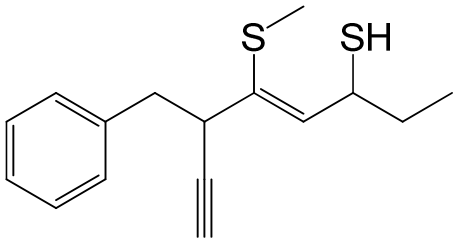
EXAM – 2 **NAME: _____Keys_____**
Spring 2018 (March 21)

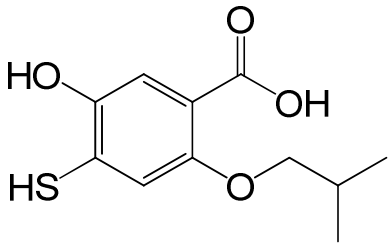
1. Name the following compounds (3 x 6 = 18 pts)

(a)



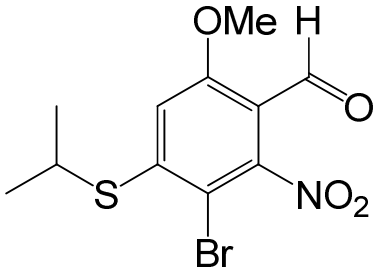
6-benzyl-5-methylthiooct-4-en-7-yne-3-thiol

(b)



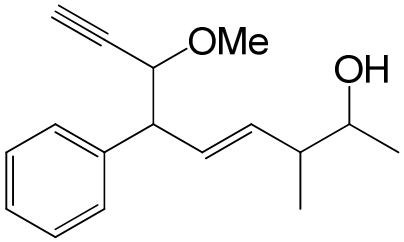
5-hydroxy-2-isobutoxy-4-mercaptobenzoic acid

(c)



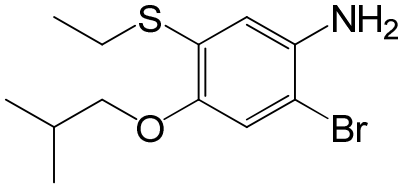
3-bromo-4-isopropylthio-6-methoxy-2-nitrobenzaldehyde

(d)



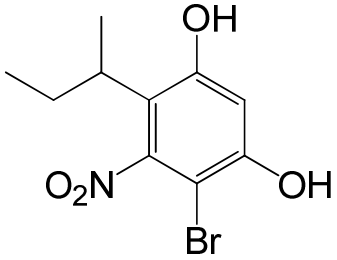
7-methoxy-3-methyl-6-phenylnon-4-en-8-yn-2-ol

(e)



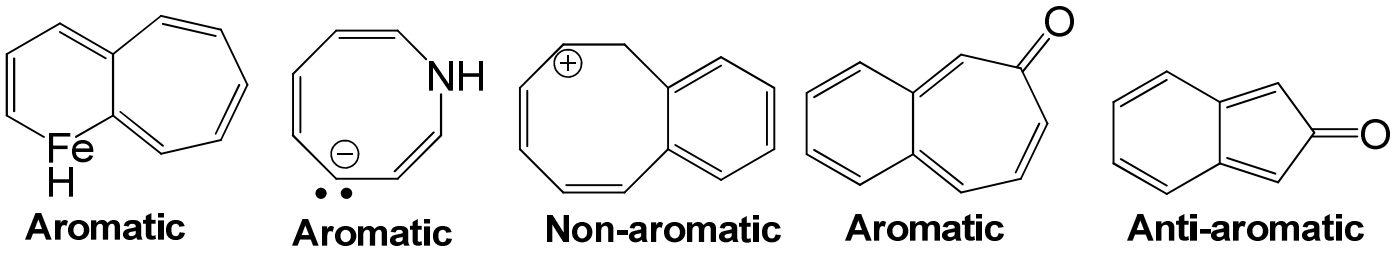
2-bromo-5-ethylthio-4-isobutoxyaniline

(f)



4-bromo-6-sec-butyl-5-nitrobenzene-1,3-diol

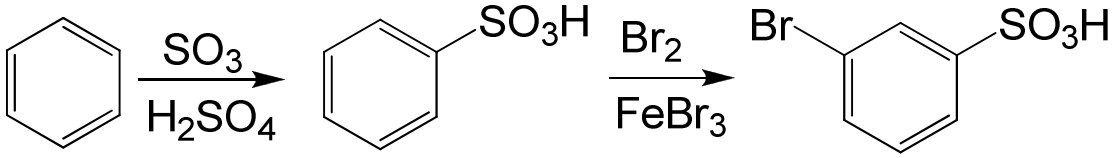
2. Classify the following molecules as aromatic, anti-aromatic or non-aromatic (5 pts)



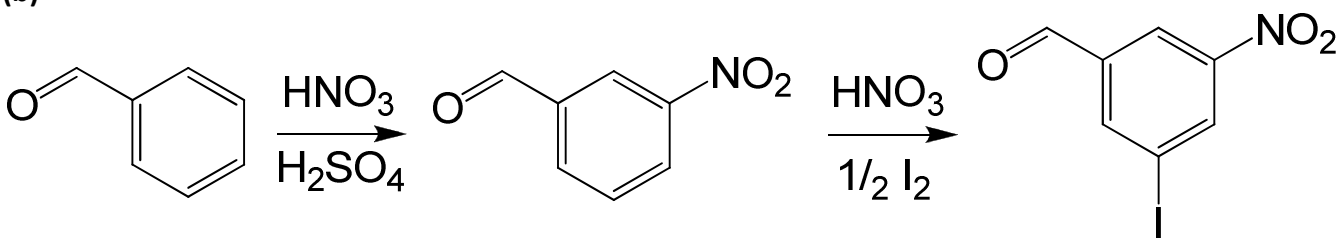
Aromatic | Aromatic | Non-aromatic | Aromatic | Anti-aromatic

3. Predict the major product(s) expected from the following reaction sequences (3 x 14 = 42 pts)

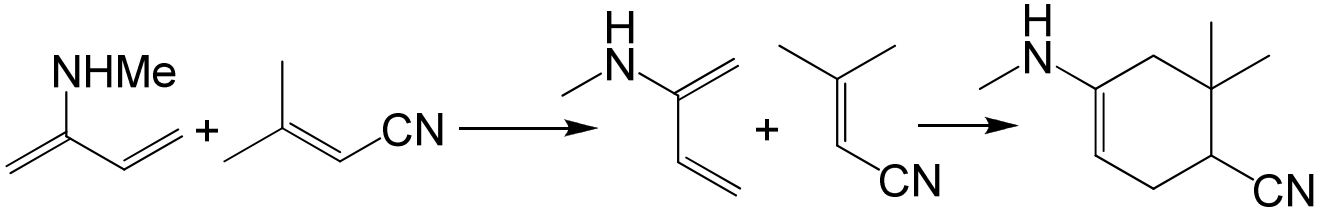
(a)



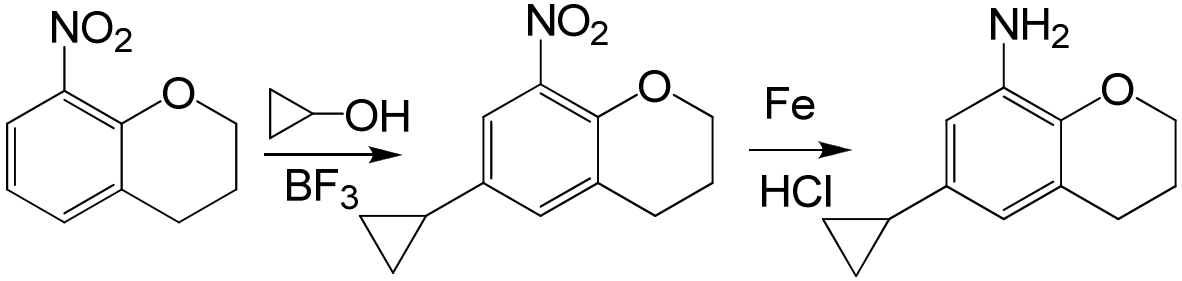
(b)



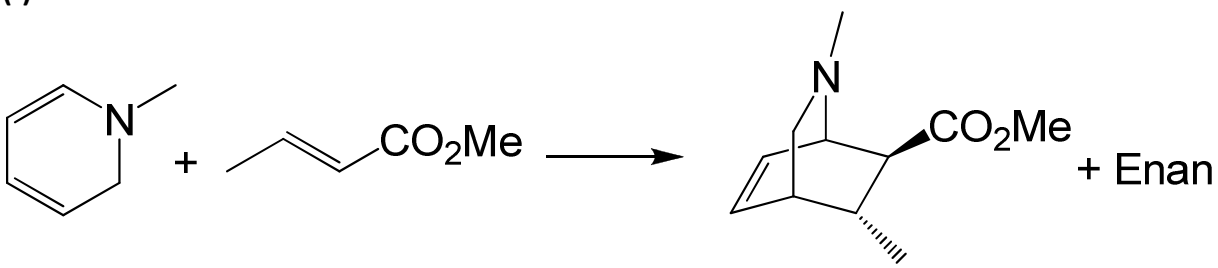
(c)



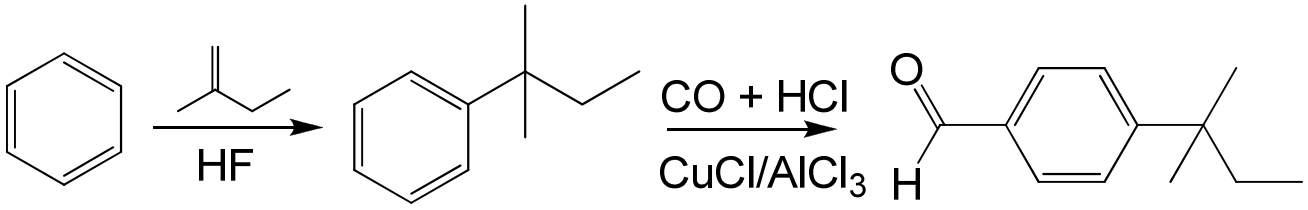
(d)



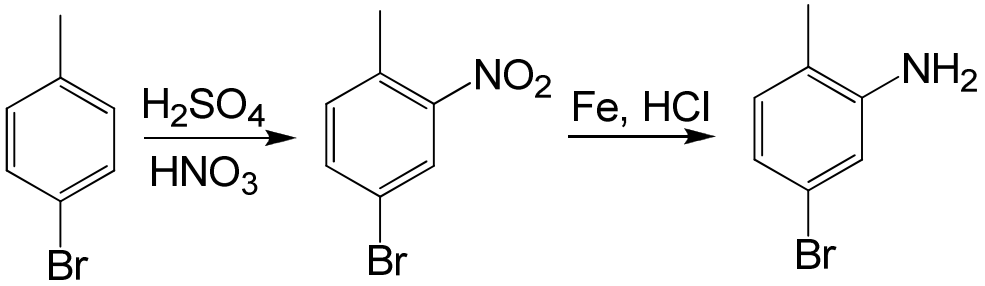
(f)



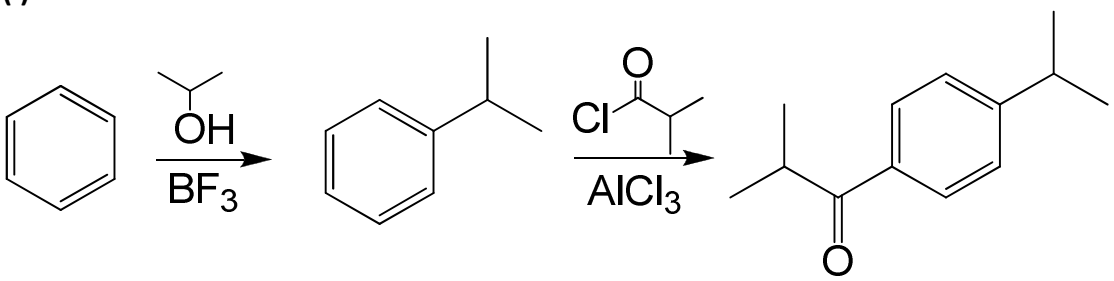
(g)


HF
CO + HCl
CuCl/AlCl3
O
H

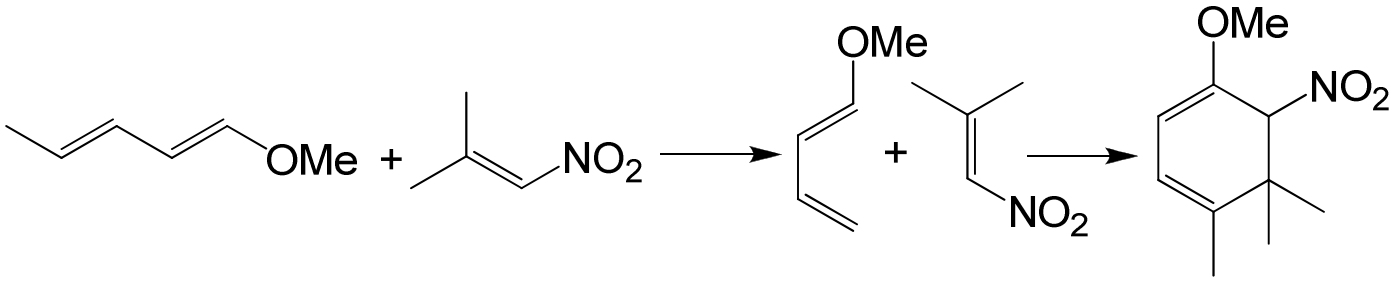
(h)


H2SO4
HNO3
NO2
Br
Fe, HCl
NH2
Br
Br

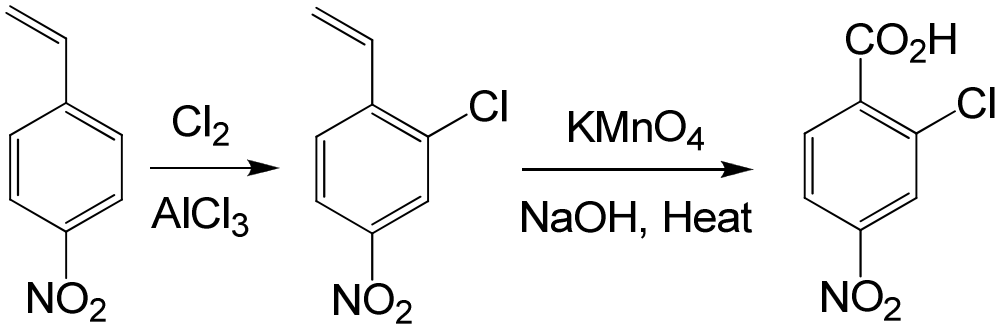
(i)


OH
BF3
O
Cl
AlCl3
O

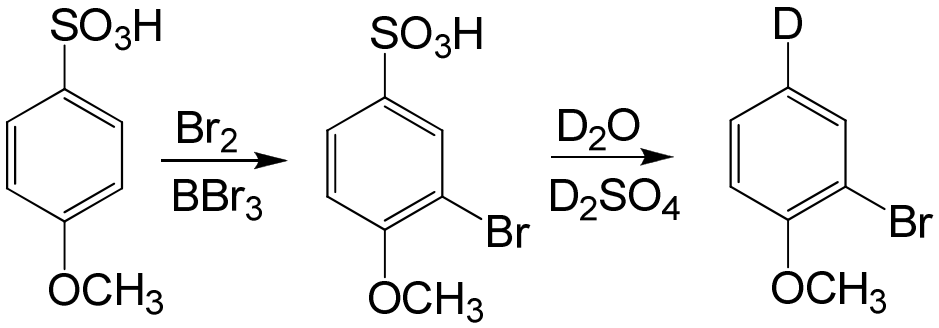
(j)


OMe
+
NO2
OMe
+
NO2
OMe
NO2

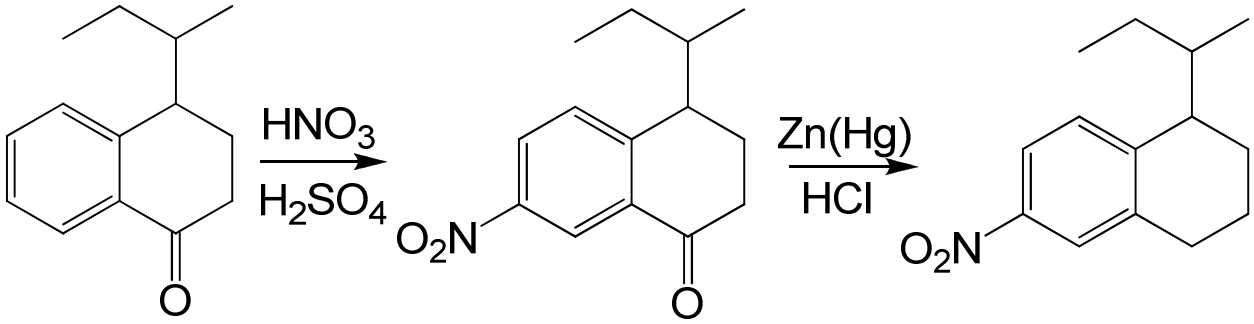
(k)


Cl2
AlCl3
Cl
NO2
KMnO4
NaOH, Heat
CO2H
Cl
NO2

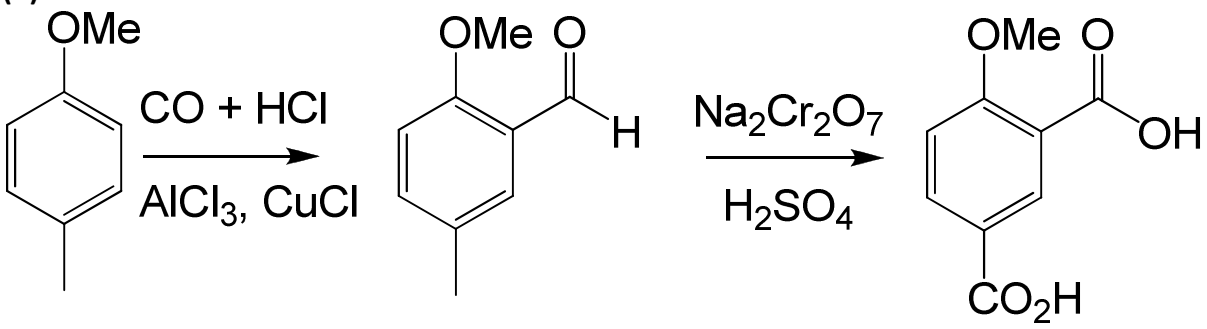
(l)


SO3H
Br2
BBr3
SO3H
Br
OCH3
OCH3
D2O
D2SO4
D
Br
OCH3

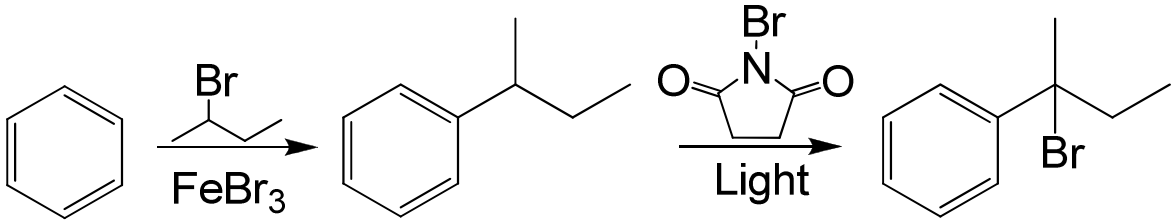
(m)


HNO3
H2SO4
O2N
O
O
Zn(Hg)
HCl
O2N

(n)

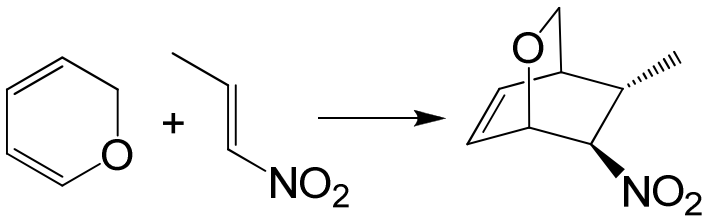

OMe
CO + HCl
AlCl3, CuCl
OMe O
H
Na2Cr2O7
H2SO4
OMe O
OH
CO2H

(o)

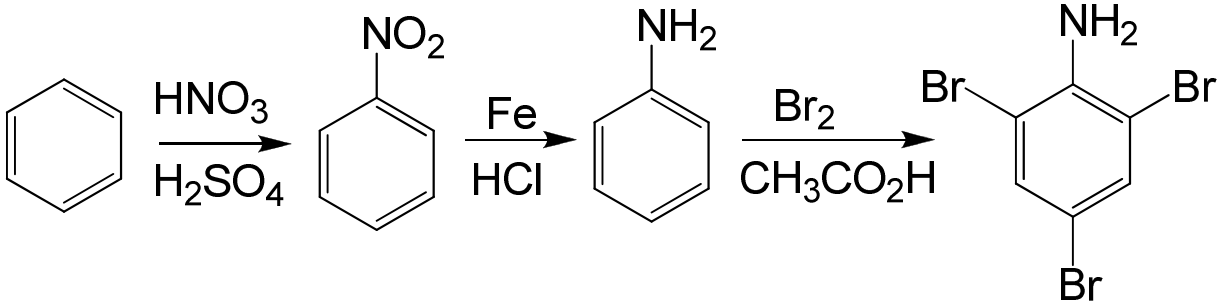

Br
FeBr3
Br
N
O
O
Light
Br

4. Show how you would synthesize each of the following compounds from the given starting material(s). **You must draw all key intermediates to receive full credit** (3 x 6 = 18 pts)

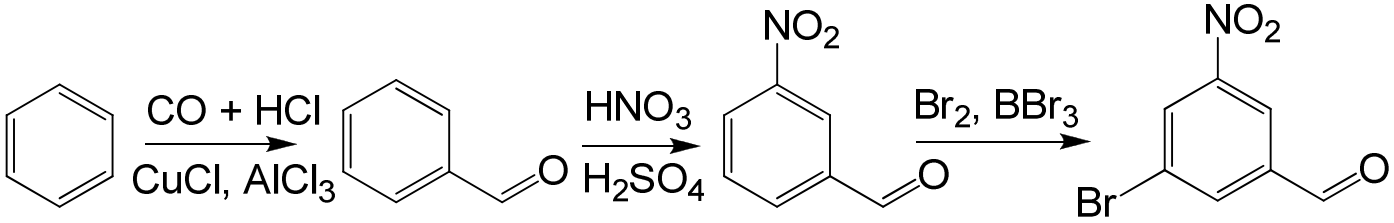
(a)



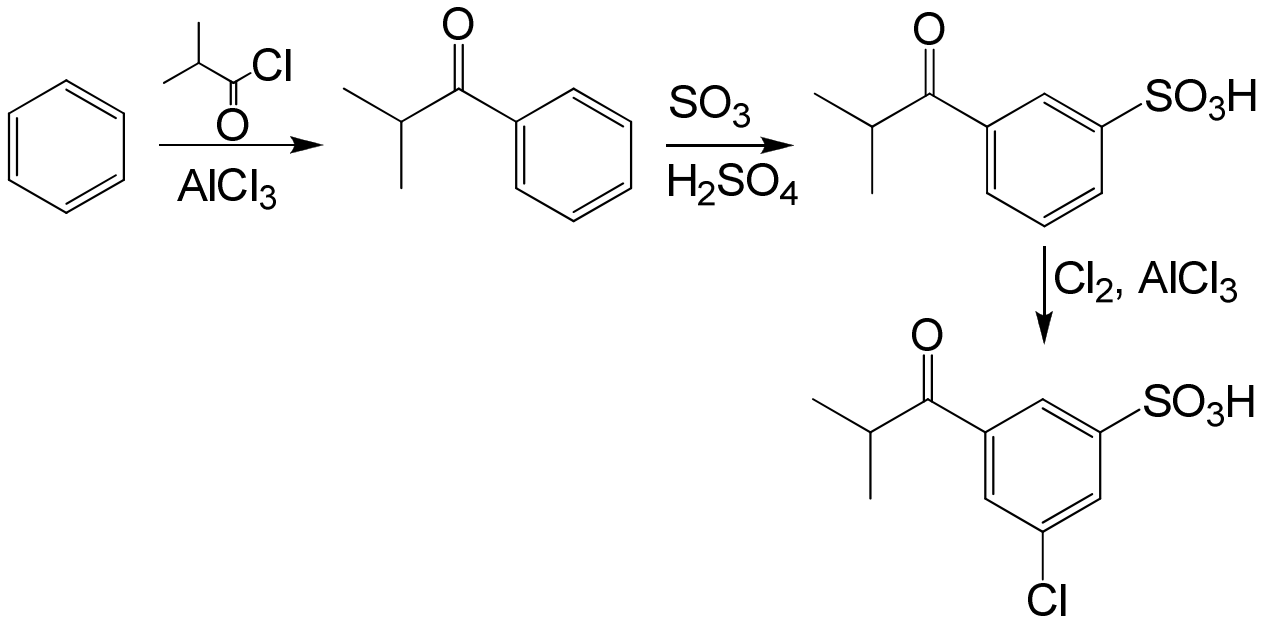
(b)



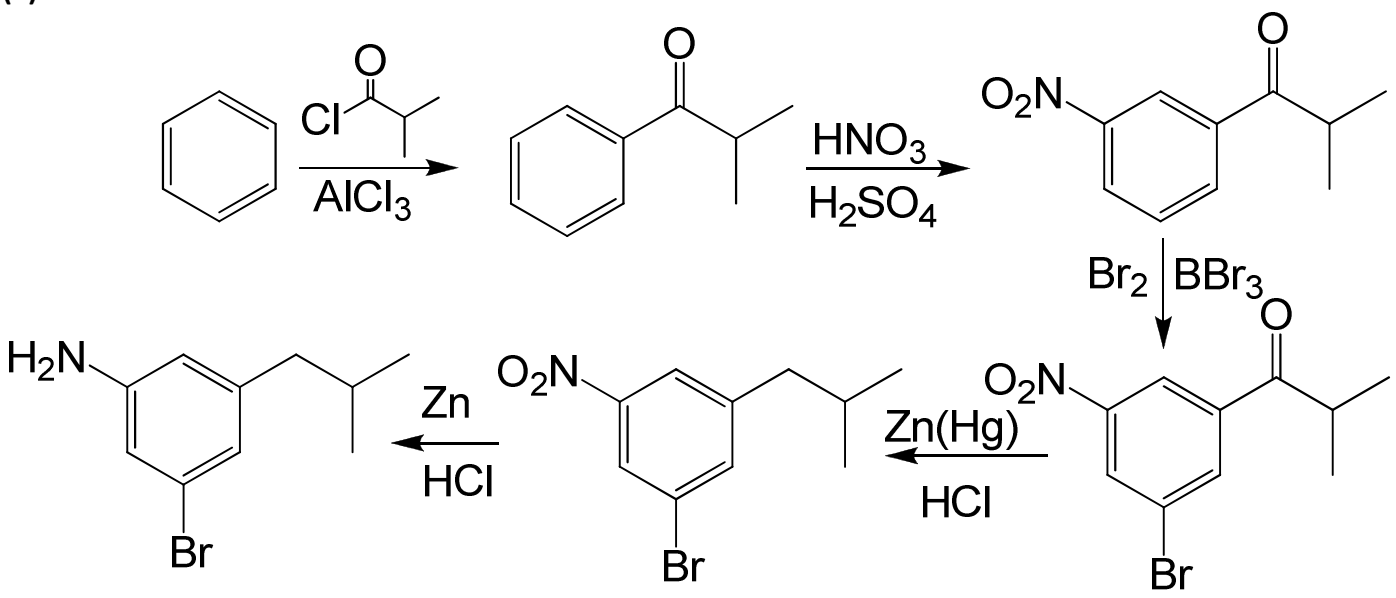
(c)



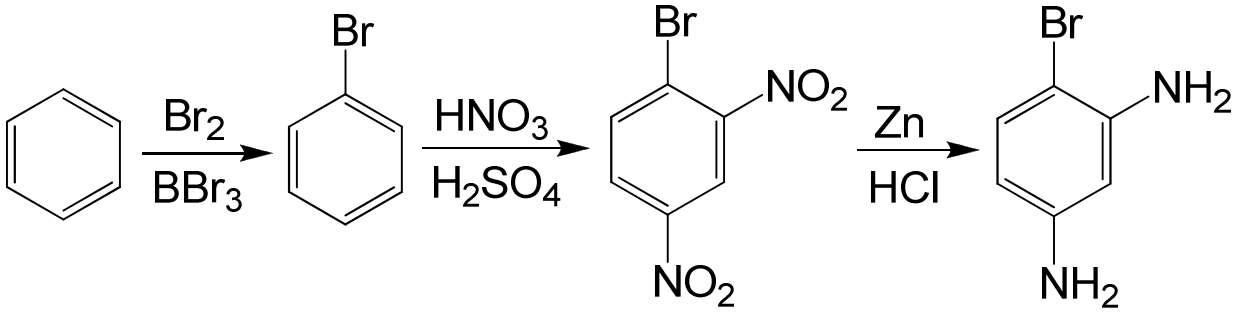
(d)



(e)

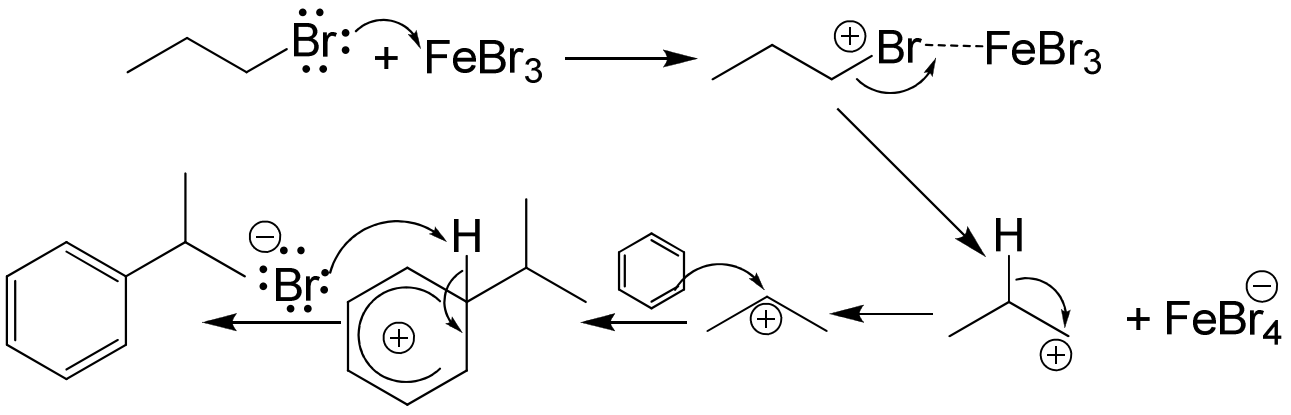


(f)

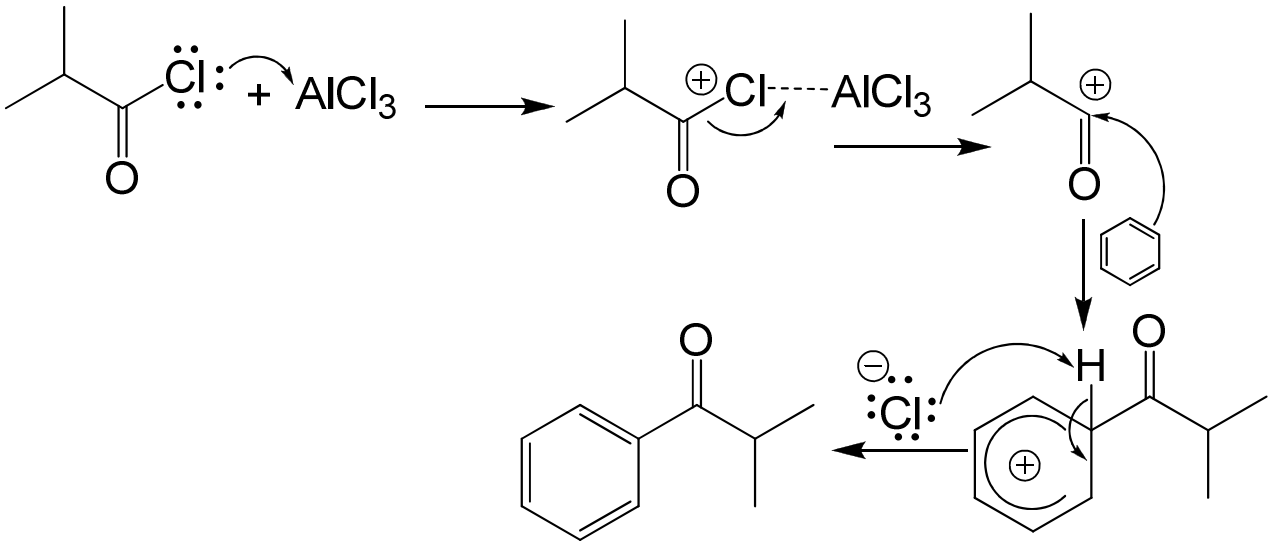


5. Propose a mechanism consistent with the following reactions (you must show all the intermediates to receive full credit) (3 x 3 = 9 pts)

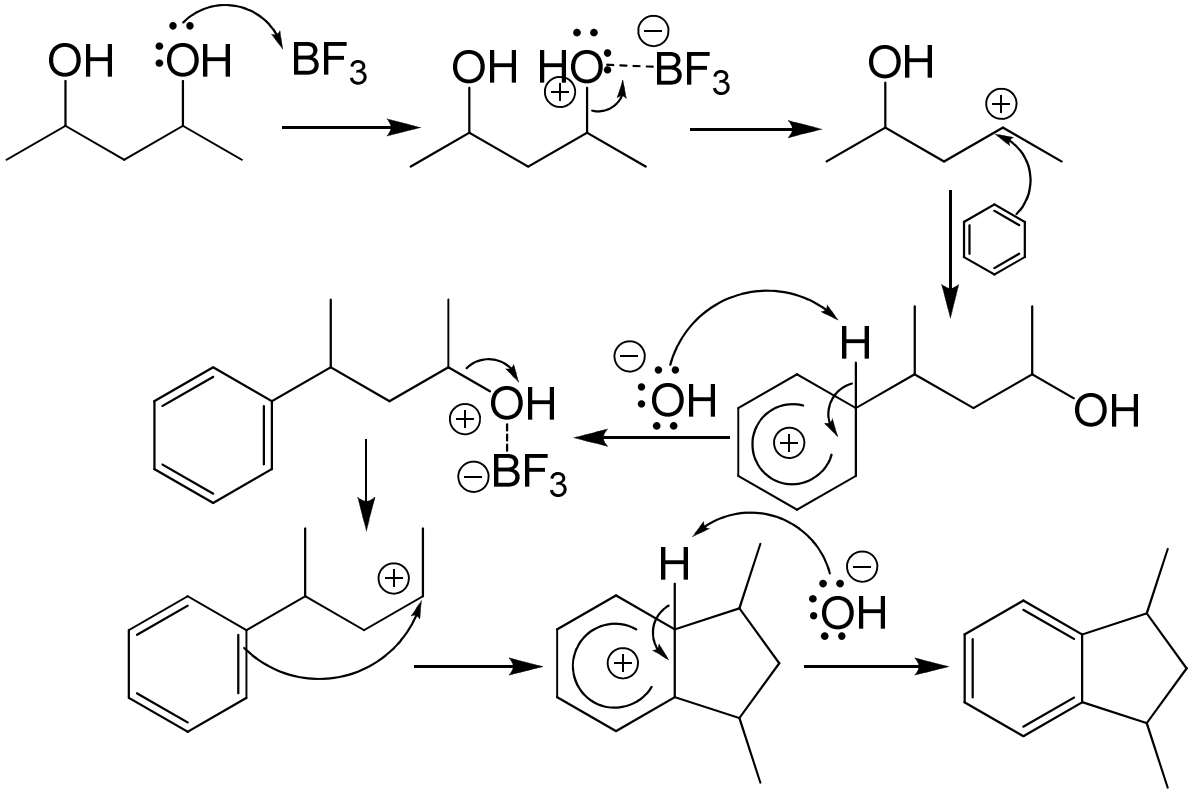
(a)



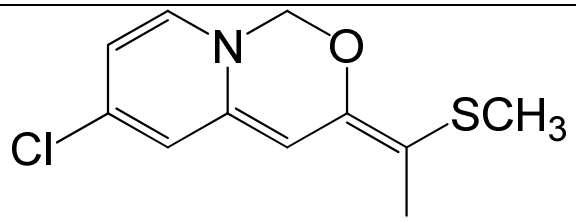
(b)


Cl
+
AlCl3
O
Cl
AlCl3
O
O
H
O
Cl
O

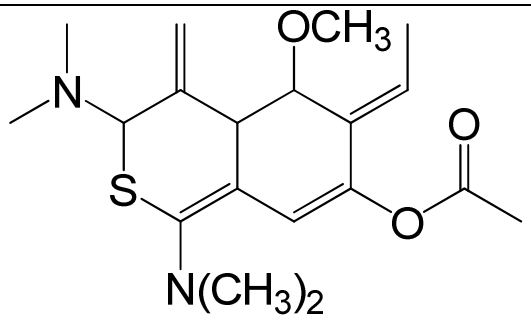
(c)


OH
OH
BF3
OH
HO
BF3
OH
H
OH
OH
OH
BF3
H
OH

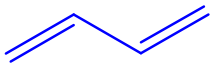
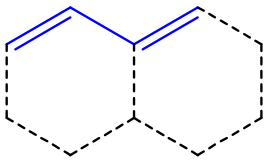
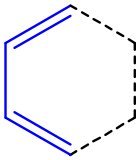
6. Use the Woodward-Fieser table to estimate the λ_{max} observed in a UV spectra of the following cross-conjugated systems (8 pts)



Parent	**253**
2 extra conjugated C=C	**60**
1 C-substituent	**5**
2 N(alkyl)$_2$	**120**
1 SCH$_3$	**30**
1 O-alkyl	**6**
1 Cl	**5**
2 exocyclic C=C	**10**
489 nm	



Parent	**214**
1 extra conjugated C=C	**30**
3 C-substituents	**15**
1 N(alkyl)$_2$	**60**
1 SCH$_3$	**30**
2 exocyclic C=C	**10**
1 ester	**0**
359 nm	

Acyclic 	**217 nm**
Heteroannular 	**214 nm**
Homoannular 	**253 nm**

For each additional conjugated double bond	**+ 30 nm**
For each exocyclic double bond	**+ 5 nm**
For each substituent	
C-substituent	**+ 5 nm**
Cl	**+ 5 nm**
Br	**+ 5 nm**
O-Alkyl	**+ 6 nm**
OCOCH$_3$	**+ 0 nm**
N(alkyl)$_2$	**+ 60 nm**
S-alkyl	**+ 30 nm**
Solvent correction	**+ 0 nm**