UNIVERSITY OF WINDSOR 59-235

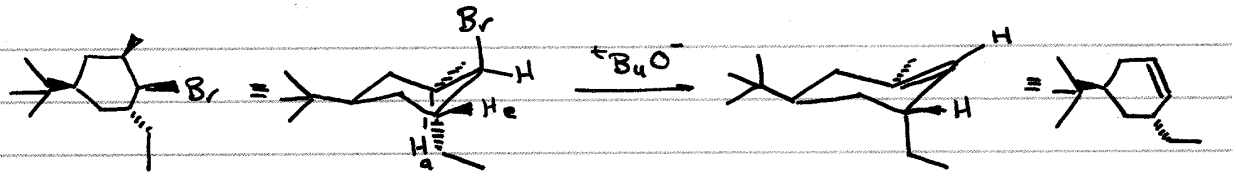
NAME OF STUDENT.... FINAL - 1999 ..... Course Name & Number.....

Student I.D. Number. SUGGESTED SOLNS ..... Course Section .....

Date of Test: ..... NAME OF INSTRUCTOR .....

Book No. .....

Total No. of Books .....

1. 

PREDOMINANT CONFORMATION

BROMINE AXIAL - GOOD FOR ELIMINATION

ONLY Ha IS TRANS - DIAXIAL ∴ ONLY ONE THAT CAN ELIMINATE

E2 ELIMINATION MECH.

2. INITIATION $Br_2 \xrightarrow{h\nu} 2\ Br\cdot$

PROPAGATION

1) 

NOTE: DON'T HAVE TO SHOW RESONANCE FORMS - BUT THEY MUST BE RIGHT IF THEY DO.

2) 

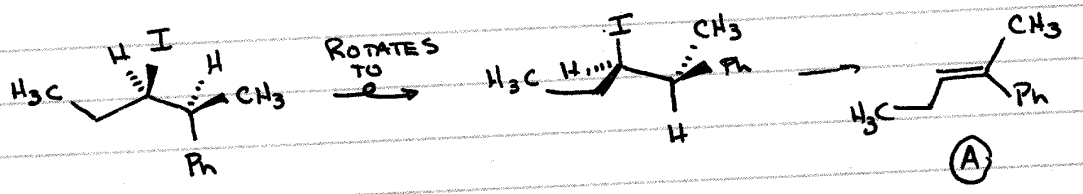
TERMINATION - ANY ONE OF

2 

OR 

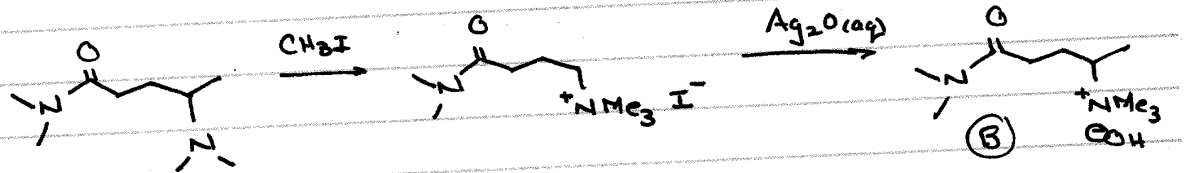
PROBABLY OTHER REASONABLE ONES, TOO.

3a).



(A)

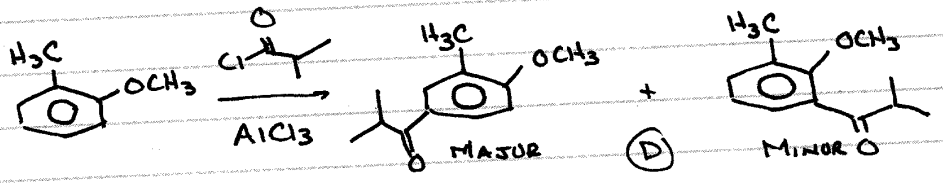
b)



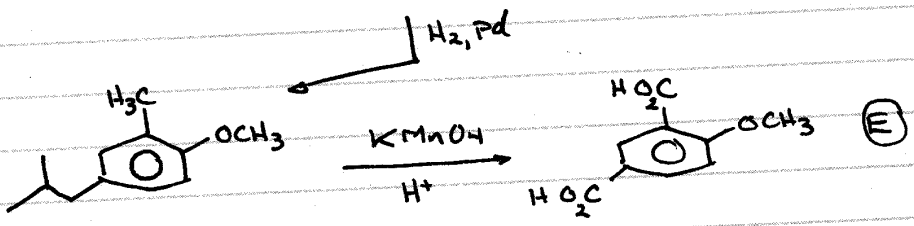
(B)

(C)

c)

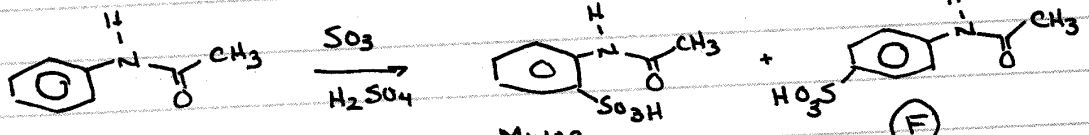


(D)

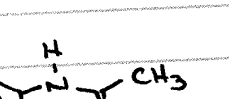


(E)

d)

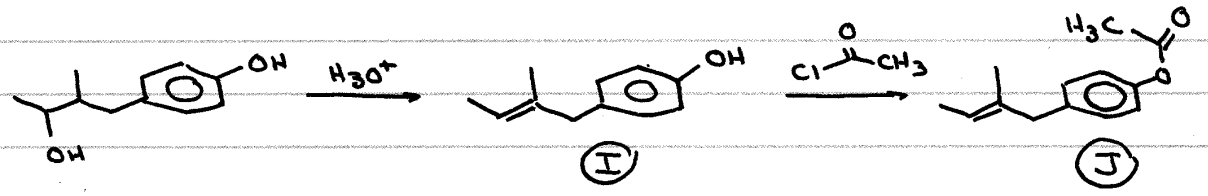


(F)

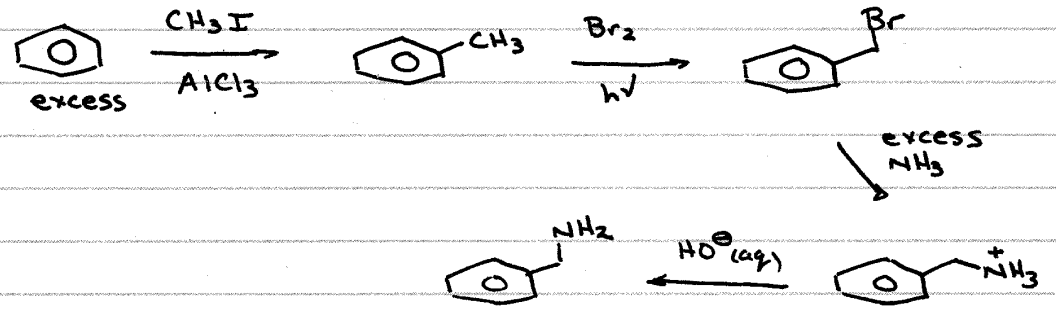


(G)

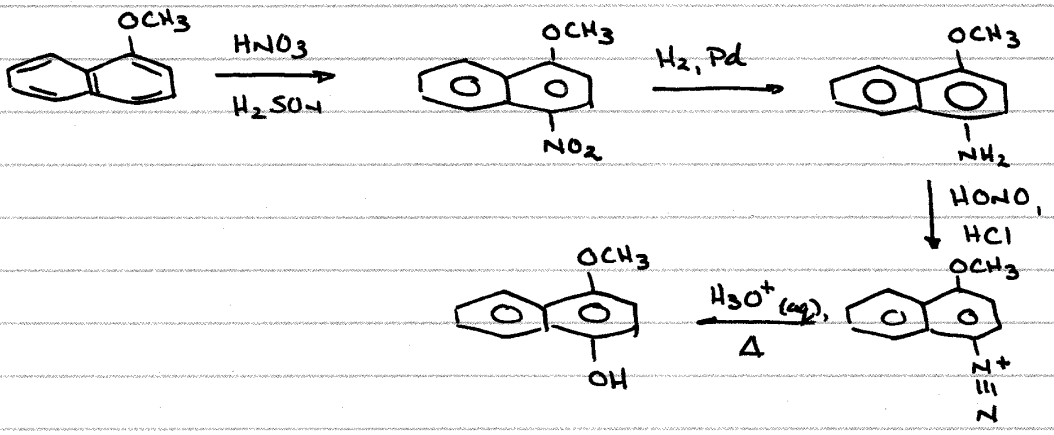
e)


OH
OH
H_3O^+
OH
I
Cl
O
CH_3
H_3C
O
O
J

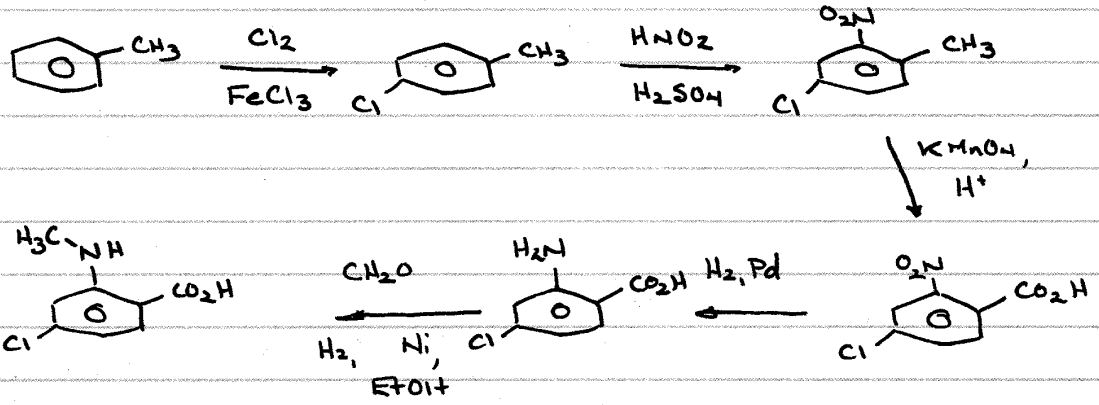
4. a)


excess
CH_3I
$AlCl_3$
CH_3
Br_2
$h\nu$
Br
excess
NH_3
NH_2
$HO^{\ominus}_{(aq)}$
$\overset{+}{N}H_3$

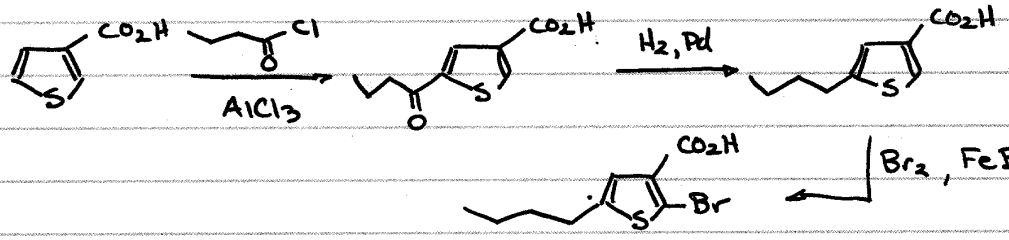
b)


OCH_3
HNO_3
H_2SO_4
OCH_3
NO_2
H_2, Pd
OCH_3
NH_2
HONO,
HCl
OCH_3
OH
$H_3O^+_{(aq)}$,
Δ
OCH_3
N^+
III
N

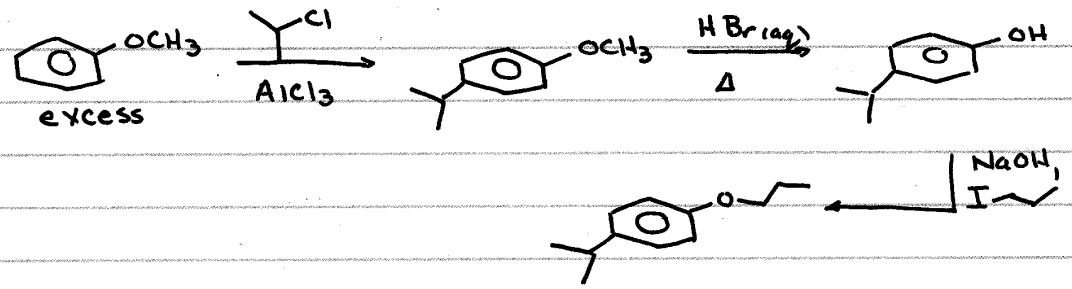
c)


CH_3
Cl_2
$FeCl_3$
CH_3
Cl
HNO_2
H_2SO_4
O_2N
CH_3
Cl
$KMnO_4$,
H^+
H_3C
NH
CO_2H
Cl
CH_2O
H_2, Ni,
EtOH
H_2N
CO_2H
Cl
H_2, Pd
O_2N
CO_2H
Cl

d)



e)

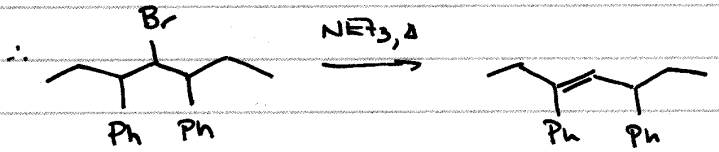


5. E2 vs. E1

FAVOURED BY β-ARYL GROUPS (ENHANCED E2)

DISFAVOURED BY β-ALKYL GROUPS (IMPEDED E2)

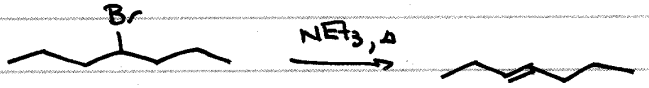
DISFAVOURED BY α- ARYL OR ALKYL GROUPS (ENHANCED E1)



MOST E2

2° ALKYL BROMIDE

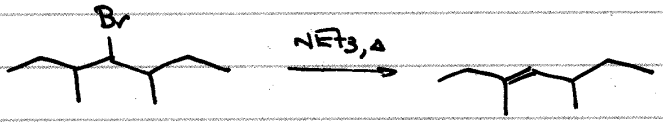
β-C'S HAVE ARYL GROUPS.



2ND MOST E2

2° ALKYL BROMIDE

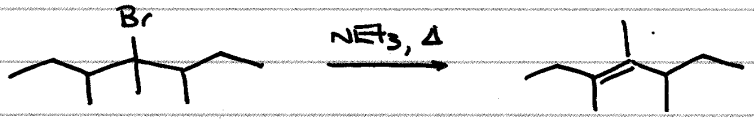
β-C'S HAVE NO ARYL GROUPS, BUT NO 'EXTRA' ALKYLS



3RD MOST E2

2° ALKYL BROMIDE

β- C'S HAVE 'EXTRA' ALKYL GROUPS



MOST E1

3° ALKYL HALIDE

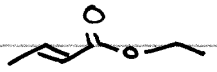
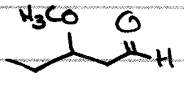
(∴ STABILIZED CATION)

β- C'S HAVE ADDITIONAL ALKYL GROUPS.

6. ANALYSIS

	C 73.43%	H 10.27%	O 16.30%
	÷ 12.011	÷ 1.008	÷ 15.999
	6.114	10.189	1.019
÷ SMALLEST #	÷ 1.019	÷ 1.019	÷ 1.019
	6.00	10.00	1

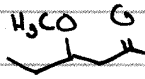
∴ EMPERICAL FORMULA IS $C_6H_{10}O$

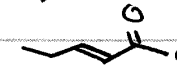
∴ ELIMINATE  AND  (TWO O'S).

FROM IR SPECTRUM

$\nu_{(C=O)}$ 1690 cm^{-1} DOESN'T FIT  (WOULD PREDICT 1710 cm^{-1})

DOESN'T FIT  (WOULD PREDICT 1710 cm^{-1})

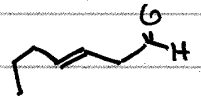
DOESN'T FIT  (WOULD PREDICT 1710 cm^{-1})

NOTE ν_{C-H} 2820 cm^{-1} SUGGEST C-H OF  - MAY ALSO BE ABLE TO ELIMINATE 

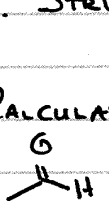
ON TO NMR

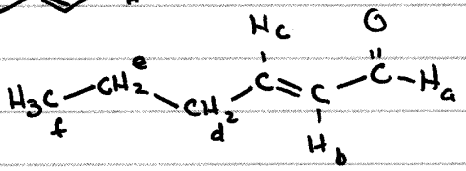
NOTE δ 9.5 ppm, AREA = 1 d (DOUBLET) CLEARLY AN ALDEHYDE

H NEXT TO A C-H

- CLEARLY ELIMINATES BOTH  (WOULD BE +) AND  (NO ALD.)

∴ STRUCTURE MUST BE 

CALCULATE SPECTRUM 



H_a PREDICT δ 9-10 ppm (OR EITHER 9.1 OR 9.3 OFF TABLE)
, d , AREA = 1
MATCHES OK $\bar{w}$ OBSERVED 9.5 ppm RESONANCE

H_b PREDICT δ 4.8-7 ppm (OR 6.0 ppm OFF TABLE)
, d of d , AREA = 1
← MAY CHOOSE 'm' INSTEAD
MATCHES 6.2 ppm OBSERVED RESONANCE

H_c PREDICT δ 4.8 - 7 ppm (OR 6.9 ppm OFF TABLE),
d of t ('m' IS fine), AREA = 1
MATCHES WELL WITH OBSERVED 6.7 ppm RESONANCE

Hd PREDICT 2.0ppm M-C=C (M=CH_2), d of t (OR 'm'), AREA=2
MATCHES OK WITH OBSERVED 2.3 ppm RESONANCE
(δ 1.55 or)
He PREDICT(δ 1.35) M-CH_2-C=C (M=CH_2) t of t ('m'), AREA=2
MATCHES OK WITH OBSERVED 1.6 ppm RESONANCE

H_f PREDICT M-C-C (NOTHING) (M=CH_3) 0.8 ppm, t, AREA = 3
MATCHES OK WITH OBSERVED 0.95 ppm RESONANCE

∴ LOOKS GOOD
∴ MUST BE 

IR ASSIGNMENTS

ν_{MAX}	2820 cm^{-1}	C–H	STRETCH	ALDEHYDE
ν_{MAX}	1690 cm^{-1}	C=O	STRETCH	CONJUGATED ALDEHYDE
ν_{MAX}	1635 cm^{-1}	C=C	STRETCH	CONJUGATED ALDEHYDE

BONUS.

- THIS CHLORIDE CAN IONIZE TO A CARBOCATION, ESPECIALLY SINCE THE CATION IS 'AROMATIC'

INITIATION

MARKOVNIKOV ADDN.

PROPAGATION

TERMINATION