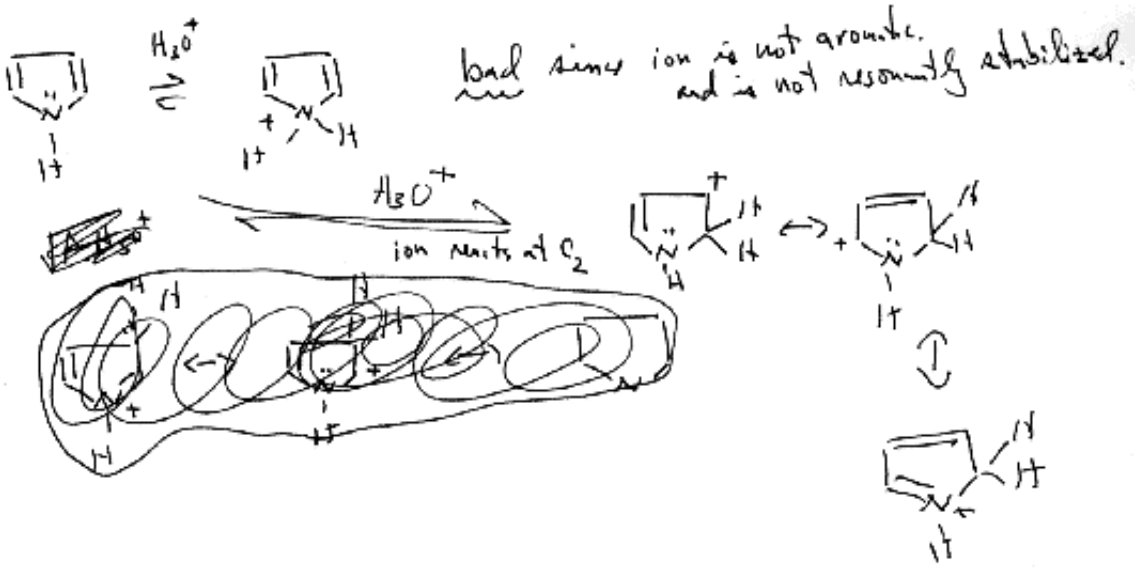

Pyrrole


Imidazole

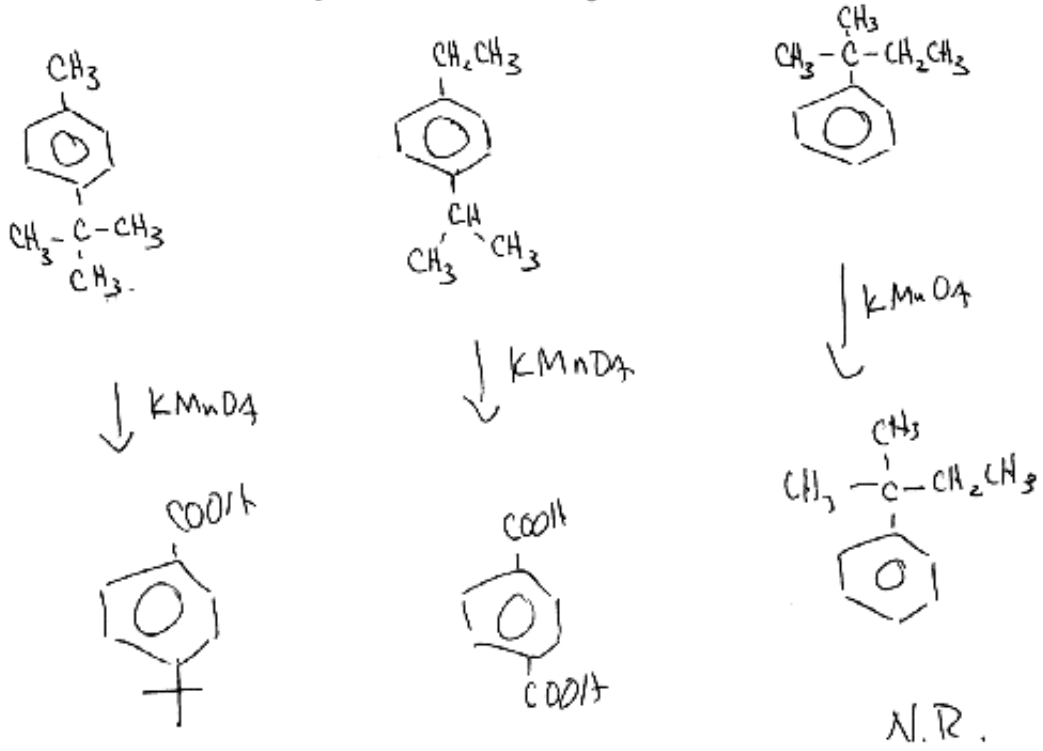
In fact, pyrrole is protonated in strong acid and at C(2) , not on nitrogen. a) Explain why pyridine and imidazole are basic and pyrrole is not. Then explain why eventual protonation is at carbon, not nitrogen.





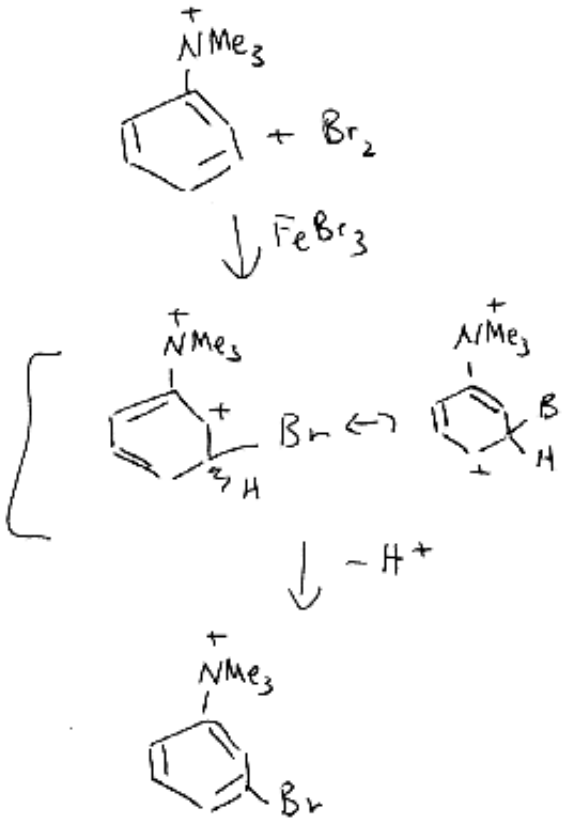


2. (10 pts) An unknown hydrocarbon is known to have one of the isomeric structures shown below. Devise a simple chemical test to distinguish these three substances.



3. (10 pts) The ammonium ion, A, is a deactivated ring and is a ***meta*** director. In contrast B is dimethylanaline and is an activated ring and an *ortho, para* director. Write the mechanism for mono-bromination for A and B.

A) $C_6H_5N(CH_3)_3^+$

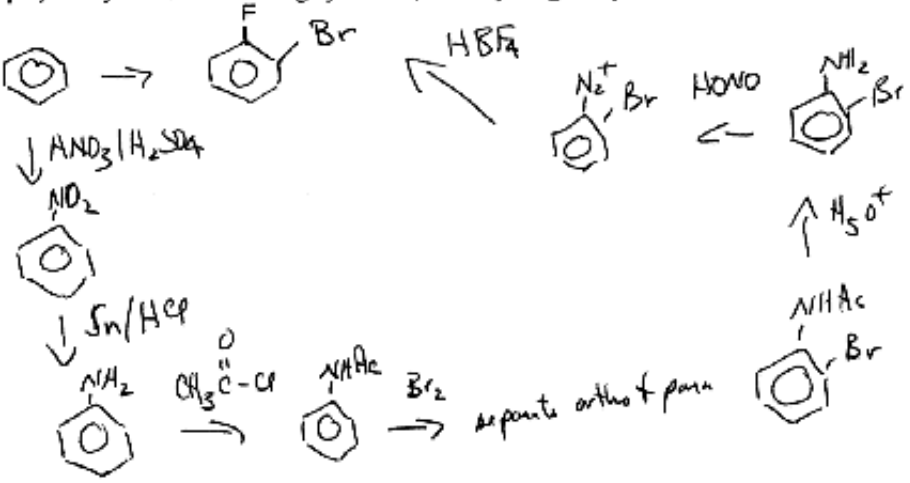


meta attack never has intermediate + charge adjacent to $\overset{+}{N}Me_3$ group.

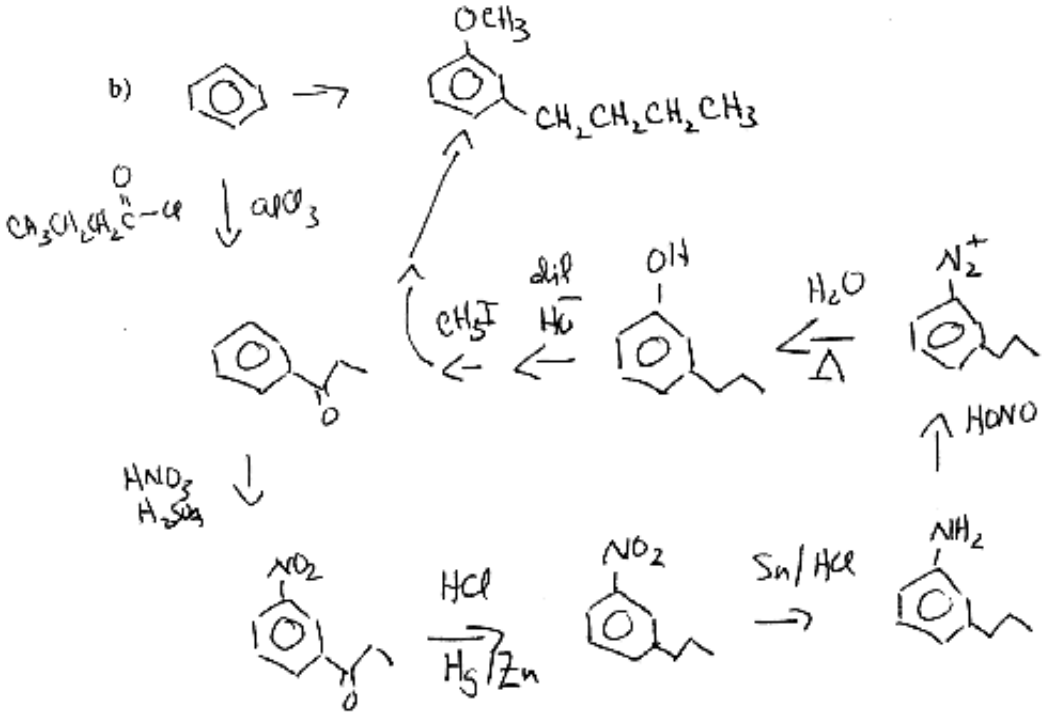
B) $C_6H_5N(CH_3)_2$

4. (50 pts) Carry out the following synthesis; use any reagents you like.

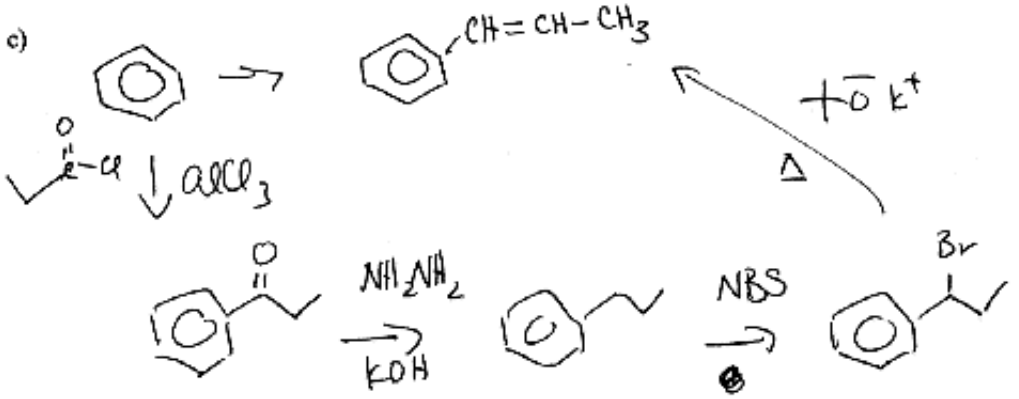
a)



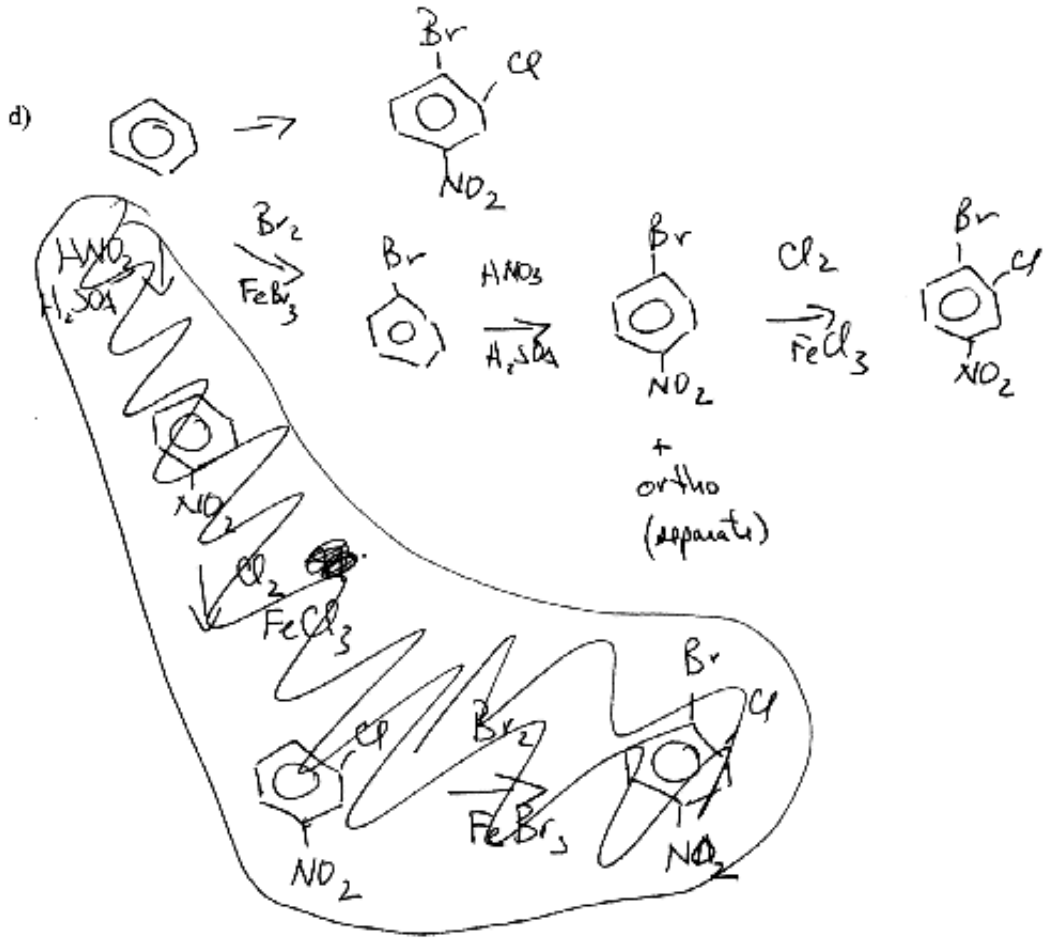
b)



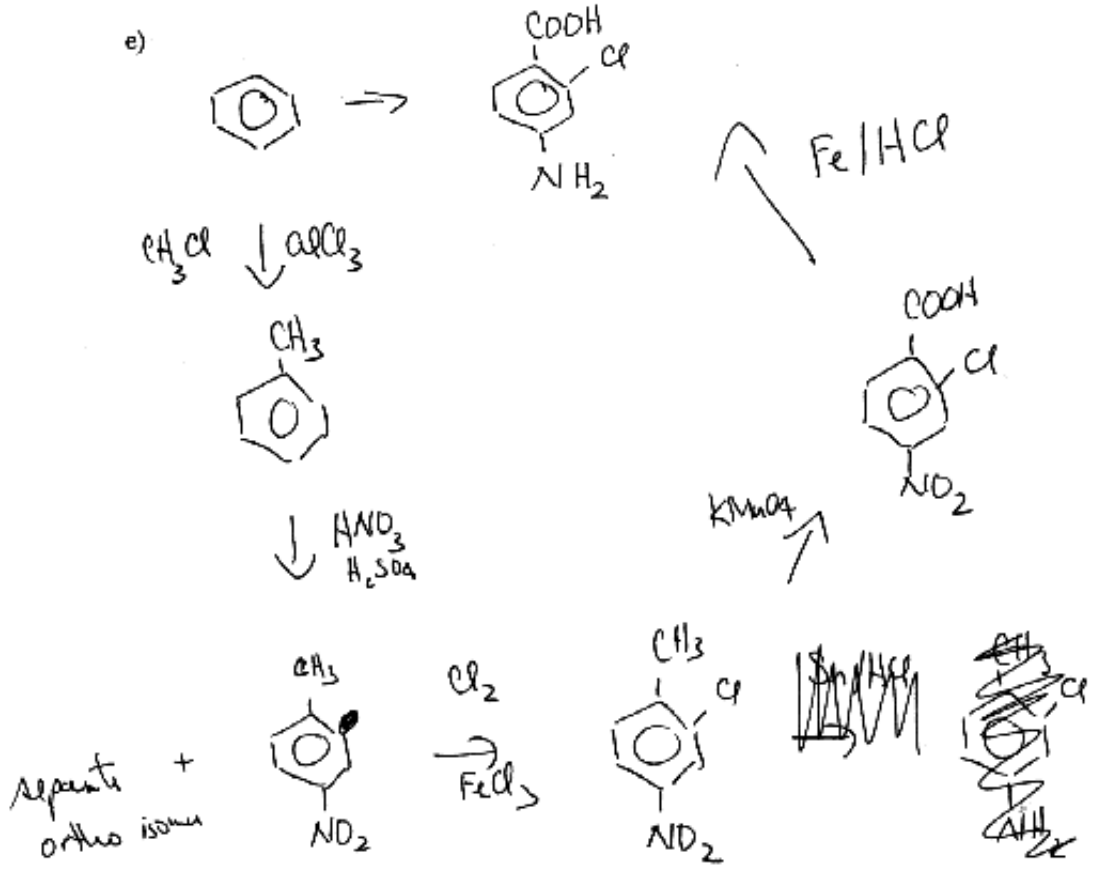
c)


CH=CH-CH3
+O K+
Δ
AlCl3
NH2NH2
KOH
NBS
Br

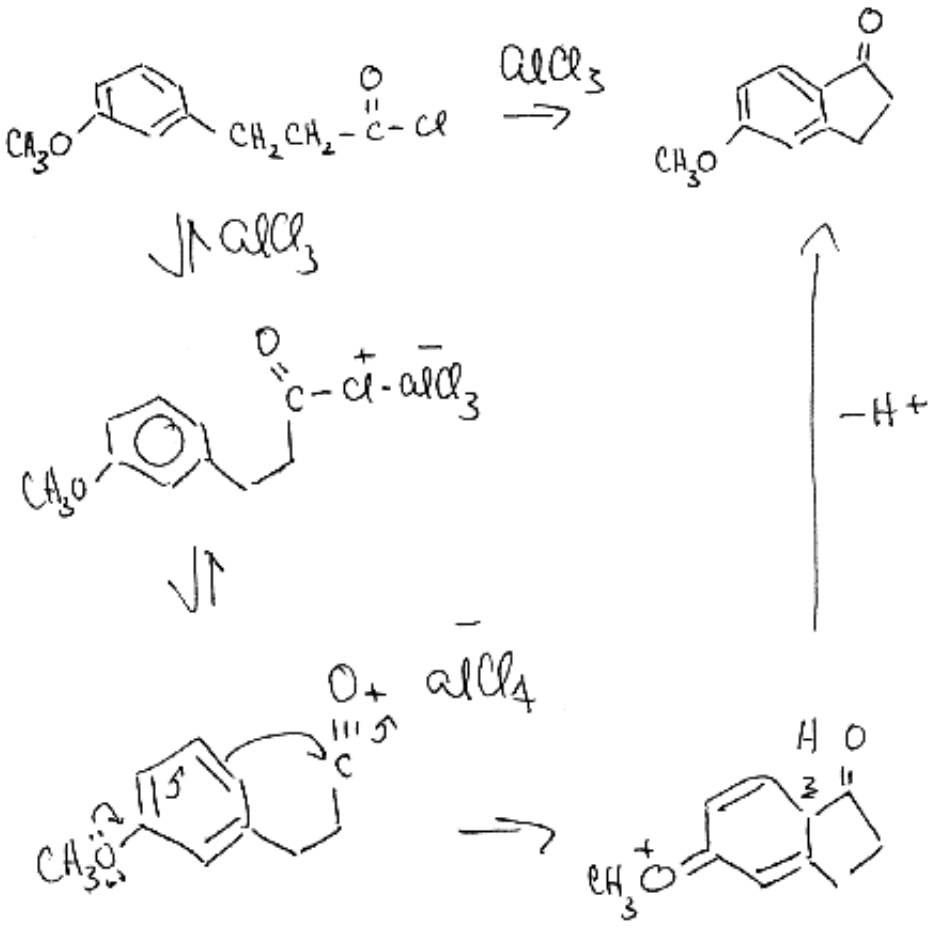
d)


Br
Cl
NO2
Br2
FeBr3
HNO3
H2SO4
Cl2
FeCl3
+
ortho
(separate)

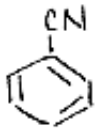
e)

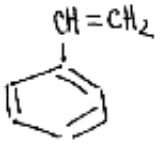

COOH
Cl
NH2
Fe/HCl
CH3Cl
AlCl3
CH3
HNO3
H2SO4
COOH
Cl
NO2
KMnO4
separate
ortho isomer
+
CH3
NO2
Cl2
FeCl3
CH3
Cl
NO2
Sn/HCl
Cl
NH2

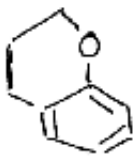
5. (10 pts) Write a resonable mechanism for the cyclization below.

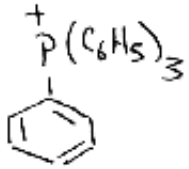


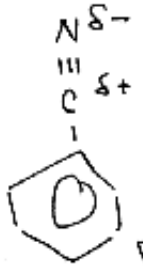
6. (10 pts) Predict the favored position of electrophilic aromatic substitution of the following compounds and justify your answer.

a) 

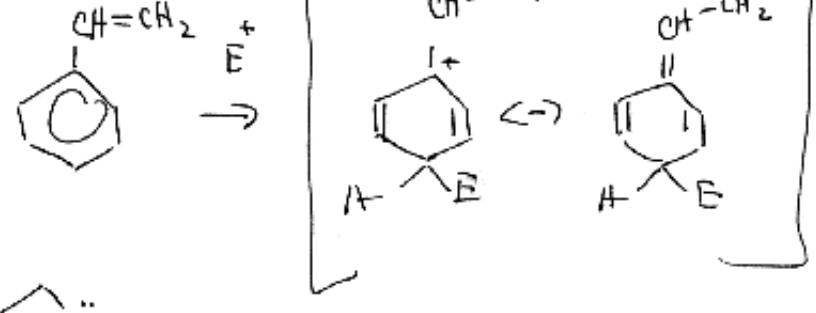
b) 

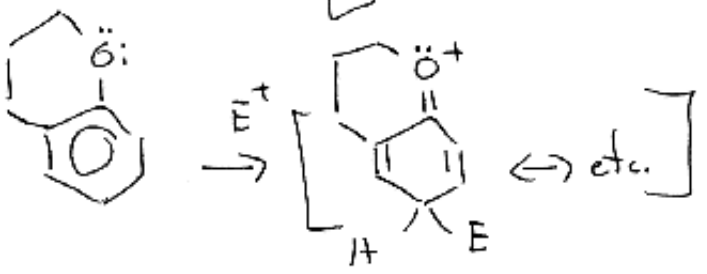
c) 

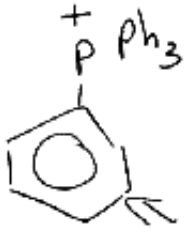
d) 

a) 

← meta director because of δ+ charge

b) 

c) 

d) 

is meta director because of $\overset{+}{P}Ph_3$ group