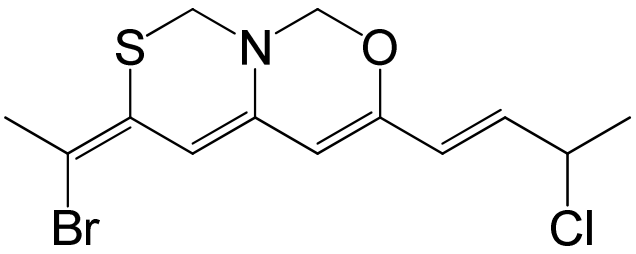
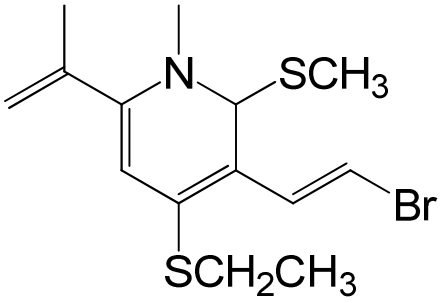
EXAM – 2 **NAME:** _____

Fall 2017 (October 19)

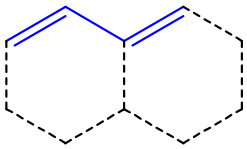
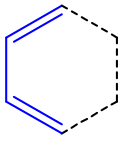
1. Use the Woodward-Fieser table to estimate the λ_{max} observed in a UV spectra of the following cross-conjugated systems (6 pts)



Parent	**214**
2 Extra C=C	**60**
S-alkyl	**30**
N(Alkyl)$_2$	**60**
Br	**5**
O-alkyl	**6**
2 Alkyls	**10**
Exocyclic C=C	**10**
	395



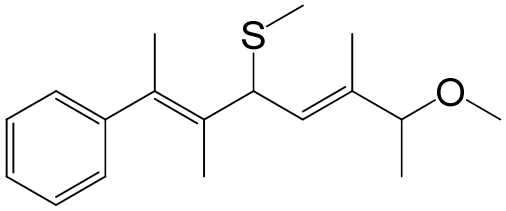
Parent	**253**
2 Extra C=C	**60**
S-CH$_2$CH$_3$	**30**
N(Alkyl)$_2$	**60**
Br	**5**
2 Alkyls	**10**
	418

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 Cl Br O-Alkyl OCOCH$_3$ N(alkyl)$_2$ S-alkyl	 **+ 5 nm** **+ 5 nm** **+ 5 nm** **+ 6 nm** **+ 0 nm** **+ 60 nm** **+ 30 nm**
Solvent correction	**+ 0 nm**

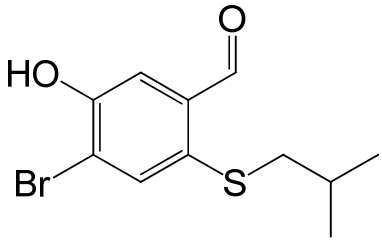
2. Name the following compounds (3 x 6 = 18 pts)

(a)



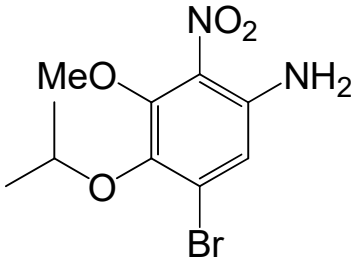
7-methoxy-3,6-dimethyl-4-methylthio-2-phenylocta-2,5-diene

(b)



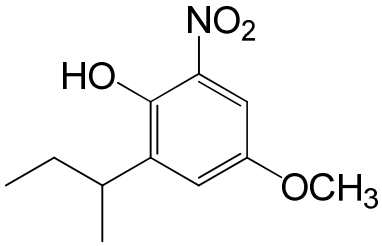
4-bromo-5-hydroxy-2-(isobutylthio)benzaldehyde

(c)



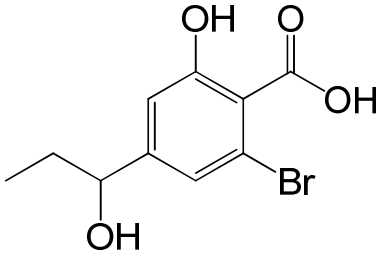
5-bromo-4-isopropoxy-3-methoxy-2-nitroaniline

(d)



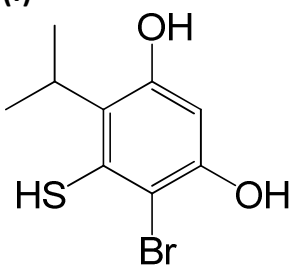
2-sec-butyl-4-methoxy-6-nitrophenol

(e)



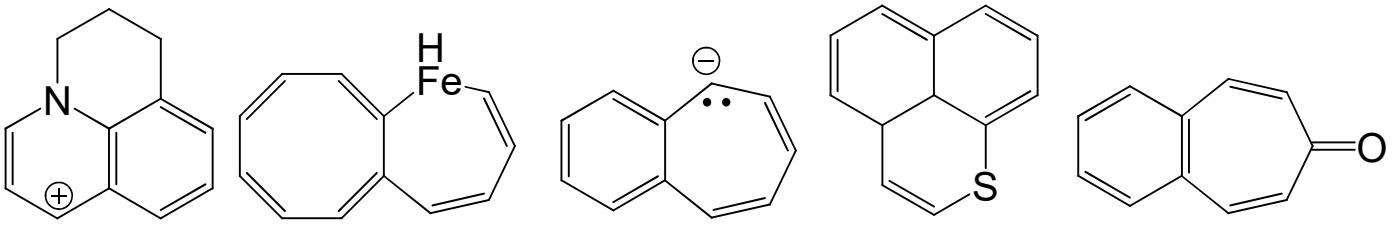
2-bromo-6-hydroxy-4-(1-hydroxypropyl)benzoic acid

(f)



4-bromo-6-isopropyl-5-mercaptobenzene-1,3-diol

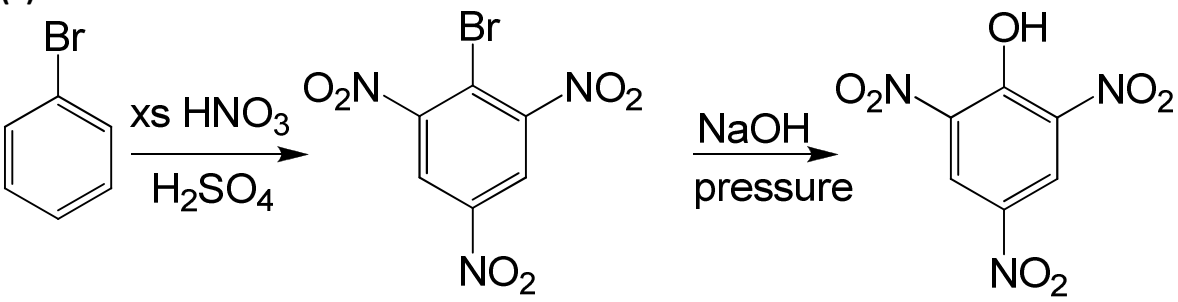
3. Classify the following molecules as aromatic, anti-aromatic or non-aromatic (5 pts)



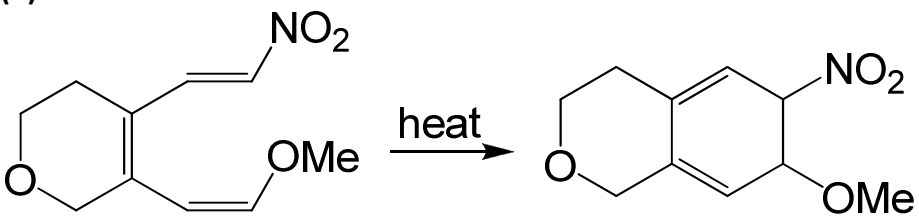
Aromatic **Antiaromatic** **Antiaromatic** **Non-aromatic** **Aromatic**

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

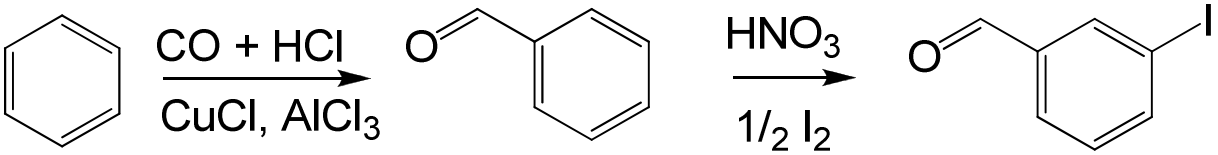
(a)



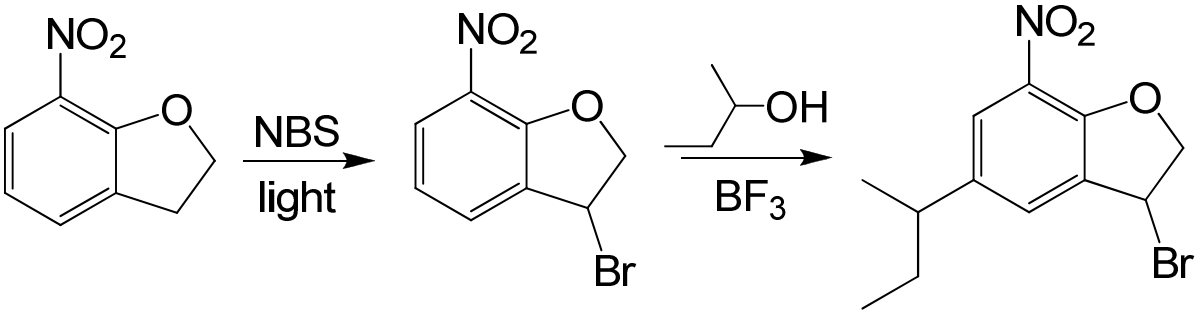
(b)



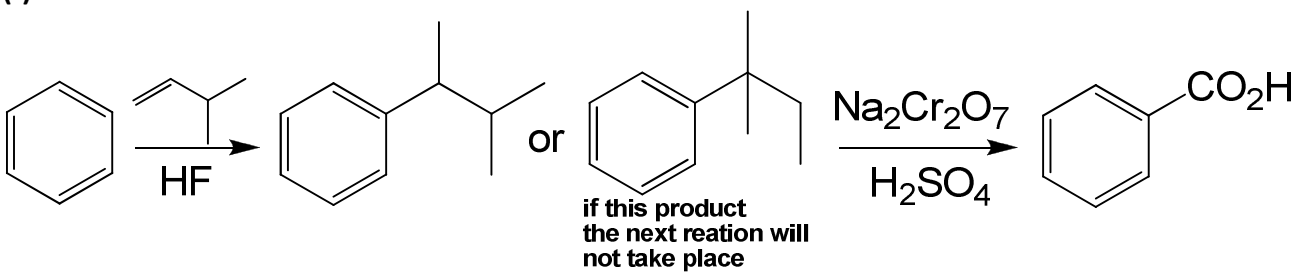
(c)



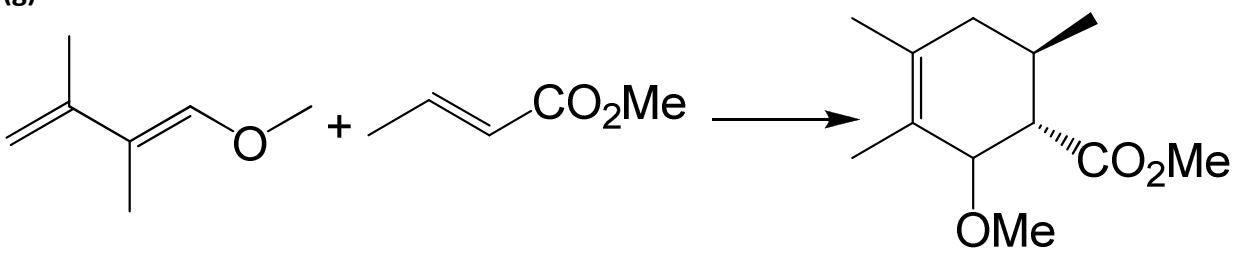
(d)



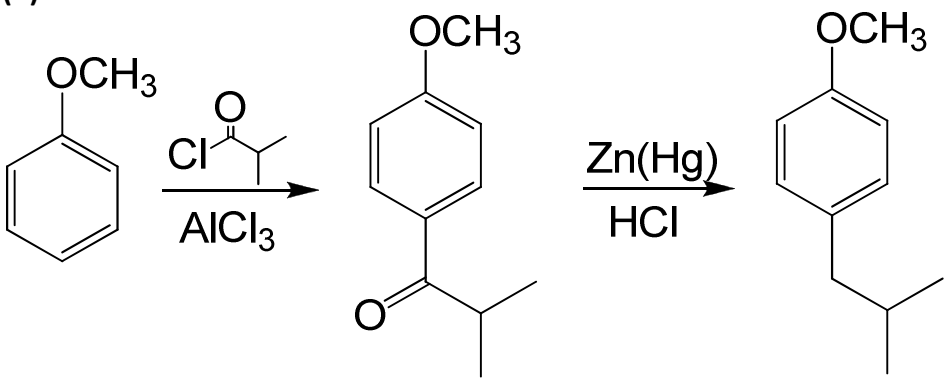
(f)


HF
or
if this product
the next reation will
not take place
$Na_2Cr_2O_7$
H_2SO_4
CO_2H

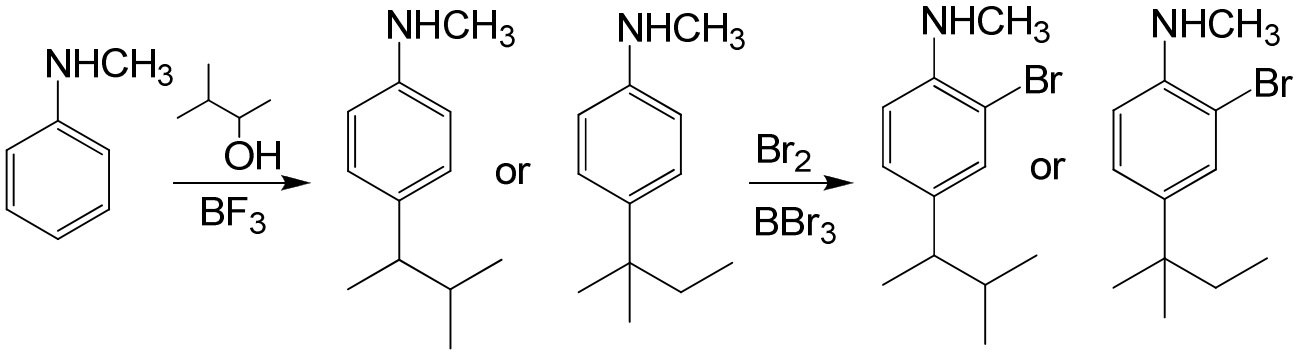
(g)


O
+
CO_2Me
CO_2Me
OMe

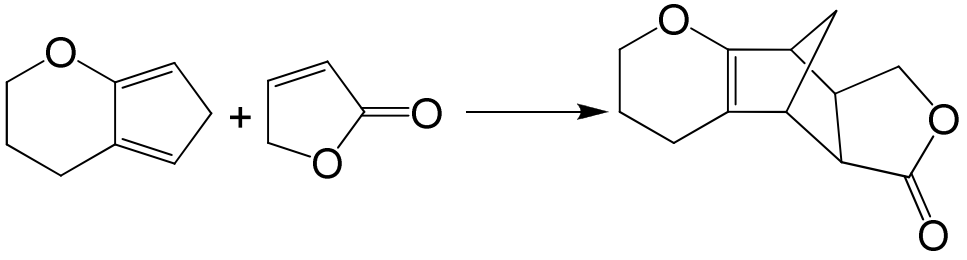
(h)


OCH_3
O
Cl
$AlCl_3$
OCH_3
O
Zn(Hg)
HCl
OCH_3

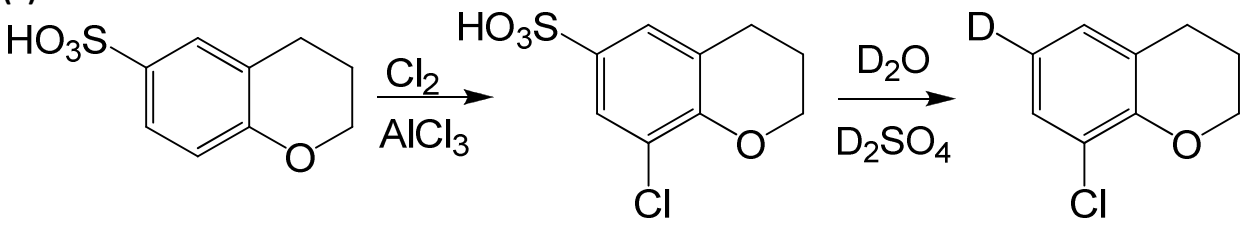
(i)


$NHCH_3$
OH
BF_3
$NHCH_3$
or
$NHCH_3$
Br_2
BBr_3
$NHCH_3$
Br
or
$NHCH_3$
Br

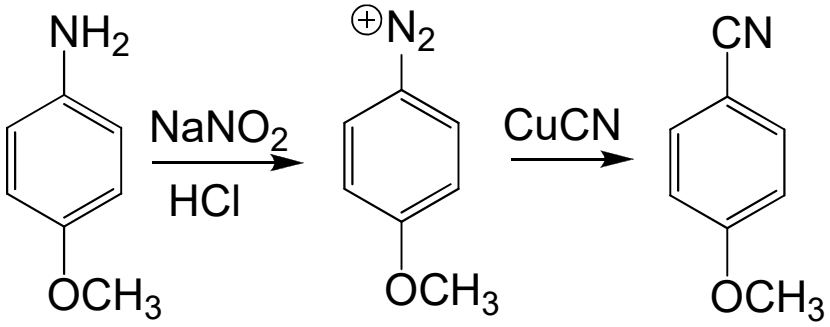
(j)


O
+
O
O
O
O
O

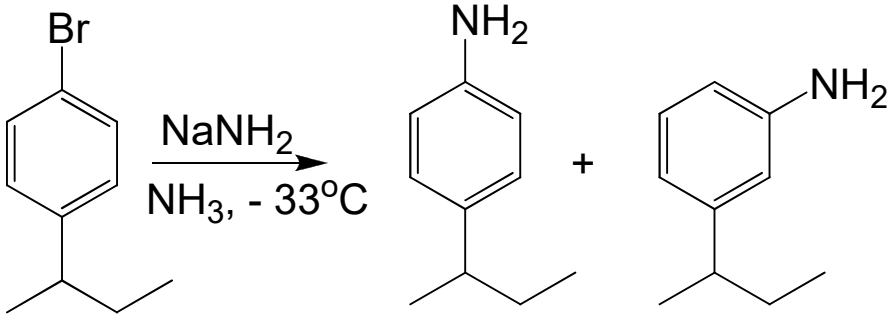
(k)


HO3S
Cl2
AlCl3
HO3S
Cl
D2O
D2SO4
D
Cl

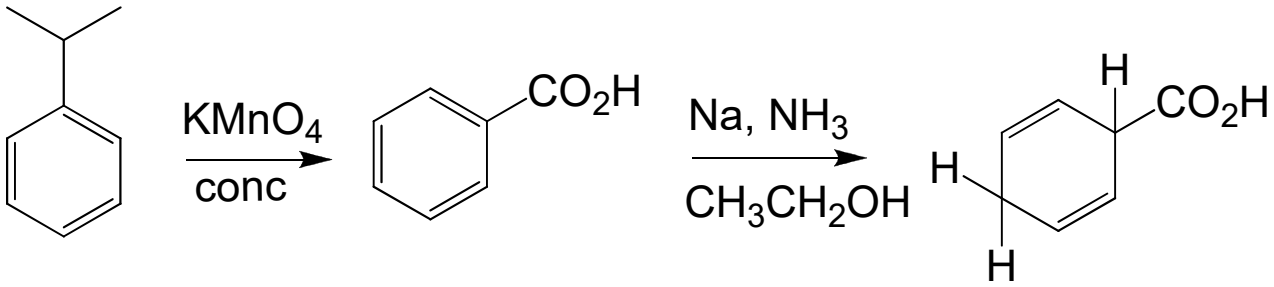
(l)


NH2
NaNO2
HCl
⊕N2
CuCN
CN
OCH3
OCH3
OCH3

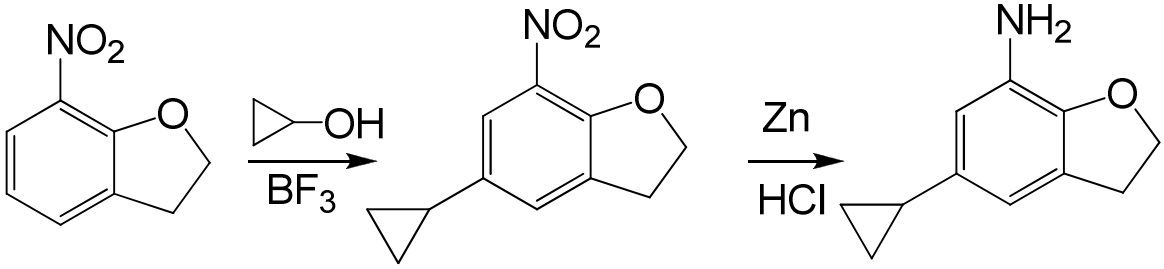
(m)


Br
NaNH2
NH3, - 33°C
NH2
+
NH2

(n)

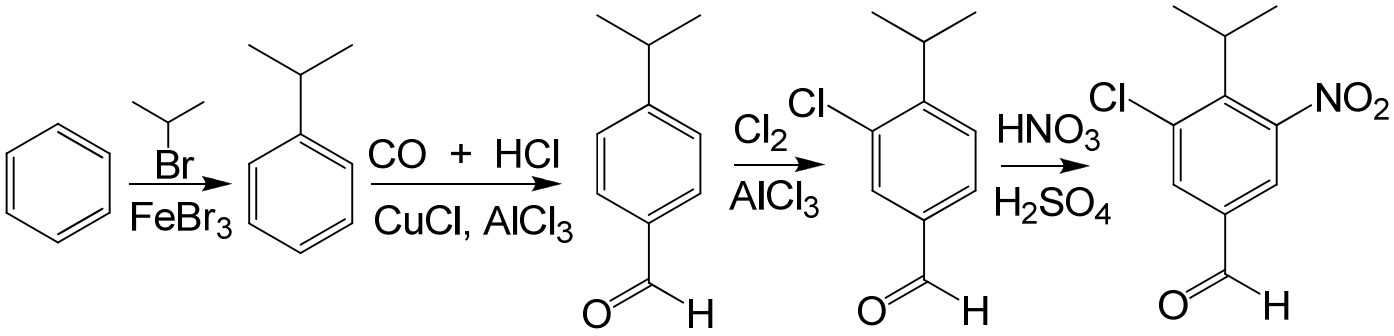

KMnO4
conc
CO2H
Na, NH3
CH3CH2OH
H
CO2H
H
H

(o)

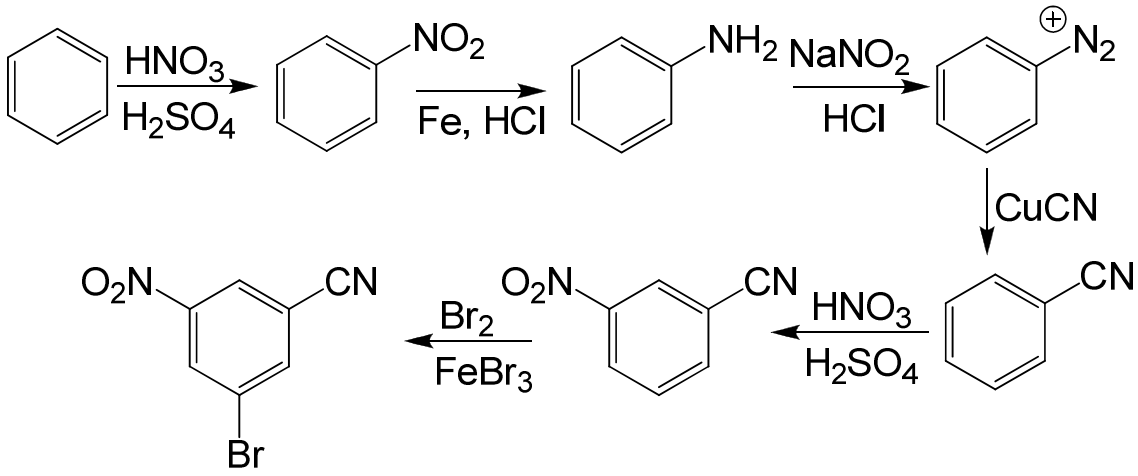

NO2
O
OH
BF3
NO2
O
Zn
HCl
NH2
O

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

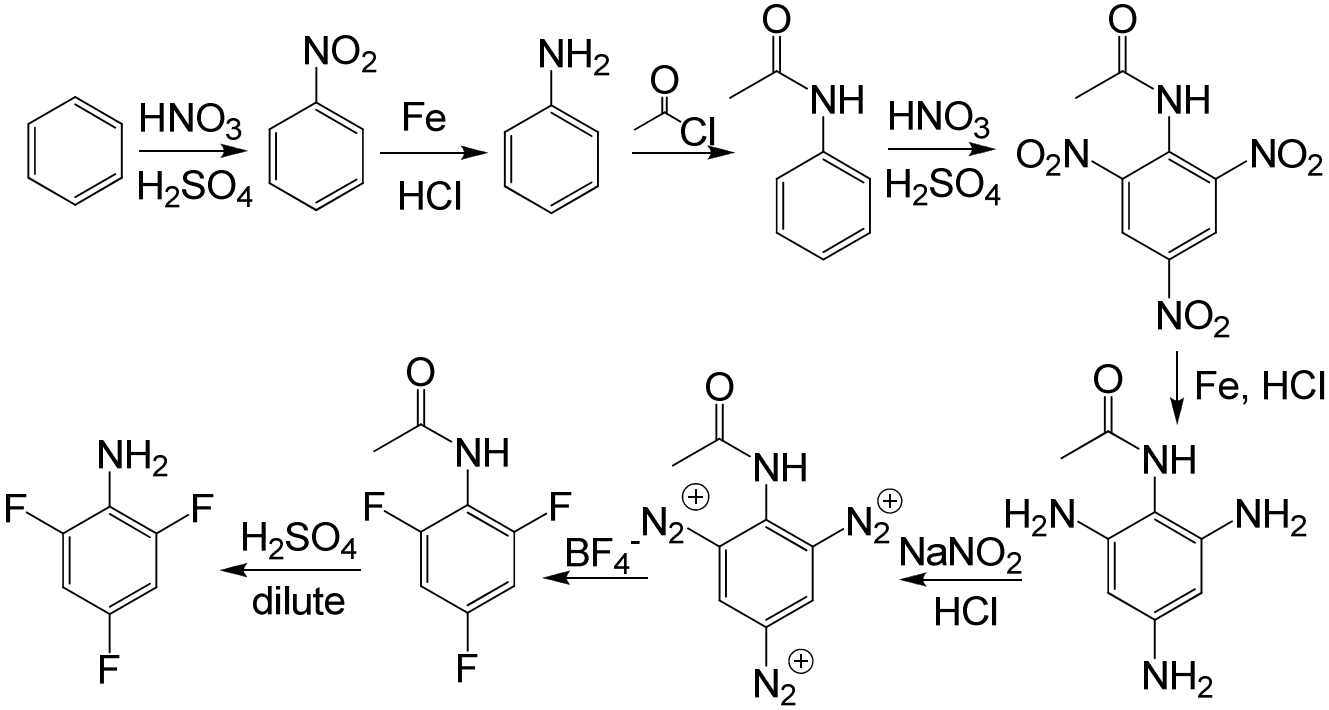
(a)



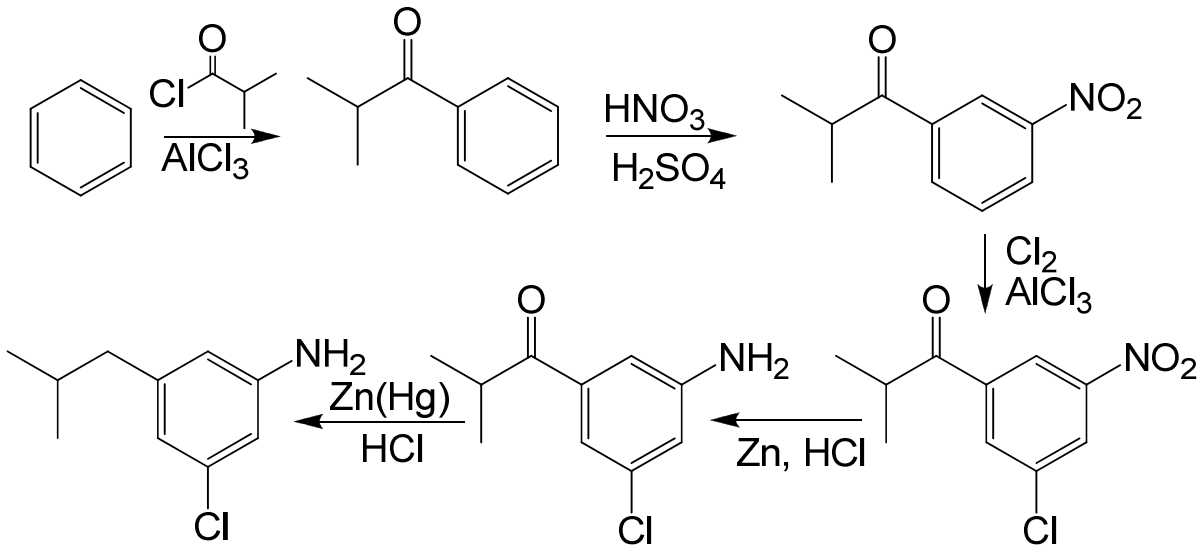
(b)



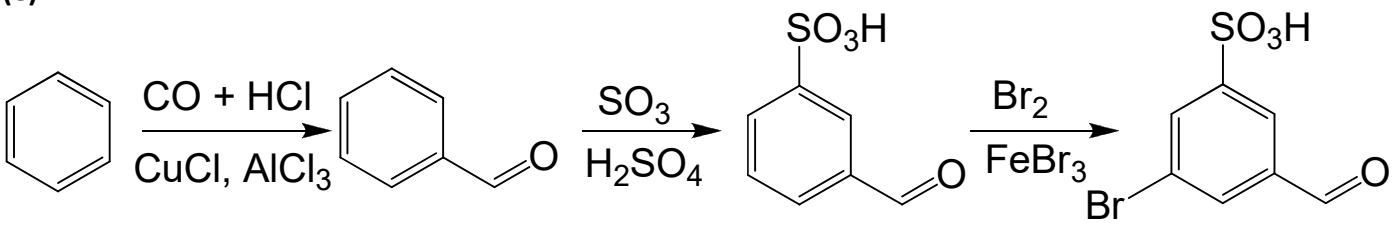
(c)



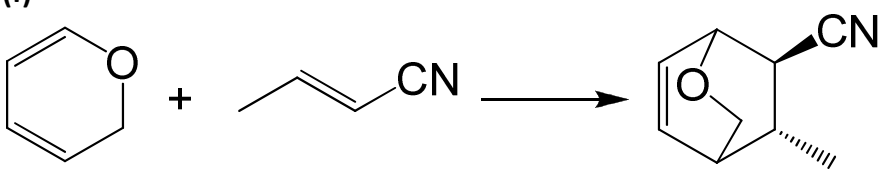
(d)



(e)

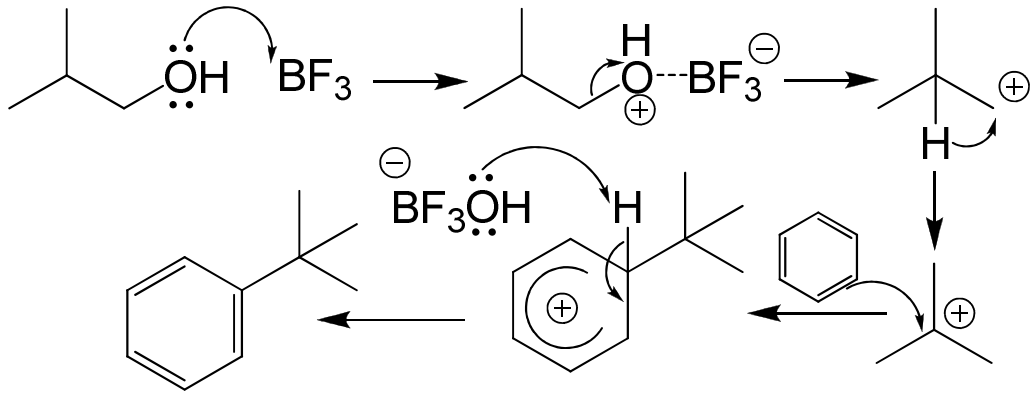


(f)

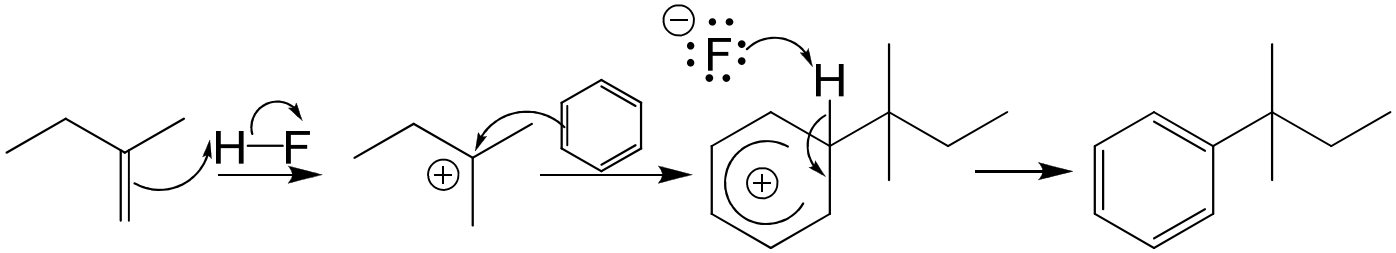


6. Propose a mechanism consistent with the following reactions (you must show all the intermediates to receive full credit) (3 x 3 = 9 pts)

(a)



(b)



(c)