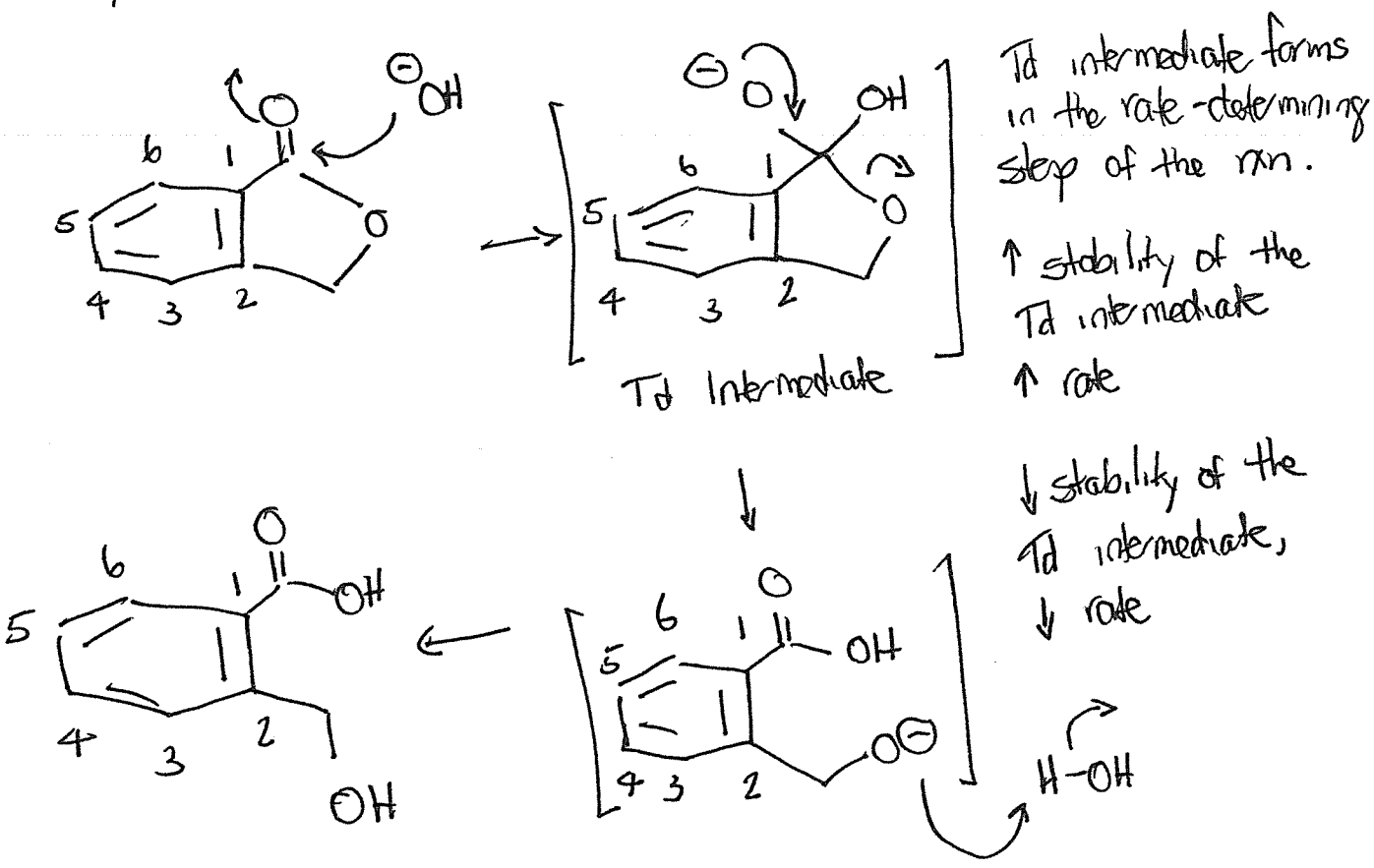
1. Base-Catalyzed Hydrolysis of benzoate esters



Td intermediate is STABILIZED when ring is ⊕ via substituent effects (determined with σ values)

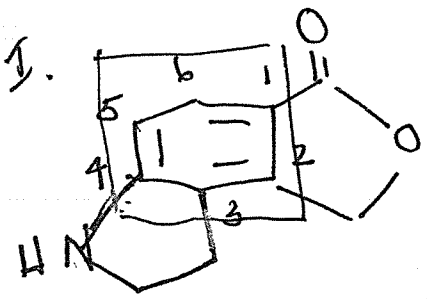
⊕ RING ↑ RATE FASTER

Td intermediate is DESTABILIZED when ring is ⊖

⊖ RING ↓ RATE SLOWER

So most ⊕, or least ⊖ ring will react FASTEST

I.

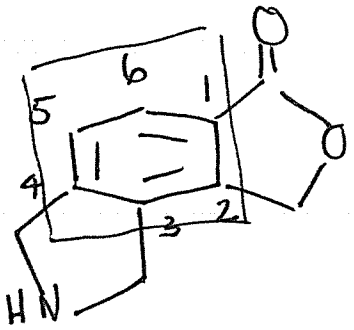


C_3 CH_3 $\sigma_m = -0.07$

C_4 AMINO $\sigma_p = -0.66$

-0.73

II.

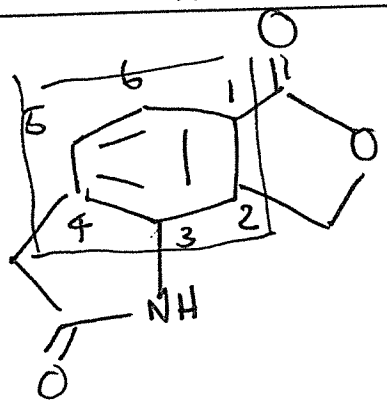


C_3 CH_3 $\sigma_m = -0.07$

C_4 CH_3 $\sigma_p = -0.17$

-0.24

III.

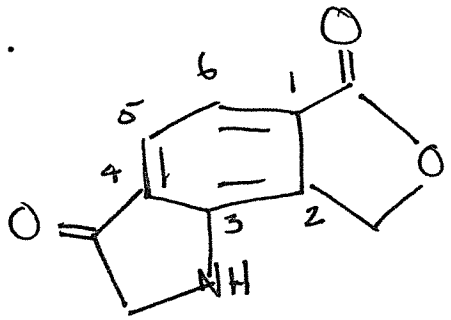


C_3 ACETAMIDO $\sigma_m = +0.21$

C_4 CH_3 $\sigma_p = -0.17$

$+0.04$

IV.



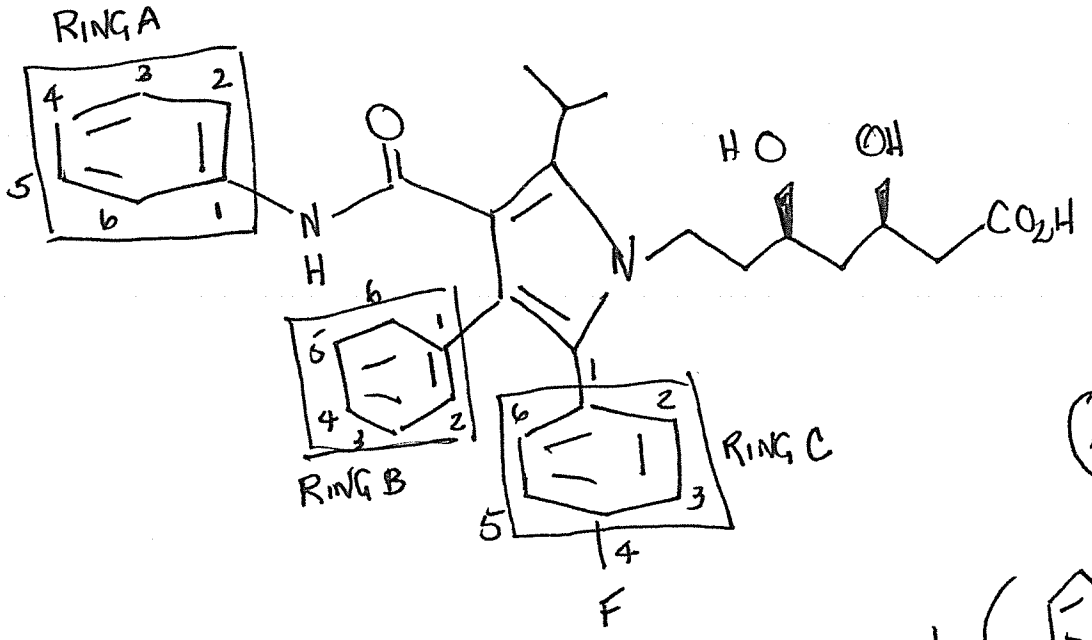
C_3 AMINO $\sigma_m = -0.16$

C_4 ACETY $\sigma_p = +0.5$

$+0.34$

IV > III > II > I (E)

2.



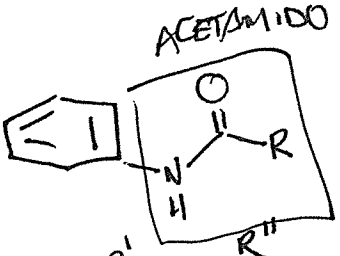
(A)

I. TRUE
II. FALSE
III. FALSE
IV. FALSE

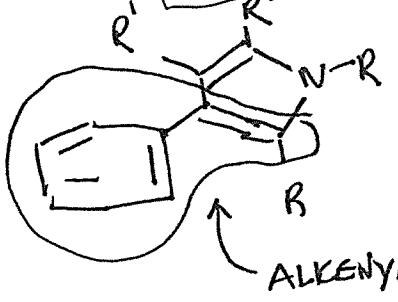
I. Ring C is PARA substituted. The F- and pyrole ( ) have a 1,4 - relationship on thes DISUBSTITUTED benzene ring.

II. The F is a DEACTIVATOR (HALOGEN EWG by INDUCTION)
The substituent at C_1 is C atom part of alkene (i.e. EXTERNAL π bond, EWG by RESONANCE)
EWG "pull" electrons out of the ring and make ring more ⊕ and LESS reactive DEACTIVATORS

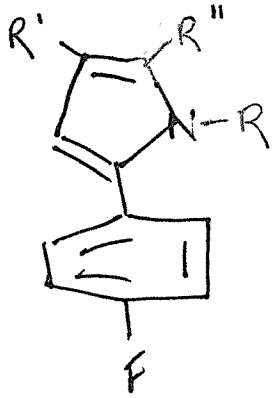
III. The most ACTIVATED rings are A and B b/c MOST ⊖

A: 

$\sigma_p = -0.02$

B. 

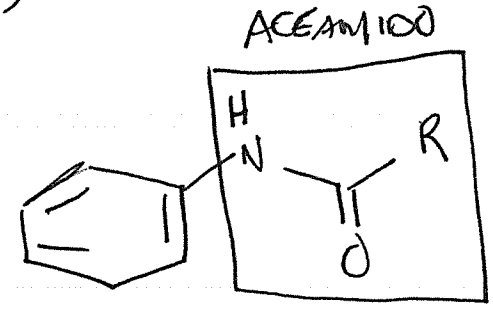
$\sigma_p = -0.02$

C 

σ_p Fluoro + −0.02
σ_p Alkenyl + 0.06
+0.04

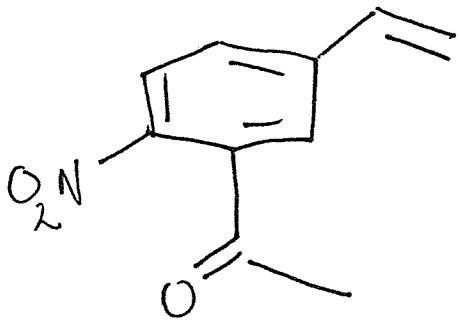
2. (CONT'D)

IV.



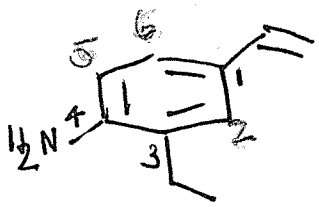
The substituent on ring A is an AMIDE and is NOT an ionizable functional group (i.e. NOT AN ACID NOT A BASE)

3.



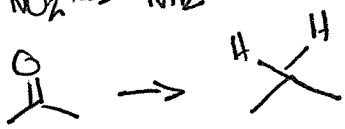
2-NITRO-5-VINYL ACETOPHENONE

I. $Zn(Hg)$, HCl
CLEMMENSEN



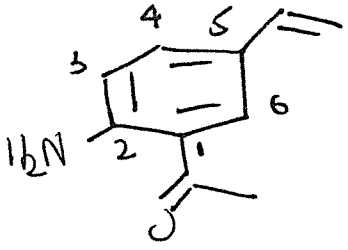
Reduces BOTH

$NO_2 \rightarrow NH_2$



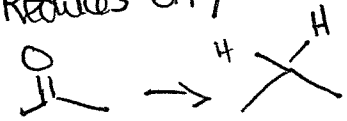
NOT ALKENES

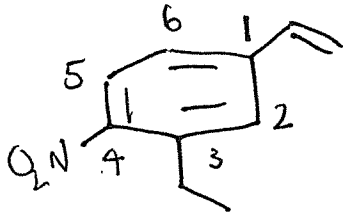
II. $SnCl_2$, HCl
Reduces ONLY
$NO_2 \rightarrow NH_2$



2-AMINO-5-VINYL ACETOPHENONE

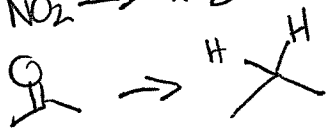
III. H_2NNH_2, KOH
WOLFF-KISHNER
Reduces only

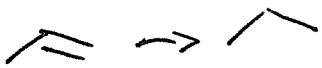


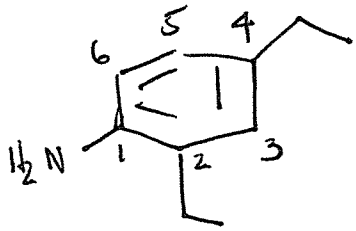


3-Ethyl-4-nitro styrene

IV. H_2, Pt
CATALYTIC HYDROGENATION
Reduces all
$NO_2 \rightarrow NH_2$







2,4-DIETHYLANILINE

(C)

4. Reaction of an alcohol with H_3PO_4 is an E_1 elimination. The mechanism involves formation of a carbocation in the rate determining step of the reaction. The most STABLE carbocation forms the fastest. Carbocation stability is determined by the following factors: SUBSTITUTION: $3^0 > 2^0 > 1^0$

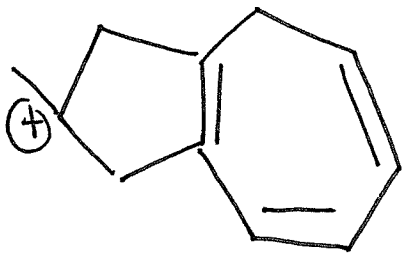
RESONANCE: Allylic > Alkyl

AROMATIC: Aromatic > Allylic > Alkyl

For allylic carbocations, the more resonance forms associated w/ the carbocation, the more stable the carbocation

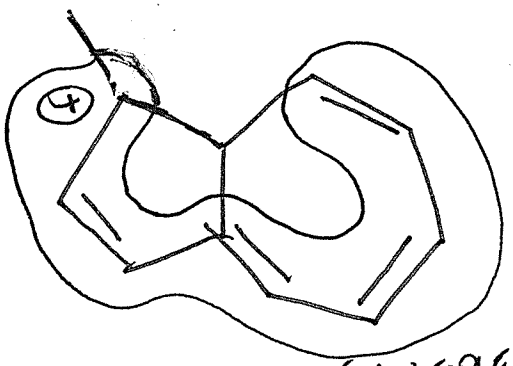
IV > II > III > I (D)

I.



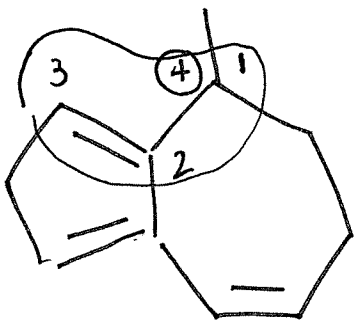
3° ALKYL CARBOCATION

II.



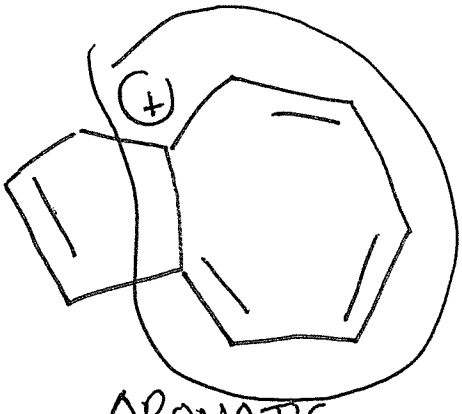
3° ALLYLIC (MULTIPLE RESONANCE FORMS)

III.



3° ALLYLIC CARBOCATION (ONE ADDITIONAL RESONANCE FORM)

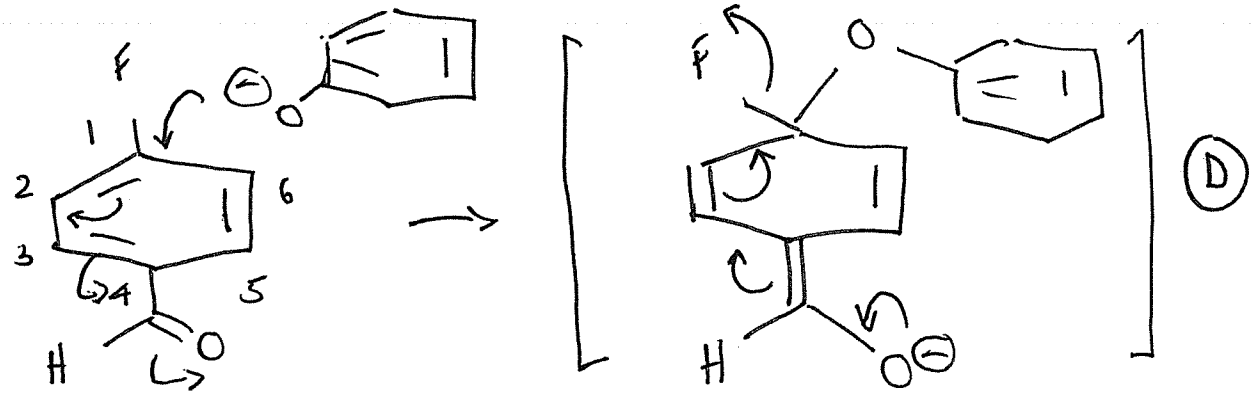
IV.



AROMATIC

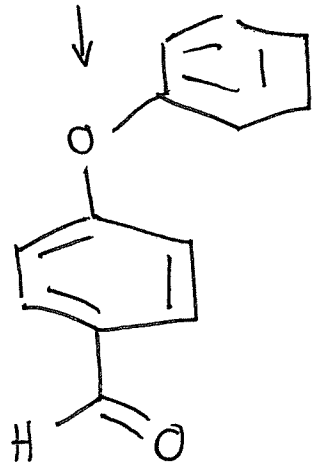
5. Reaction of para-fluorobenzaldehyde with phenoxide is a nucleophilic aromatic substitution reaction.

(PHENOXIDE)



Para-fluorobenzaldehyde

(corresponds to II)



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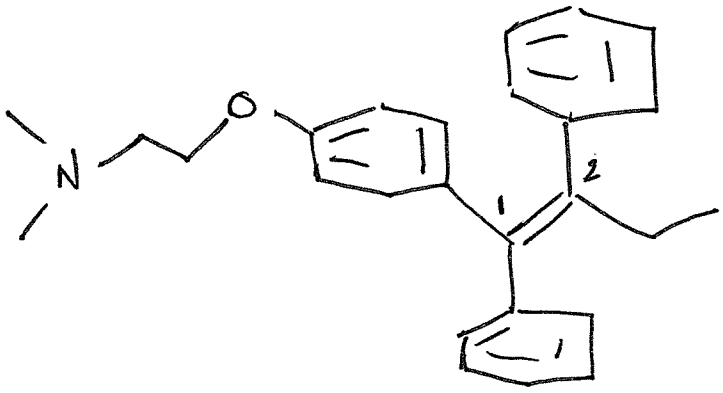
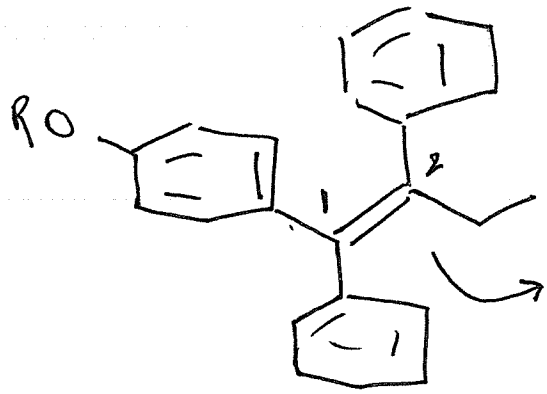
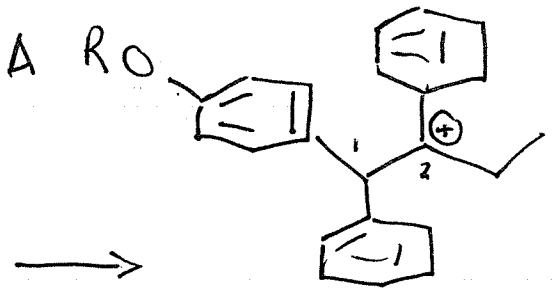
6. Reaction of tamoxifen with H_3O^+ is an electrophilic addition of a STYRENE.



The C_1-C_2 carbons represent the alkenyl group of the styrene.

The rxn energy diagram is derived from the mechanism of the rxn.

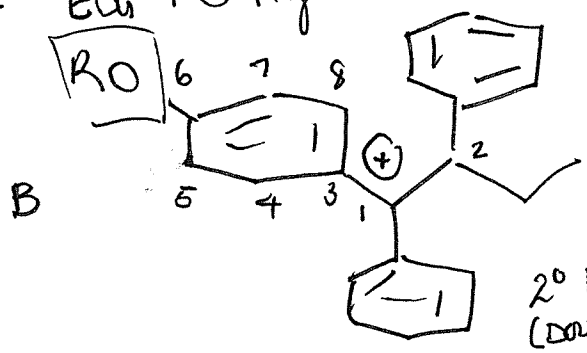




2° BENZYLIC

The π $e^{\ominus}$ of the alkene react w/ H^+ to form two carbocations. @ C_1 and C_2 C_1 carbocation (B) is more stable

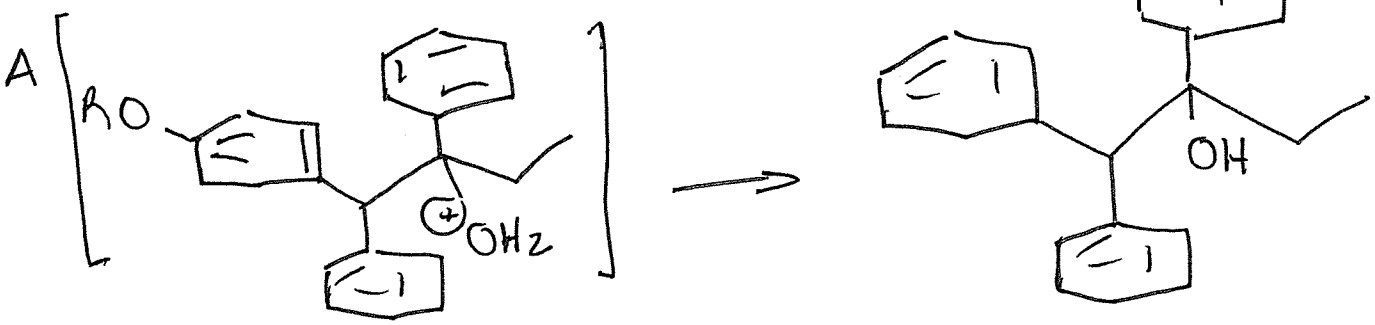
EDG ↑ ⊖ ring

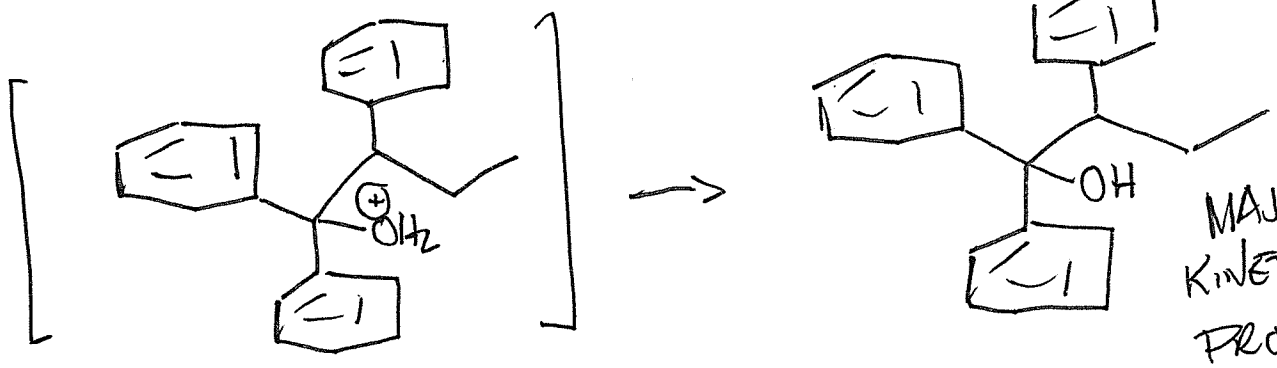


2° BENZYLIC (DOUBLE) AND EDG @ C_6 stabilizes C_1 carbocation

MORE STABLE

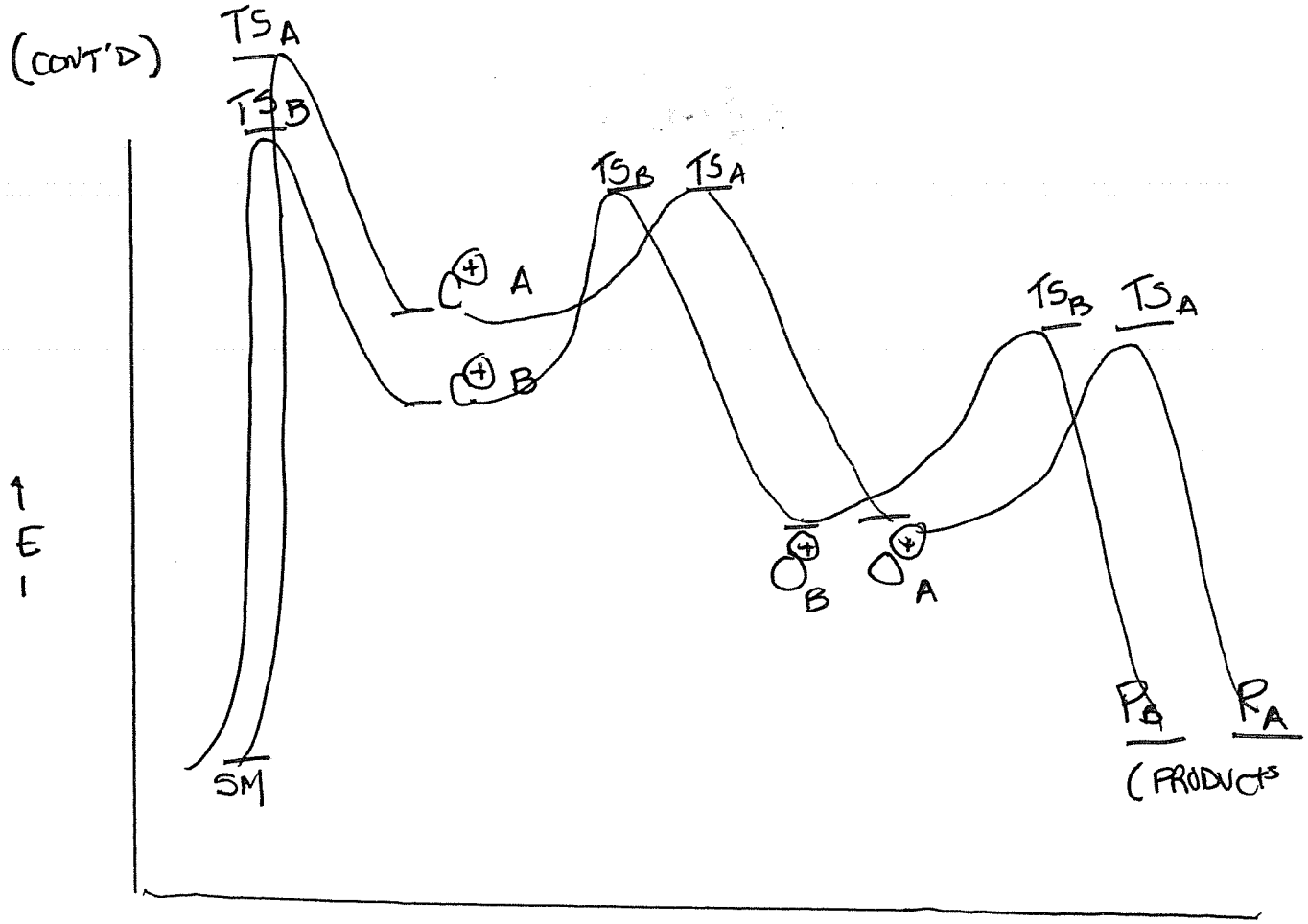
Each of the two carbocations continues to react w/ H_2O to form two oxonium ion intermediates. Both are equally stable





MAJOR KINETIC PRODUCT

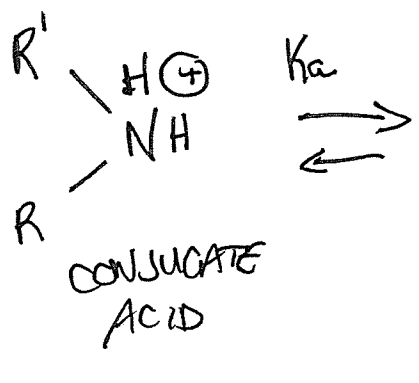
6. (CONT'D)



This diagram corresponds to choice d. (D)

---

7. Tenofovir contains five nitrogen atoms, each of which can behave as a base by accepting a proton ($H^{\oplus}$) to form a conjugate acid. The strength of the base (i.e. how readily it ACCEPTS a proton) is represented by the pKa of its conjugate acid. The relationship of the conjugate acid pKa to base strength is described below



$K_a = \frac{[B]}{[CA]}$

$pK_a = -\log K_a$

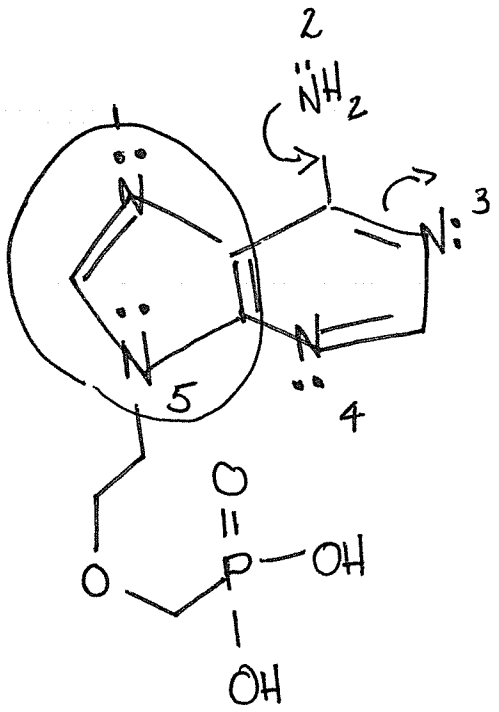
$pK_a + pK_b = 14$

↑ stability of [B]
↑ concentration of [B]
↑ Ka, ↓ pKa, ↑ pKb

If B is very stable, specifically if stability dependent on lone pair pKb is high, pKa low

1. (CONT'D)

If the lone pair on N is part of aromatic system, BASE is VERY stable and will have VERY LOW pKa and HIGH pKb
WEAK BASE

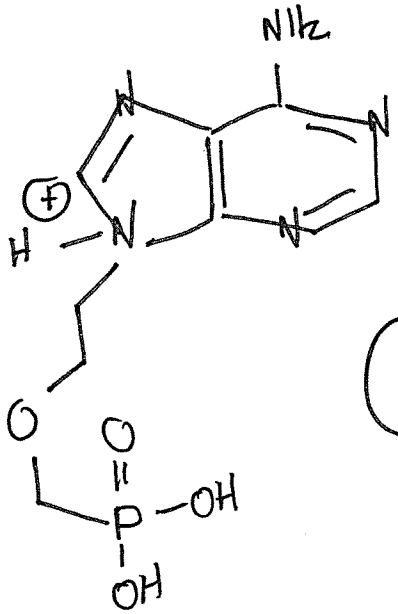


Each N is labeled as 1, 2, 3, 4 or 5

The lone pairs on N_1, N_3 and N_4 are NOT involved in resonance or required as part of an aromatic ring, so these lone pairs are very available to react w/ H^+ (STRONG BASES)

The N_2 nitrogen lone pair is involved in resonance so it is less available to accept a proton compared to N_1, N_3 and N_4.

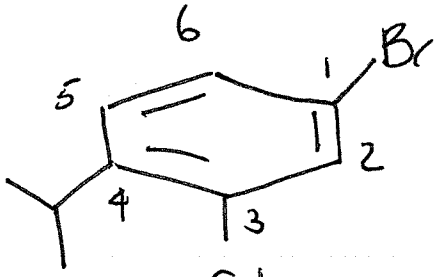
The lone pair on N_5 is part of the AROMATIC SYSTEM in the circled part of the structure at the top right. The conjugate acid that is generated from this N_5 will have the LOWEST pKa and highest pKb



(A)

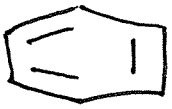
8.

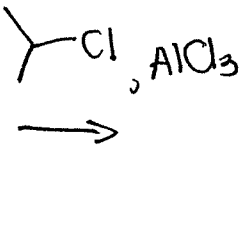
BENZENE

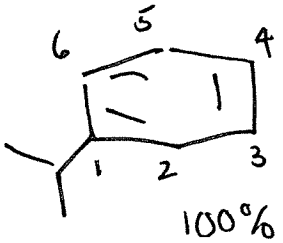


1-BROMO-3-CHLORO-ISOPROPYLBENZENE

1.

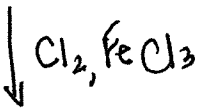






100%

ISOPROPYL @ C_1 IS AN ACTIVATOR and o,p-director DIRECTS to C_2 (or C_6) and C_4

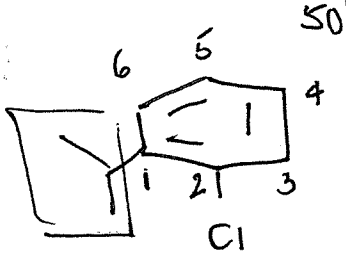


ISOPROPYL @ C_1
ACTIVATOR, ortho, para DIRECTOR
DIRECTS TO C_4, C_6

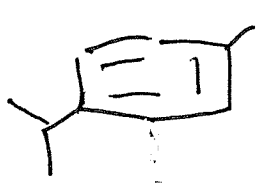
Cl @ C_2
DEACTIVATOR
DIRECTS TO C_3, C_5

RXN FOLLOWS ACTIVATOR NOT DEACTIVATOR

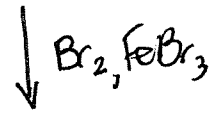
50%



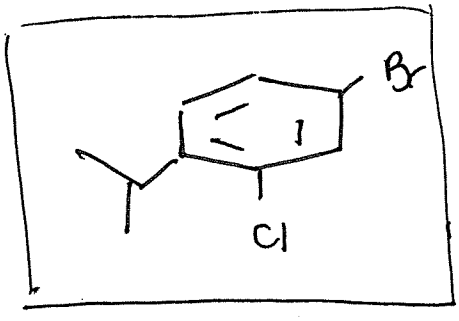
50%



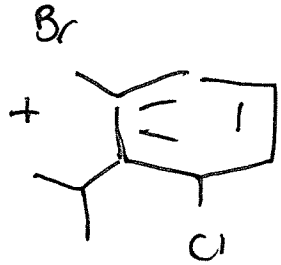
(cannot go on to give target product)



50%



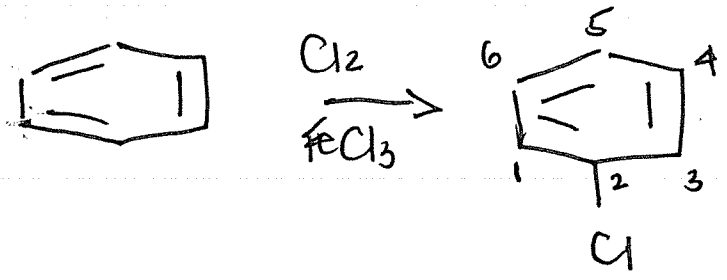
50%



TARGET PRODUCT

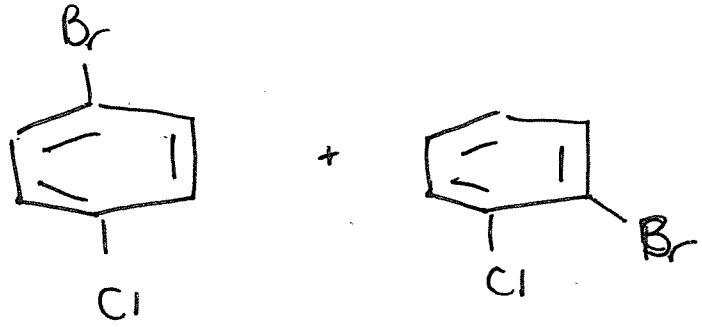
This product represents 25% of theoretical yield overall.

II.

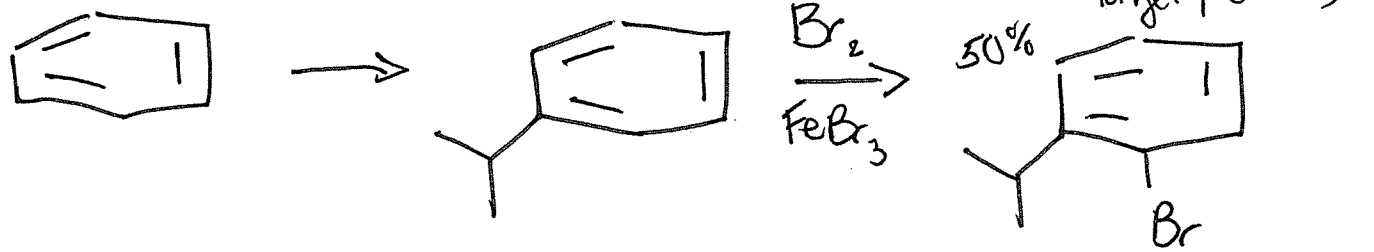


Cl @ C_2 is a DEACTIVATOR, o,p- DIRECTOR
DIRECTS TO C_3, C_5

NEITHER OF THESE PRODUCTS CAN GO ON TO FORM THE TARGET PRODUCT

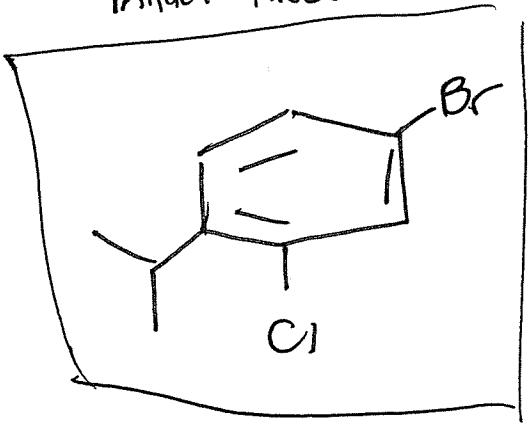


III.



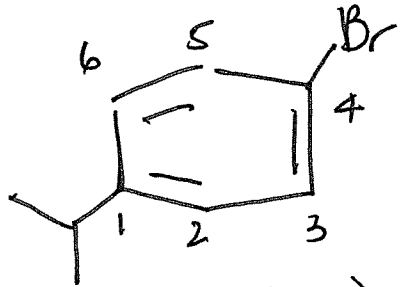
(cannot go on to give target product)

TARGET PRODUCT



This product represents 50% of overall theoretical yield.

50% +



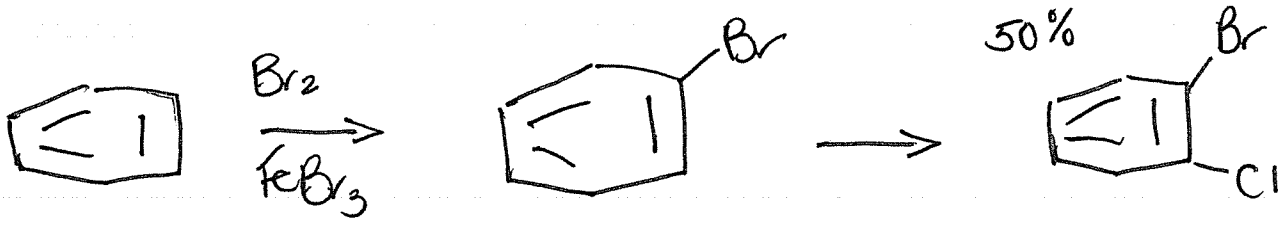
REACTION FOLLOWS ACTIVATOR

ISOPROPYL (ACTIVATOR) DIRECTS TO C_2, C_6 (same)

Br (DEACTIVATOR) DIRECTS TO C_3, C_5

8. (CONT'D)

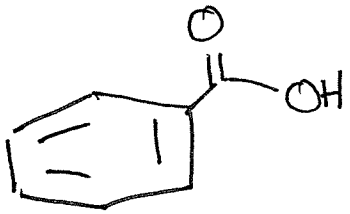
IV.



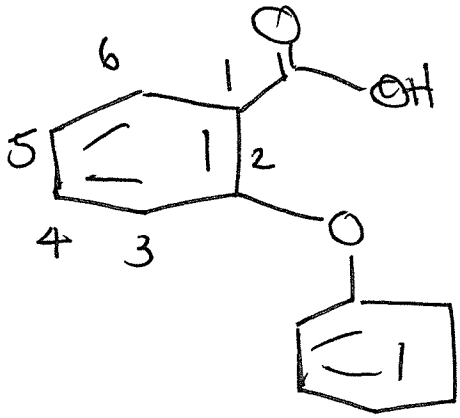
Neither of these products can go on to give the target product.

(C)

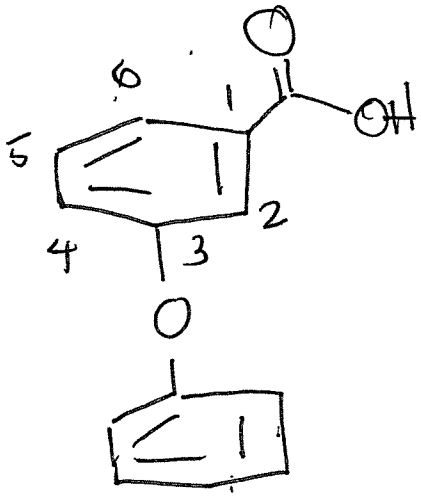
9.



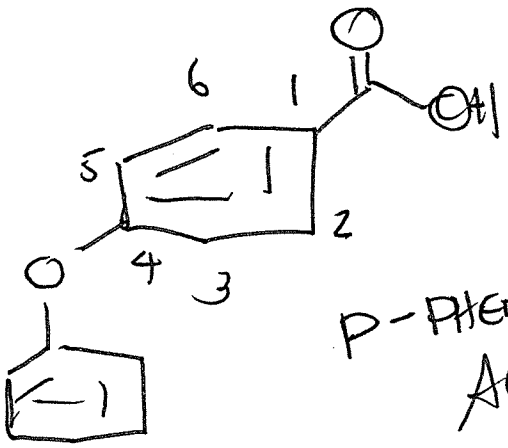
BENZOIC ACID



O-PHENOXYBENZOIC ACID



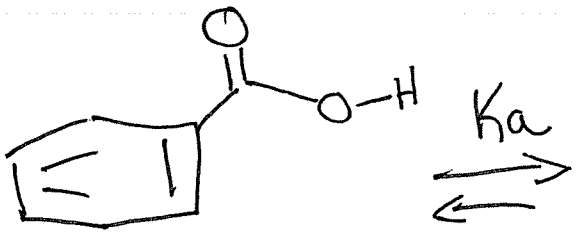
m-PHENOXY BENZOIC ACID



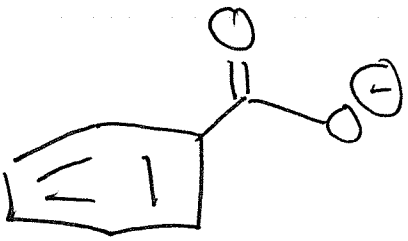
P-PHENOXY BENZOIC ACID

9. (CONT'D)

In order to understand the substituent effects on pKa of benzoic acid, consider the following:



ACID (A)



CONJUGATE BASE (CB)

$$K_a = \frac{[CB]}{[A]}$$

$$pK_a = -\log K_a$$

Substituents can make the ring ⊕ or ⊖ by RESONANCE EFFECTS or INDUCTIVE EFFECTS

The CB has a ⊖ charge

If the ring is ⊕ due to substituents, the CB is STABILIZED

⊕ ⊖ STABILIZE CB

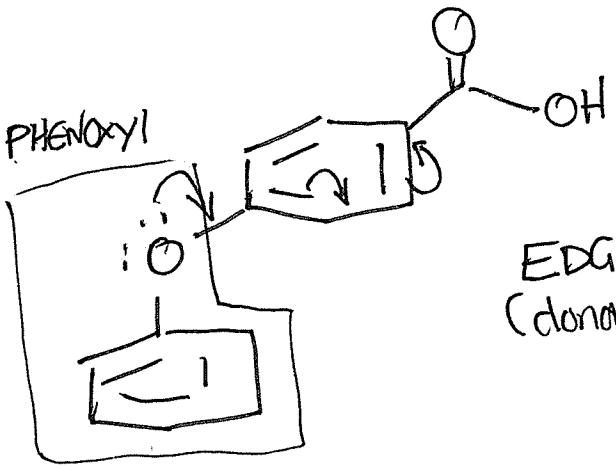
↑ [CB] ↑ Ka ↓ pKa

If the ring is ⊖ due to substituents, the CB is DESTABILIZED

⊖ ⊖ DESTABILIZE CB

↓ [CB] ↓ Ka ↑ pKa

For a PHENOXY SUBSTITUENT



EDG by RESONANCE: (donates INTO Ring)

Atom directly bonded to ring has lone pair

↑ ⊖ ring ↑ pKa

9. (CONT'D)

The phenoxy group is EWG by INDUCTION: (pulls e^- out of ring) Atom directly bonded to ring is more electronegative than carbon

↑ ⊕ ring ↓ pKa

So, phenoxy substituted benzoic acids with

- pKa HIGHER than benzoic acid ↑ ⊕ of ring and are EDG by RESONANCE
- pKa LOWER than benzoic acid ↑ ⊕ of ring and are EWG by INDUCTION

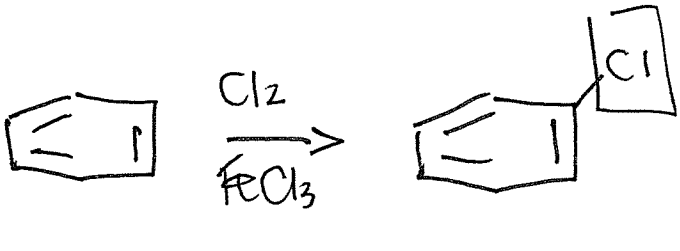
o-	m-	pKa BENZOIC ACID	pKa p-PHENOXY BENZOIC ACID
3.53	3.95	4.19	4.52

LOWER — EWG by INDUCTION

HIGHER — EDG by RESONANCE

So, phenoxy substituent follows an INDUCTIVE EFFECT in ORTHO, META positions, and a RESONANCE EFFECT in PARA position (D)

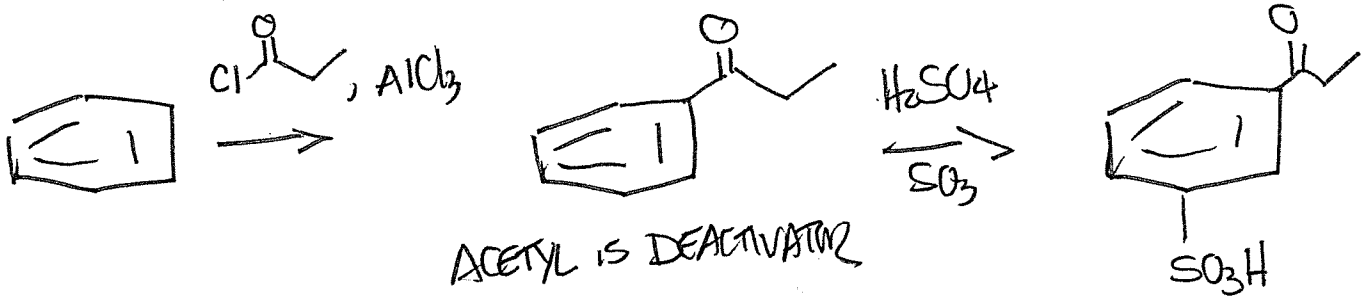
10. Reaction of benzene with each of the different reagents in the first step all occur at the SAME rate. However, once the substituent is introduced (i.e. Cl for I;  for II; NO_2 for III) the second step rates will be different, based on how the substituent ↑ or ↓ ⊖ character of the ring. The most ⊖ ring (or least ⊕) will react fastest in step 2.

I. 

Cl is DEACTIVATOR

$\sigma_p = +0.23$

o, p-DIRECTOR

II. 

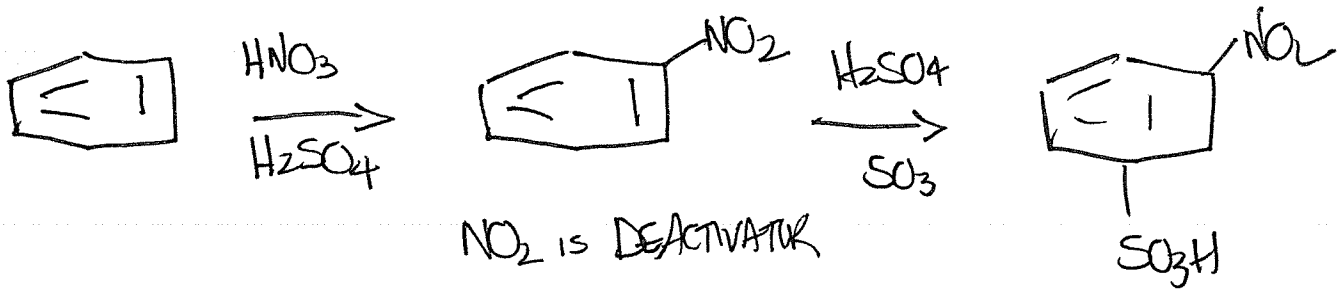
ACETYL is DEACTIVATOR

$\sigma_p = +0.5$

m-DIRECTOR

10. (CONT'D)

III.



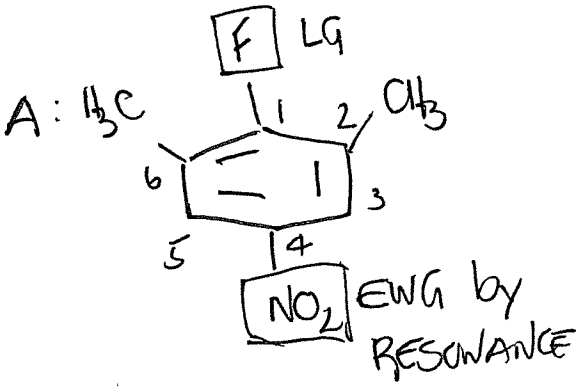
NO_2 is DEACTIVATOR

$\sigma_p = +0.78$

m-DIRECTOR

I > II > III (C)

11.



EAS: must have AT LEAST ONE unsubstituted carbon on benzene (i.e. bonded to H) that is not BETWEEN two substituted carbons

NAS: must have leaving group (LG) (usually F) and an EWG by resonance ortho- or para- to the LG

BENZYNE: must have LG and at least one ortho H

EAS CANNOT occur since "open" carbons @ C_3 and C_5 are between two substituted carbons (STERICALLY BLOCKED)

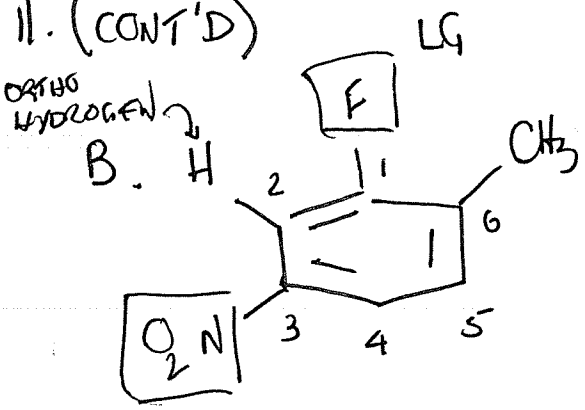
NAS CAN occur since F leaving group is PARA to NO_2 (EWG by resonance)

BENZYNE CANNOT occur since no ortho H relative to carbon bonded to F leaving group

A = I

11. (CONT'D)

B.



EWG by RESONANCE

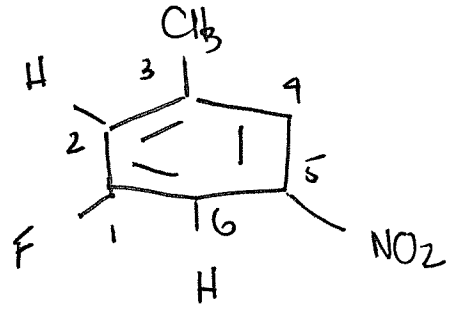
EAS CAN occur
C_4 and C_5 are open

NAS CANNOT occur since LG is META to EWG by resonance

BENZYNE CAN occur since ortho Hydrogen is available relative to F LG

B = II, III

C.



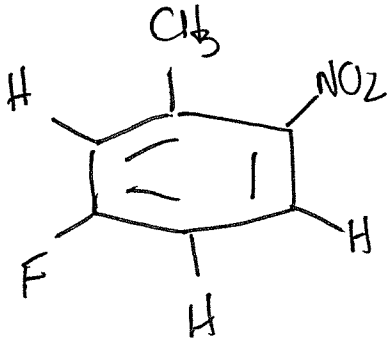
EAS CANNOT occur
C_2, C_4, C_6 STERICALLY BLOCKED

NAS CANNOT occur since LG is meta to EWG by resonance

Benzyne CAN occur since there is an ortho H relative to LG

C = III

D.



EAS CAN occur

NAS CAN occur

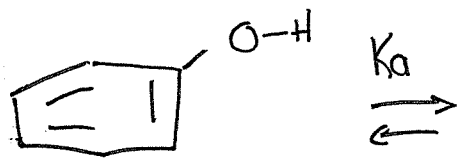
BENZYNE CAN occur

D = I, II, III

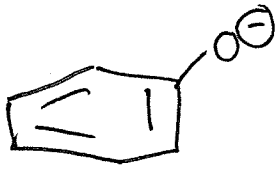
A = I B = II, III C = III D = I, II, III

(A)

12.



PHENOL
ACID (A)



CONJUGATE BASE
(CB)

$K_a = \frac{[CB]}{[A]}$

$pK_a = -\log K_a$

↓ pK_a STRONGEST ACID

⊕ or ⊖ RING
depends on substituents
Substituents w/ largest ⊕ σ value ⇒ strongest acid

Substituents w/ largest ⊖ σ value ⇒ weakest acid

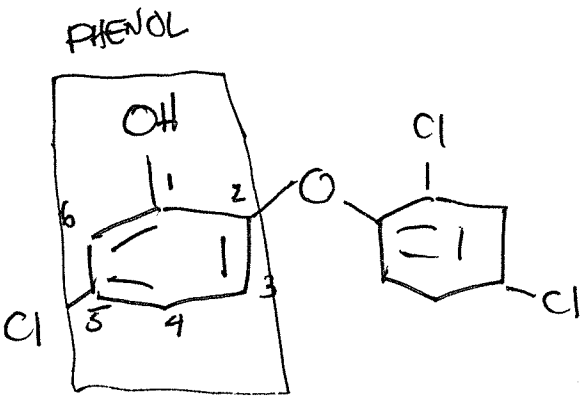
σ_p / σ_m determined based on position of substituent relative to phenol OH group

If CB is STABILIZED by making ring ⊕,
↑ [CB] ↑ K_a ↓ pK_a
STRONGER ACID
⊕ ⊖

STRONGEST ACID
MOST ⊕
(OR LEAST ⊖)
RING

If CB is DESTABILIZED by making ring ⊖
↓ [CB] ↓ K_a ↑ pK_a
WEAKER ACID
⊖ ⊖

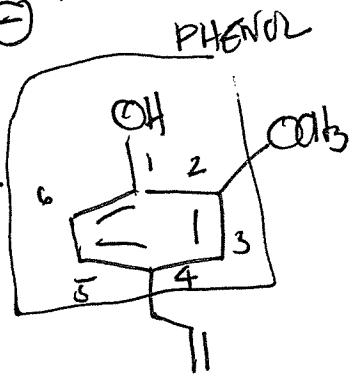
I.



C_2 Phenoxy (ORTHO) $\sigma_p = \underline{-0.21}$

C_5 Cl $\sigma_m = \underline{+0.37}$ $\boxed{+0.16}$

II.



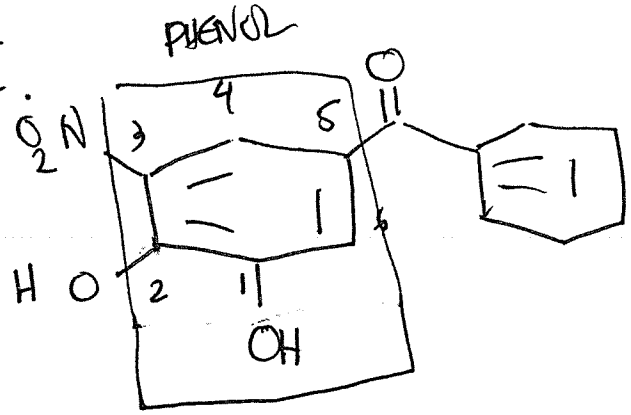
C_2 Methoxy (ortho) $\sigma_p = \underline{-0.27}$

C_4 CH_3 $\sigma_p = \underline{-0.17}$

$\boxed{-.44}$

12. (CONT'D)

III.



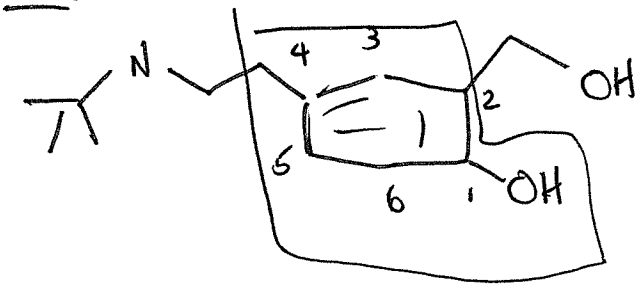
C_2 HYDROXY (ORTHO) σ_p -0.37

C_3 NITRO σ_m $+0.71$

C_5 ACETYL σ_m $+0.38$

$+0.72$

IV.



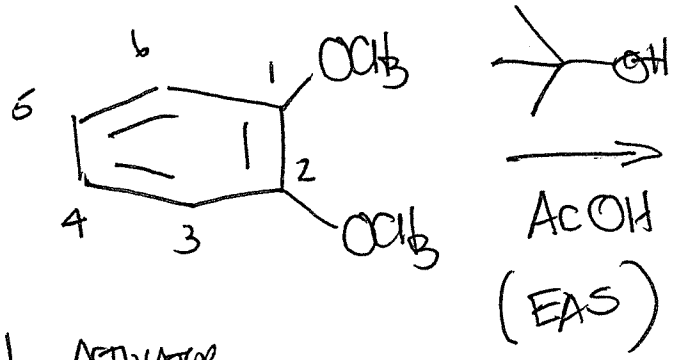
C_2 CH_3 (ORTHO) $\sigma_p = -0.17$

C_4 CH_3 $\sigma_p = -0.17$

-0.34

III > I > IV > II (E)

13.



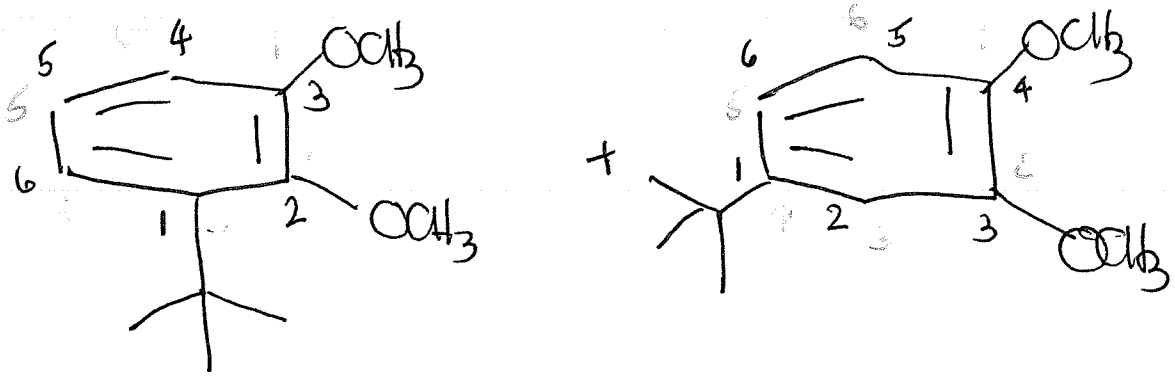
C_1 OCH_3 ACTIVATOR o,p-DIRECTOR DIRECTS TO C_4, C_6

t-Bu at C_6 is SAME compound as t-Bu @ C_3

C_2 OCH_3 ACTIVATOR o,p- DIRECTOR DIRECTS TO C_3, C_5

t-Bu @ C_4 SAME compound as t-Bu @ C_5

B. (CONT'D)



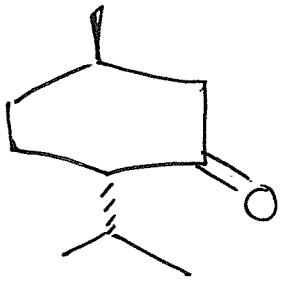
MONOALKYLATED PRODUCTS

1-t-butyl-2,3-dimethoxy benzene

1-t-butyl-3,4-dimethoxy benzene.

(E)

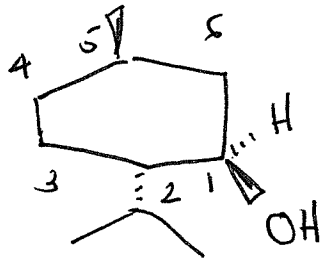
14.



$NaBH_4$

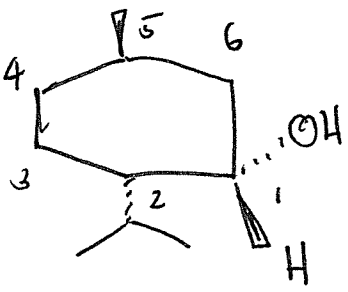
CH_3OH

A



+

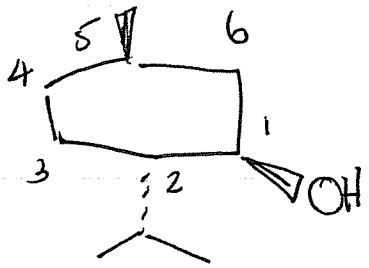
B



$H^{\ominus}$ from $NaBH_4$ reacts with menthone from front and back to give rise to two products A and B. These are DIASTEREOMERS and have differ energies (stabilities)

Each of these products has two chair conformations that can be used to predict stability.

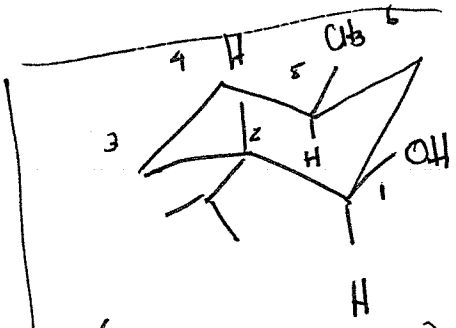
A



EQ MORE STABLE THAN AXIAL

(-) MENTHOL

MORE STABLE THAN OTHER CONFORMATION

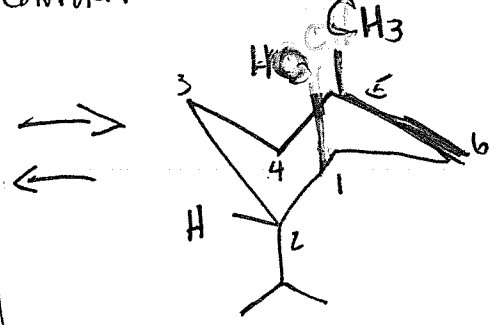


(corresponds to II)

C_2: EQ ISOPROPYL

C_1 EQ hydroxy

C_5 EQ methyl



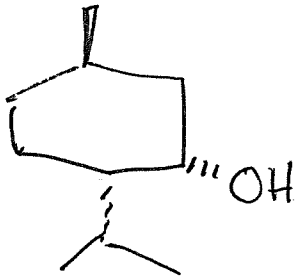
C_2 AX ISOPROPYL

C_1 AX HYDROXY

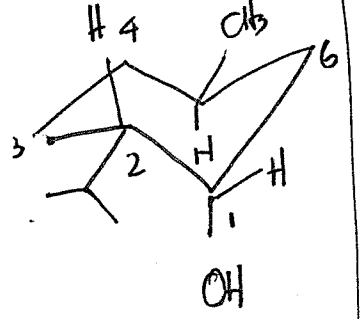
C_5 AX METHYL

MOST STABLE, MAJOR PRODUCT

B



LESS STABLE MINOR PRODUCT

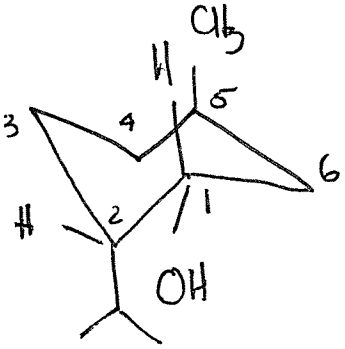


C_1 AX HYDROXY

C_2 EQ ISOPROPYL

C_5 EQ METHYL

(corresponds to I)



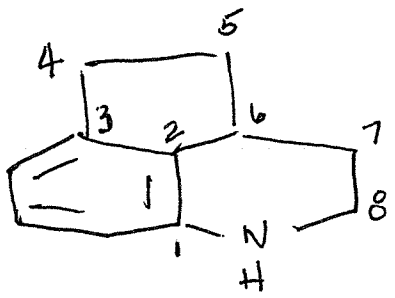
C_1 EQ HYDROXY

C_2 AX ISOPROPYL

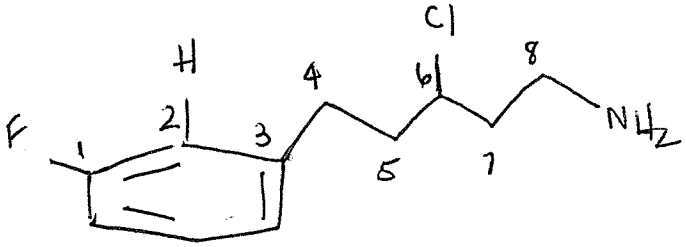
C_5 AX METHYL

(+) NEOMENTHOL

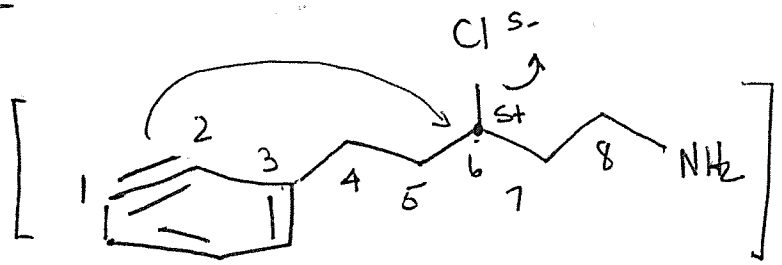
15.

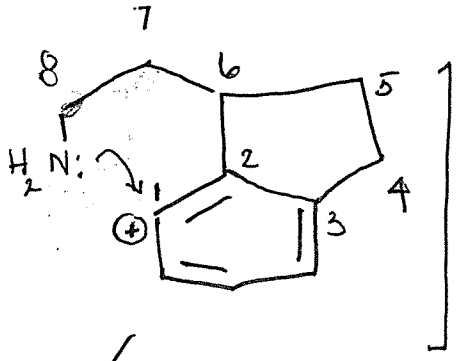


F.

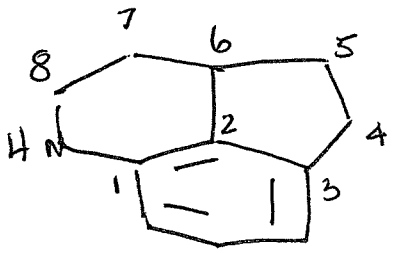


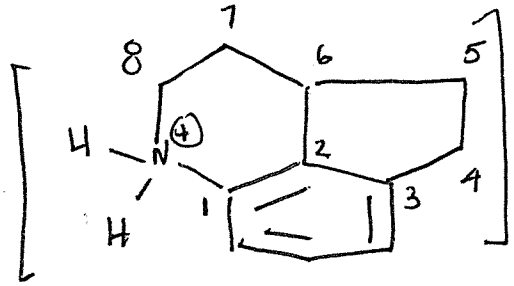
C_2





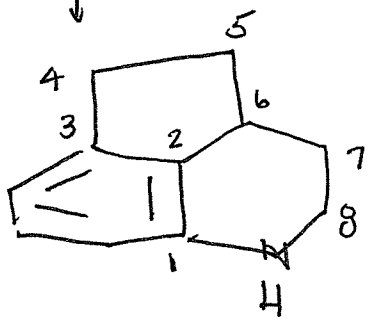
Yi $e^{\ominus}$ from benzyne react at electrophilic C_6 bonded to Cl



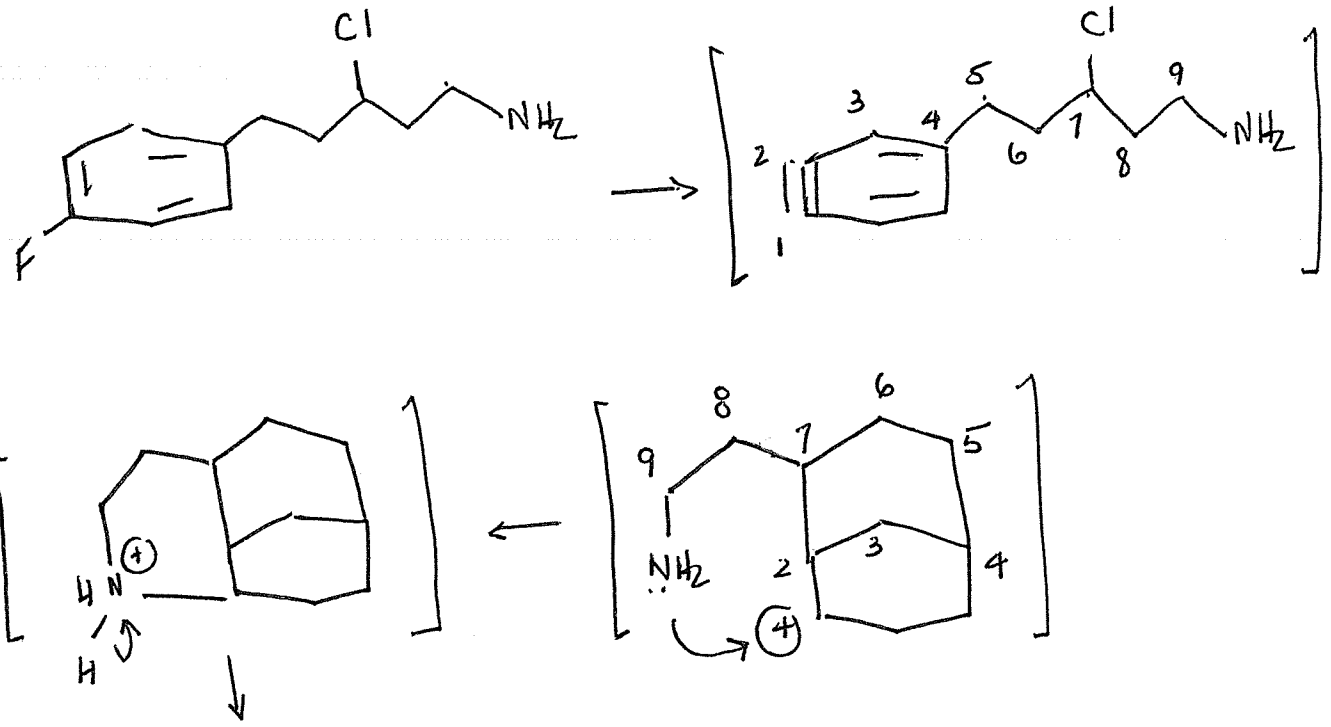


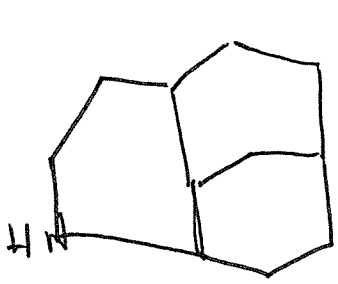
This is the same structure as compound shown

↓ FLIP OVER



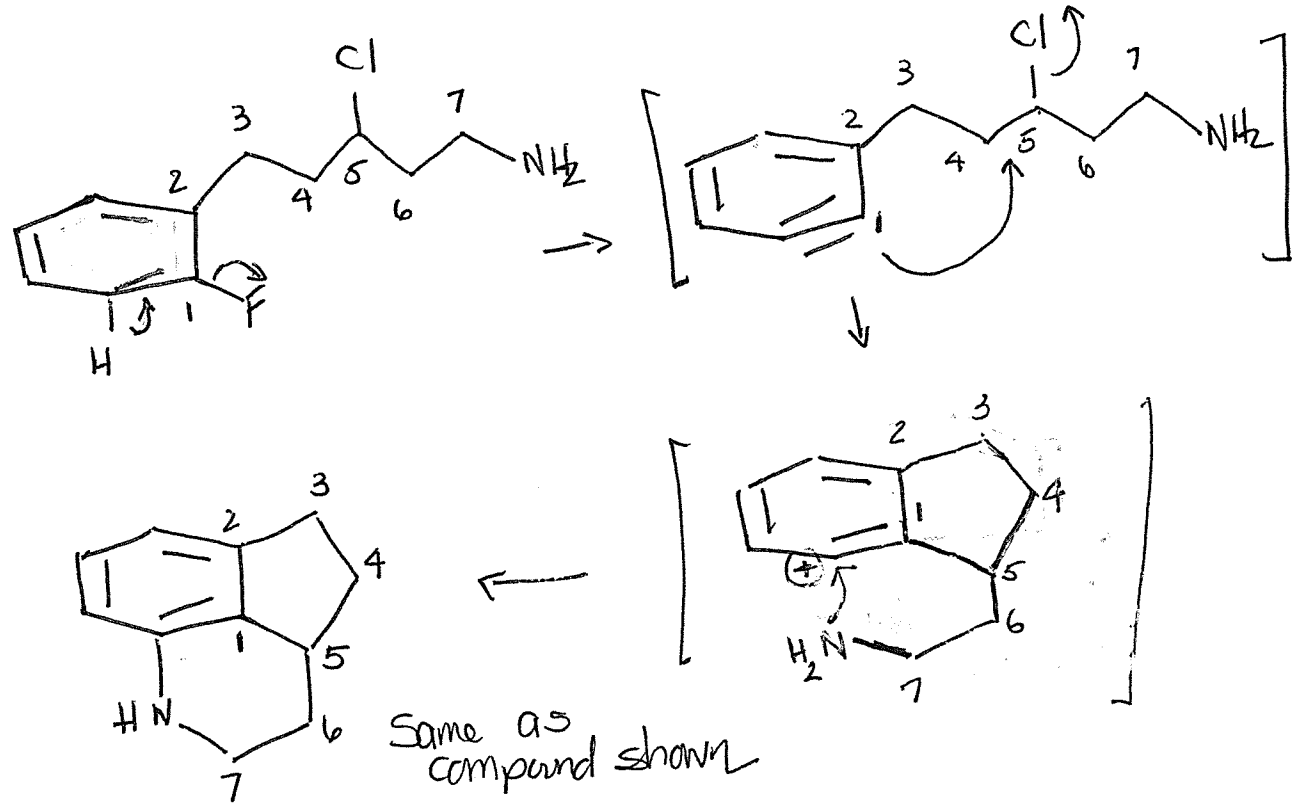
II.





Not compound shown

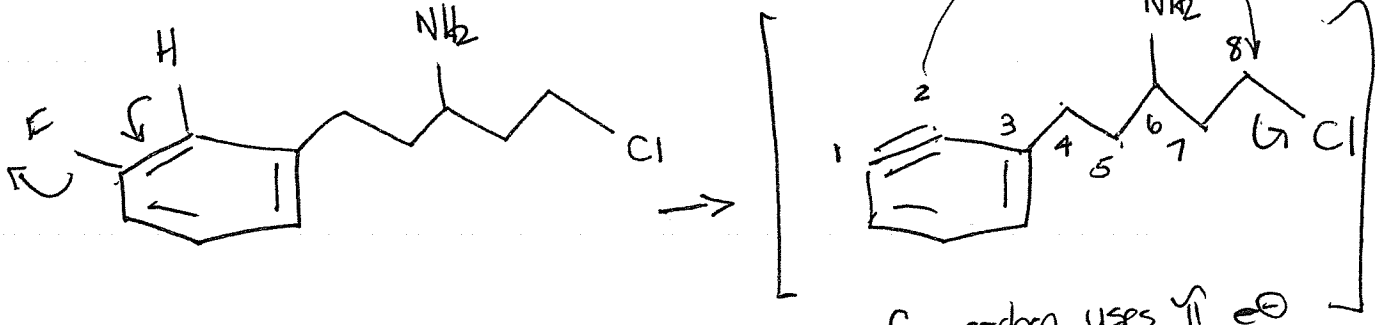
III



Same as compound shown

16. (CONT'D)

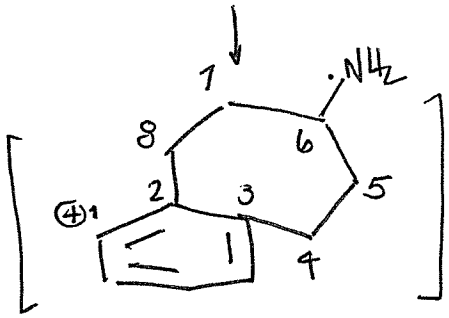
IV.



C_2 carbon uses π $e^{\ominus}$ to react w/ C_8

I & III

(B)



Amine @ C_6 cannot reach to react @ C_1 Carbocation

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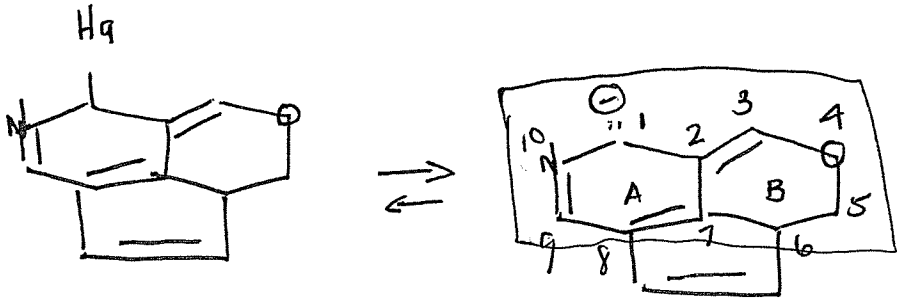
16. I. (FALSE)

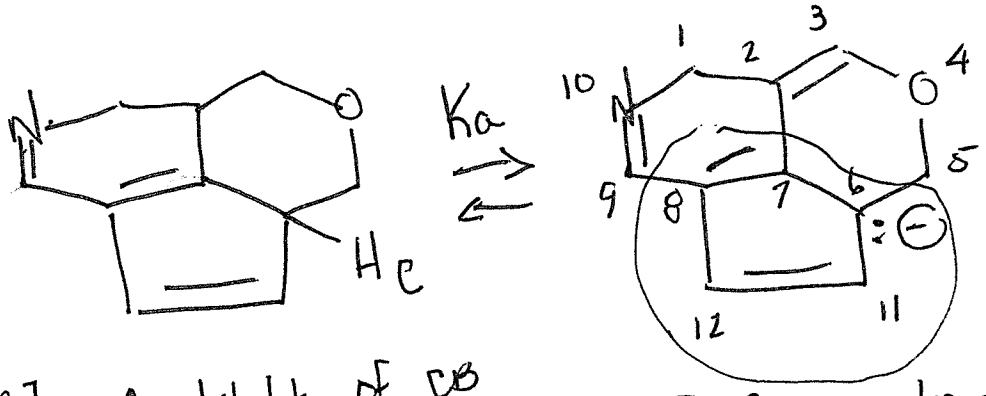


The combination of ring A and B of the conjugate base CANNOT be aromatic as C_5 and C_{10} are sp^3 and cannot adopt PLANAR geometry required for AROMATICITY

16. (CONT'D)

II. The pKa of Hc is lower than the pKa of Ha and Hb because the conjugate base associated with dorpation of Hc is aromatic. When the conjugate base is aromatic, it increases the stability and concentration of the conjugate base, resulting in a much lower pKa (C)

FALSE



$K_a = \frac{[CB]}{[EA]}$ ↑ stability of CB
↑ [CB]
↑ Ka ↓ pKa

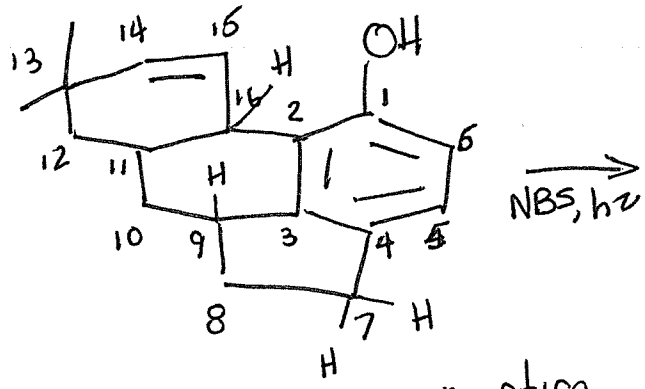
$pK_a = -\log K_a$

The five membered ring (circled) is aromatic where the conjugate bases derived from Ha and Hb are not.

III. The conjugate base (circled) has 6 $e^{\ominus}$. The lone pair and the two $e^{\ominus}$ from each of the two π bonds in this ring (i.e. C_{11}-C_{12} and C_7-C_8) (TRUE)

IV. Compound A is NOT AROMATIC as none of the individual rings or combinations fulfill the criteria for aromaticity. (FALSE)

17. Most stable radical forms the fastest in the propagation step of NBS, hz reaction



$3° > 2° > 1°$

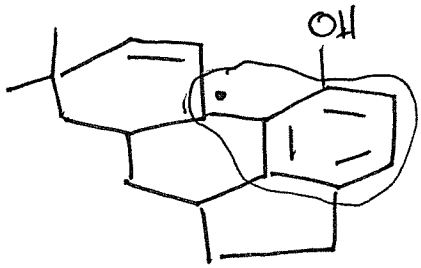
MOST STABLE — LEAST STABLE

(B)

Benzylic bromination reaction

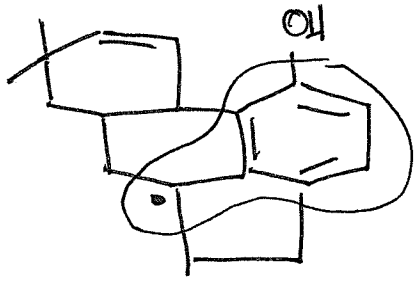
Benzylic hydrogen at C_1, C_9, C_{16}

I. MOST STABLE



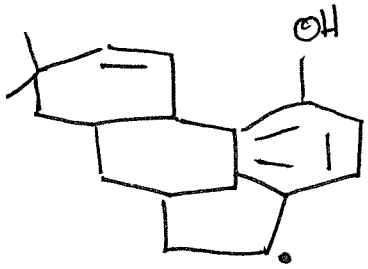
3° BENZYLIC RADICAL (also ALLYLIC)

II.



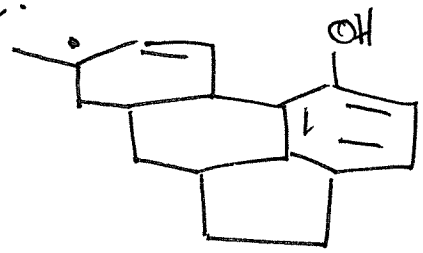
3° BENZYLIC RADICAL

III.



2° BENZYLIC RADICAL

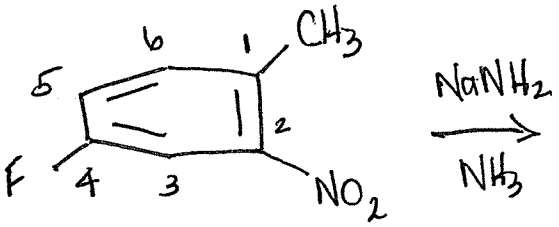
IV.



NOT BENZYLIC RADICAL

3° ALLYLIC

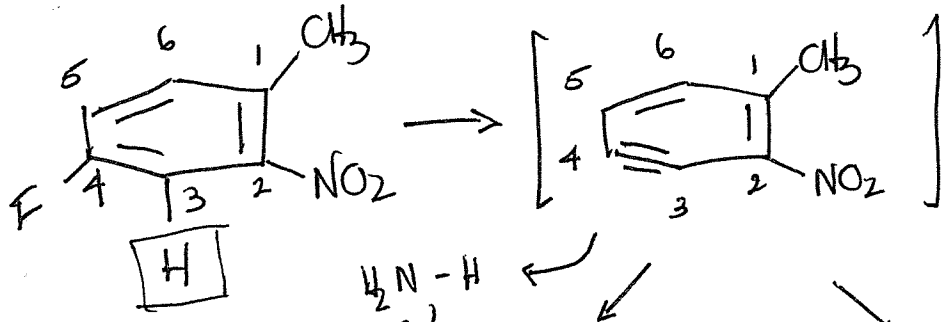
18.



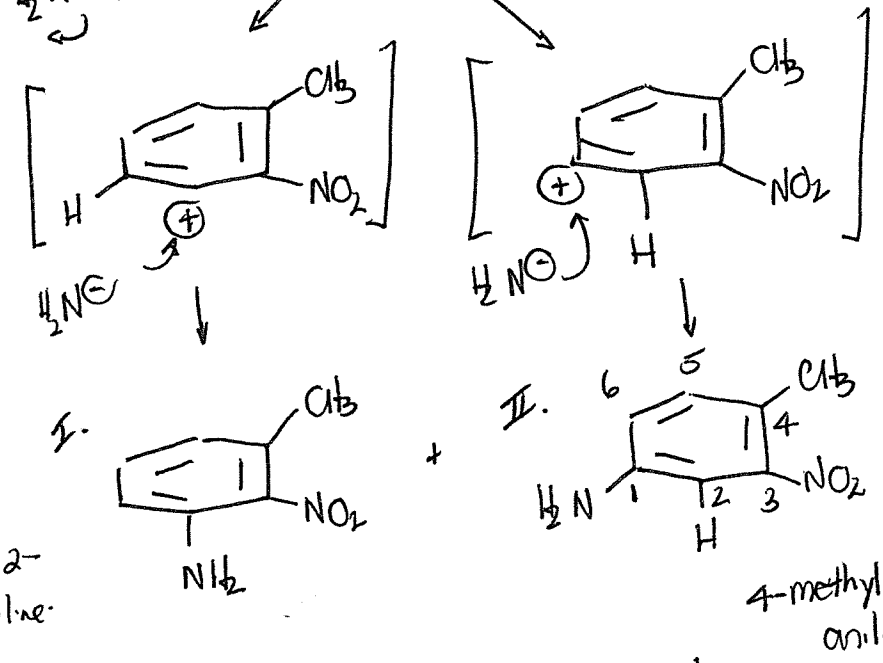
4-FLUORO-2-NITRO TOLUENE

BENZYNE REACTION

There are two ortho hydrogens. Must consider products from BOTH ortho hydrogens



C_3 ORTHO HYDROGEN



I.

3-methyl-2-nitroaniline.

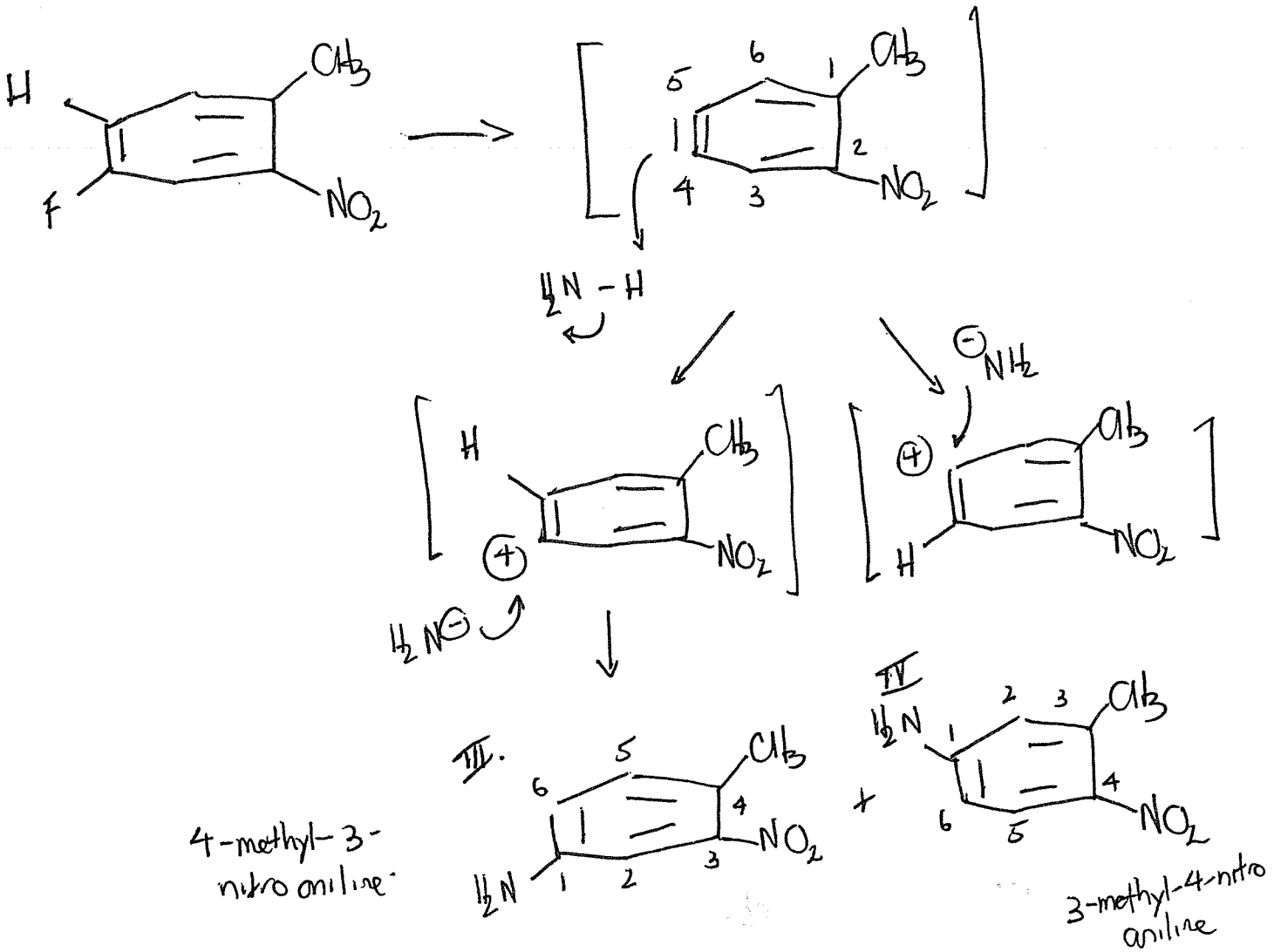
+

II.

4-methyl-3-nitro aniline

ALSO NEED TO CONSIDER C_5 ORTHO HYDROGEN

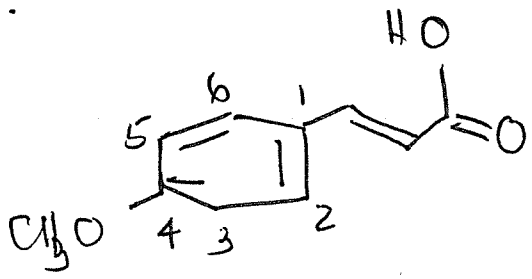
18. (CONT'D)



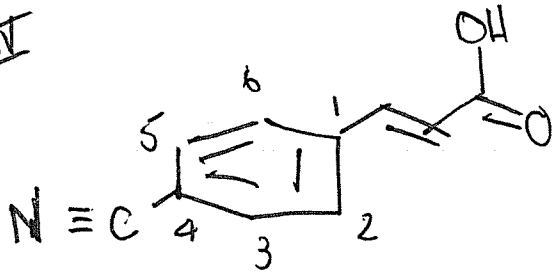
The overall yield of the reaction, from both the C_3 AND C_5 ortho hydrogens. is 25% I, 25% II 25% III and 25% IV. But II and III are exactly the same compound. so there is 50% of this compound which is 4-methyl-3-nitro aniline. (II) (B)

The most potent compound is III and the least potent is IV

III.



IV



The only difference between these compounds is the substituent @ C_4. For III, the substituent is an EDG w/ a σ_p value = -0.27 and the cyano group is an EWG with a σ_p value of +0.66. This suggests Rings with ↑ ⊖ character are more potent and rings w/ less ⊖ or more ⊕ character are less potent.

III > I > II > IV

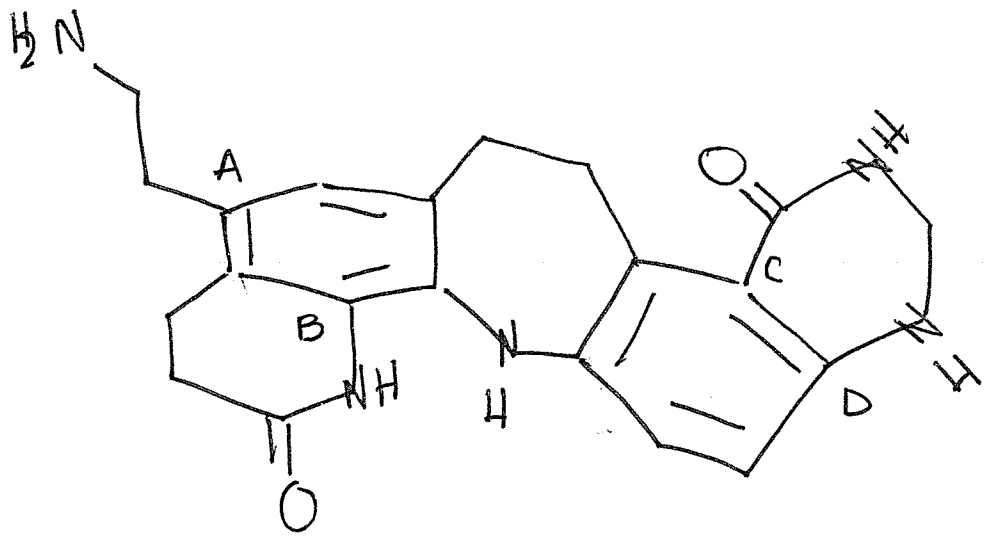
$\sigma_p = -0.27$ (H) $\quad \sigma_m = +0.12$ $\quad \sigma_p = +0.66$

(OCH_3) $\quad \sigma = 0$ $\quad$ (OCH_3) $\quad$ (CN)

A meta chloro group on the ring would have a σ_m value = +0.37 meaning it would fall between II and IV.

III > I > II > mCl > IV (A)

20.



A: (P)–$CH_2CH_2NH_2$ ETHYL

B: (P)–N(H)–C(=O)–R ACETAMIDO

C: (P)–C(=O)–NHR ACETYL

if N of HN–C(=O)– bonded to parent

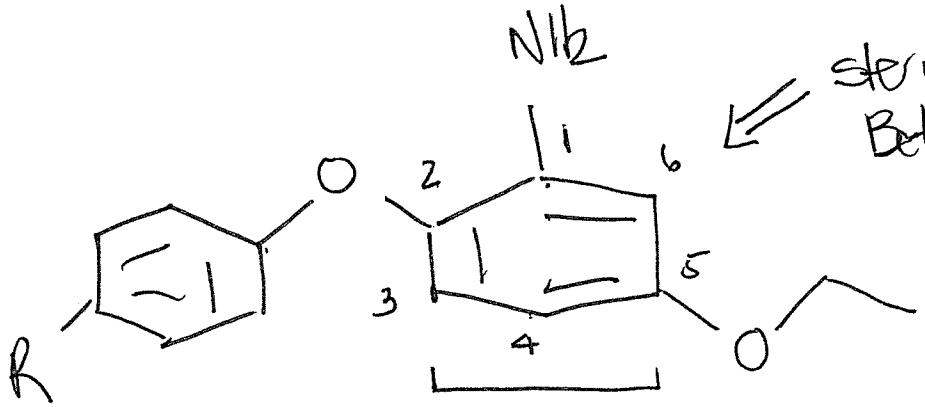
if C of –C(=O)–NH bond to parent

D: $HN-CH_2-R$ AMINO

(D)

21. (CONT'D)

Once most activated ring is identified, then consider directing ability of substituents on that ring (i.e. RING C)



sterically blocked. Between two substituted carbons on ring.

RING C

C1: AMINO o, p⁻ DIRECTOR — ACTIVATOR $\sigma_p = -0.66$

DIRECTS TO ~~C6~~, C4 BUT C6 sterically blocked

C2. PHENOXY o, p⁻ DIRECTOR — ACTIVATOR $\sigma_p = -0.21$

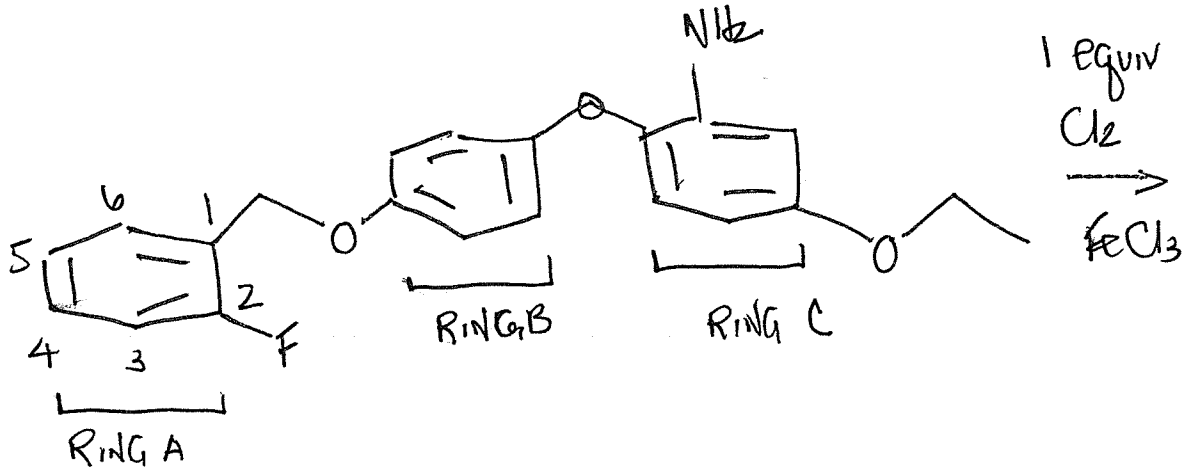
DIRECTS TO C3

C5: ETHOXY o, p⁻ DIRECTOR — ACTIVATOR $\sigma_p = -0.24$

DIRECTS TO C4, ~~C6~~

Reaction directed to C4 b/c both ethoxy and amino direct here. (D)

21.



Consider which of the three rings is most ACTIVATED base on the # of activating / deactivating groups on the ring. The most ACTIVATED (or LEAST DEACTIVATED) ring will react to give ayer product (s)
MOST ACTIVATOR = MOST (-) (or least (+))

A: (P)-F : DEACTIVATOR $\sigma_p =$

(P)- CH_2 : ACTIVATOR $\sigma_p = -0.17$
(METHYL)

B: (P)—O-CH_2 : ACTIVATOR
(METHOXY)

(P)-O—Ph : ACTIVATOR
(PHENOXY)

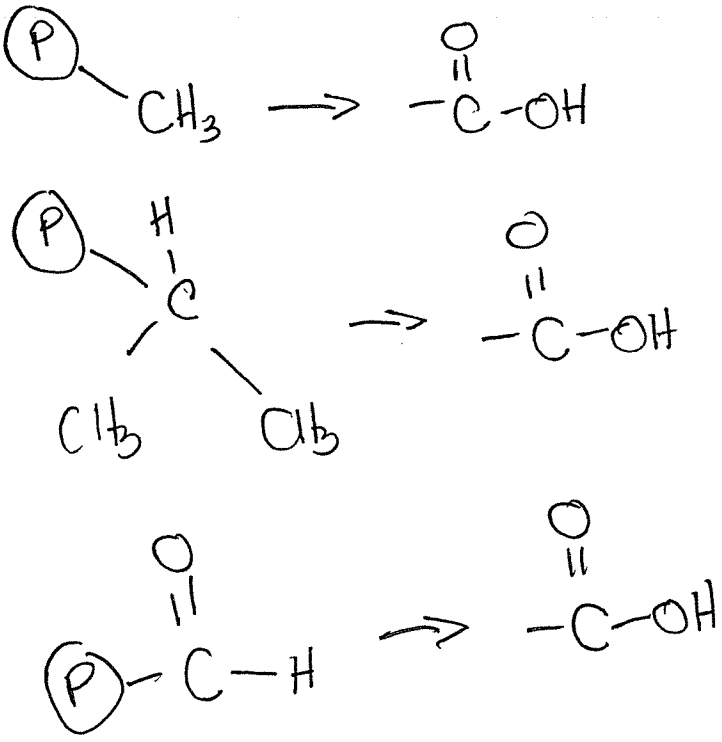
C: $-NH_2$: ACTIVATOR
(AMINO)

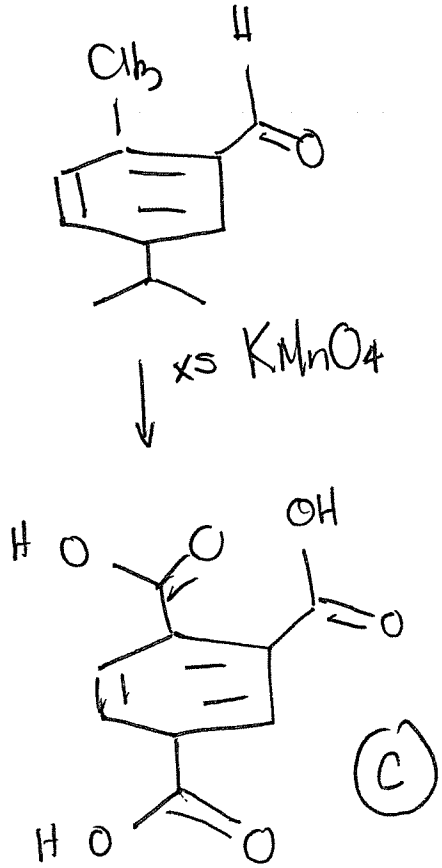
$-O-CH_2CH_3$ ACTIVATOR
(ETHOXY)

$-O$ Ph (PHENOXY) · ACTIVATOR

Ring C is MOST ACTIVATED b/c has most activating groups

22. $KMnO_4$ reacts with benzylic carbons (and N) w/ at least one H, and oxidizes those carbons to carboxylic acids





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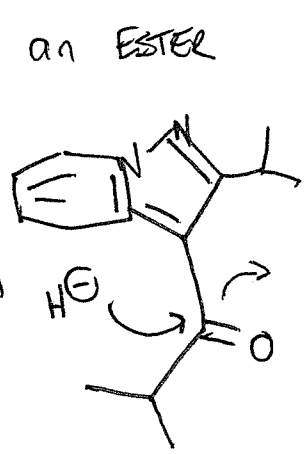
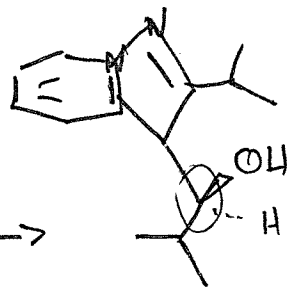
23. $NaBH_4$, CH_3OH reacts with aldehydes and ketones, but not esters of carboxylic acids. $NaBH_4$ will not react w/ the carbonyl group in IV b/c it is an ESTER

I. Ibuprofen does not contain any chiral centers and is not chiral. The ketone reacts to create a new chiral center

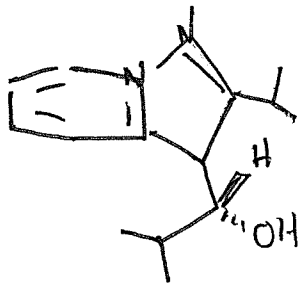
Reacts from Top and Bottom





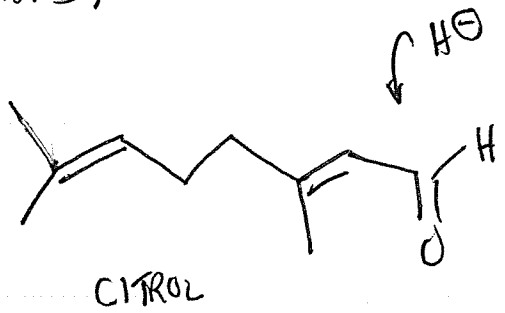
Starting Ibuprofen is PROCHIRAL

PRODUCTS ARE CHIRAL

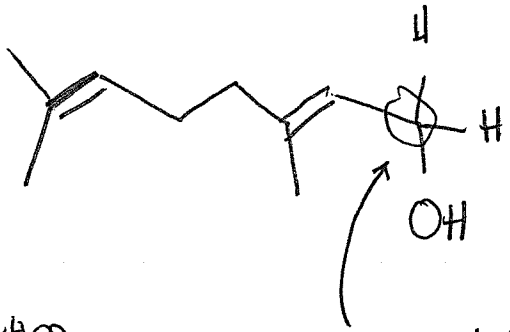


23. (CONT'D)

II.



CITROL

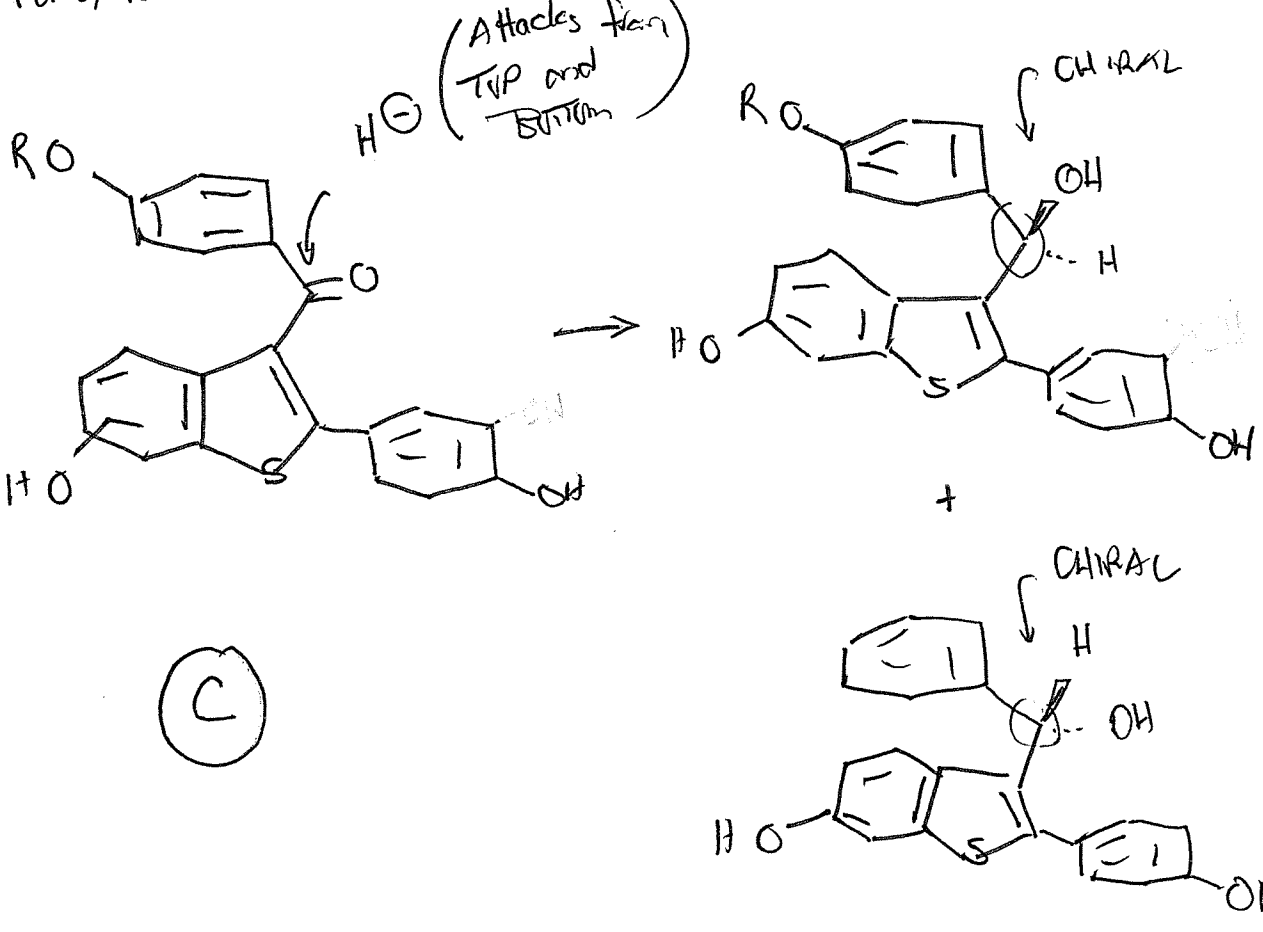


NOT CHIRAL

Citrol reacts w/ $NaBH_4$ but does not form a chiral center because the new sp^3 carbon is not bonded to 4 unique substituents

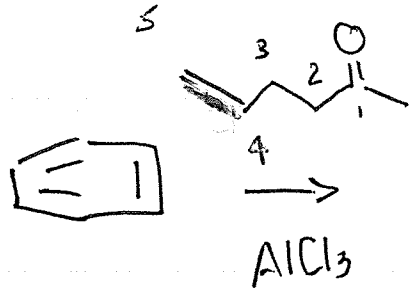
So starting citrol is NOT PROCHIRAL

III. Ketone of raloxifene reacts w/ $NaBH_4$. Raloxifene does not contain any chiral centers but reaction w/ $NaBH_4$ results in formation of a new sp^3 carbon that is chiral, therefore raloxifene is PROCHIRAL in this reaction.



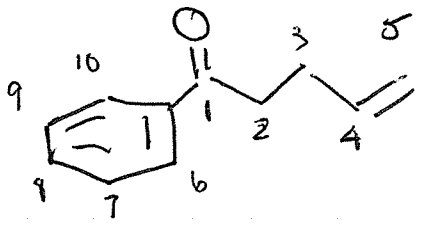
C

24.

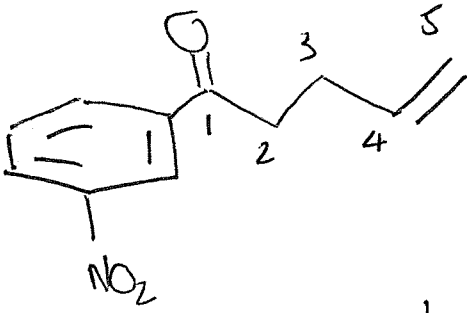


$AlCl_3$

↓ ACETYL GRP EWG by RESONANCE — m-DIRECTOR



↓ HNO_3, H_2SO_4

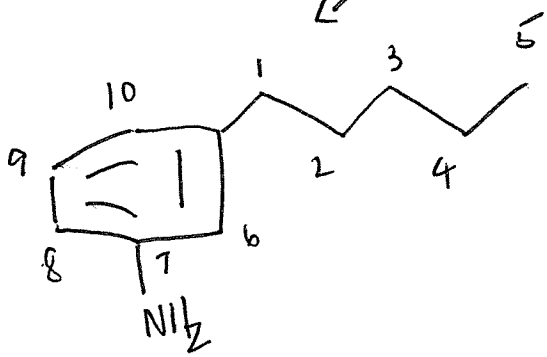


NO_2

This represents structure X.

Catalytic hydrogenation (H_2, Pt) reduces benzylic NO_2, ketones and alkenes.

H_2, Pt

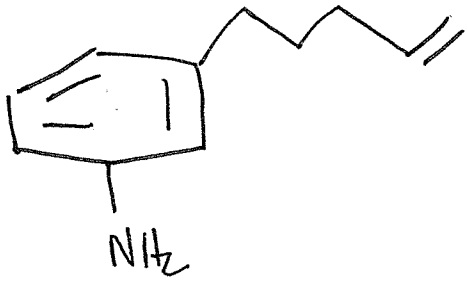


NH_2

A

↓ $Zn(Hg)$, HCl

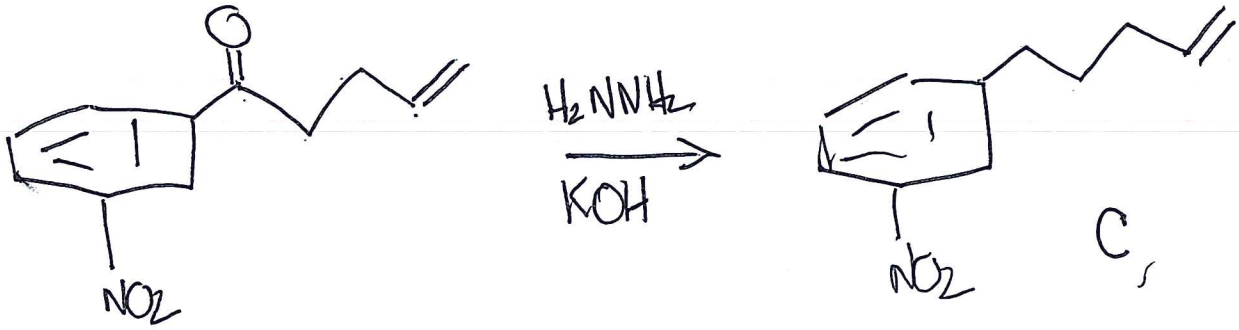
Clemmensen reduction reduces benzylic ketones and nitro groups but NOT alkenes



NH_2

B

24. (CONT'D)



Wolf-Kishner (KOH, H_2NNH_2) reduces benzylic ketones only, not nitro or alkenes

A = III

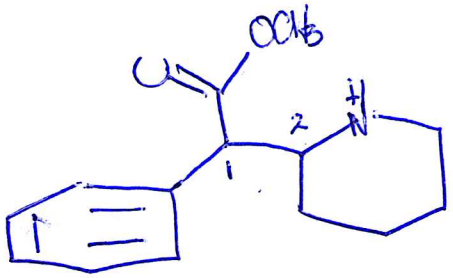
B = II

C = I

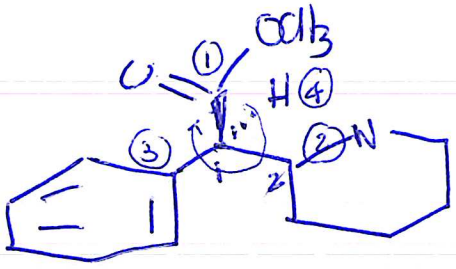
E

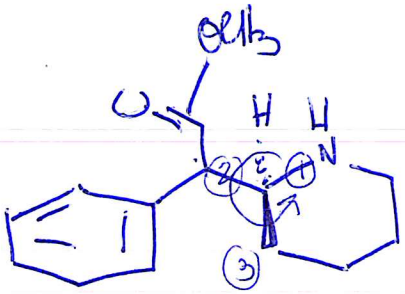
---

25. Methylphenidate has 2 chiral centers at C_1 and C_2. There are four stereoisomers of methylphenidate that are shown as I, II, III and IV. Focalin is the d-isomer of the racemic mixture of ritalin. A racemic mixture is a 50:50 mixture of ENANTIOMERS So ritalin is a mixture of focalin (R,R) and its ENANTIOMER (S,S).



25. (CONT'D)

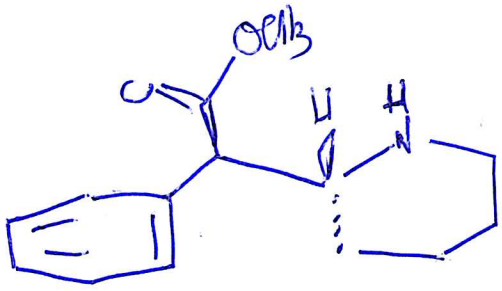




Configuration at C_1 is R in this structure

Configuration at C_2 in this structure is S

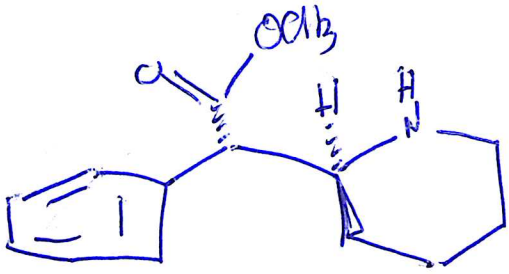
So R, R is



CORRESPONDS TO IV

D

and S, S is



CORRESPONDS TO I