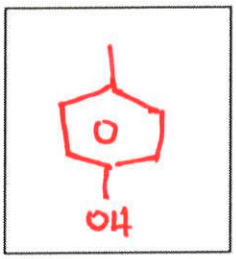
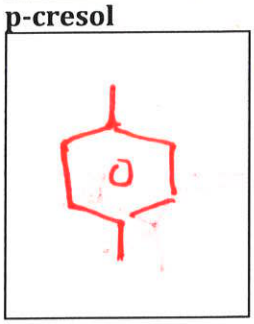
Your Name: Answers

2.1 Nomenclature (10 pts)

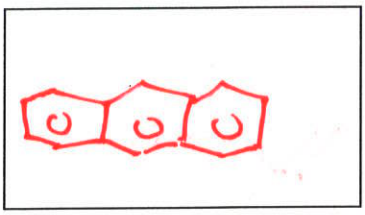
Name or provide the structure for the compounds below. (1 point each/10 pts total)



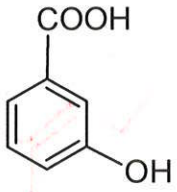
p-cresol



p-xylene

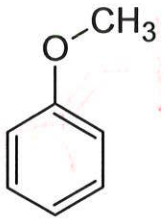


anthracene



m-salicylic acid

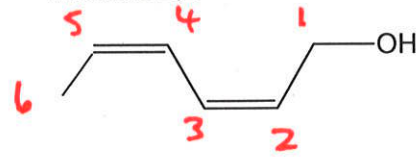
common name



anisole

common name

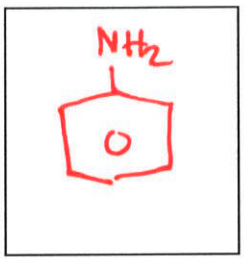
include E,Z



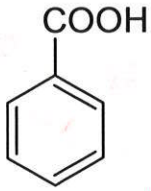
(Z,Z)

2,4- hexadien-1-ol

IUPAC (include E,Z)



aniline



Benzoic Acid

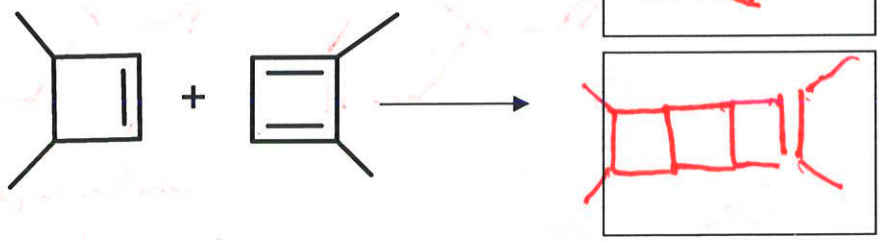
common name

2.2. Diene cycloaddition chemistry (8 points)

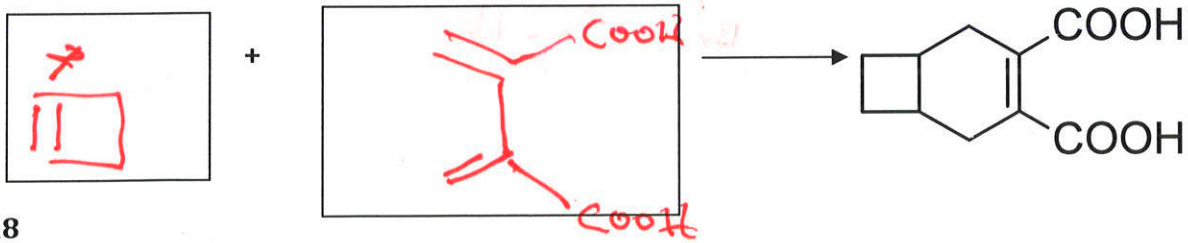
Predict the products in the cycloadditions below: (2 pts per box)

a)

b)



c)

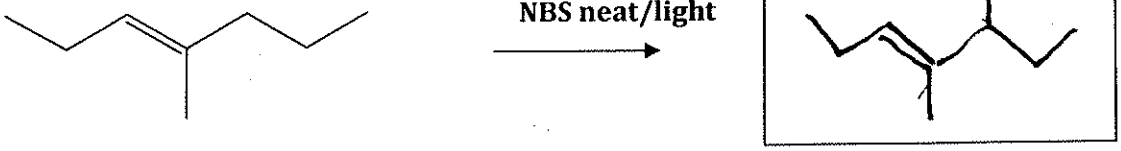


___/18

2.3. Classical Diene and Allyl Chemistry (12 pts)

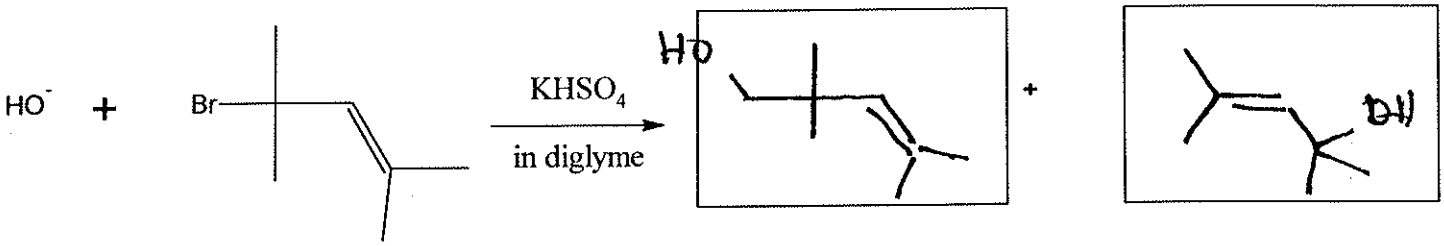
2.3.1. Allyl Radical chemistry (2 pts)

Predict the **most likely** product:



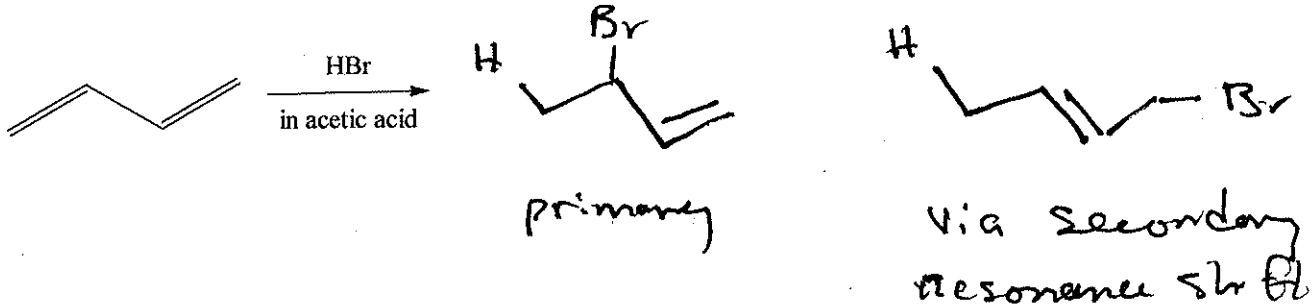
2.3.2. Allylic carbocation chemistry (4 pts)

a) Predict the unique alcohol products of the carbocation reaction below (2 pt each)

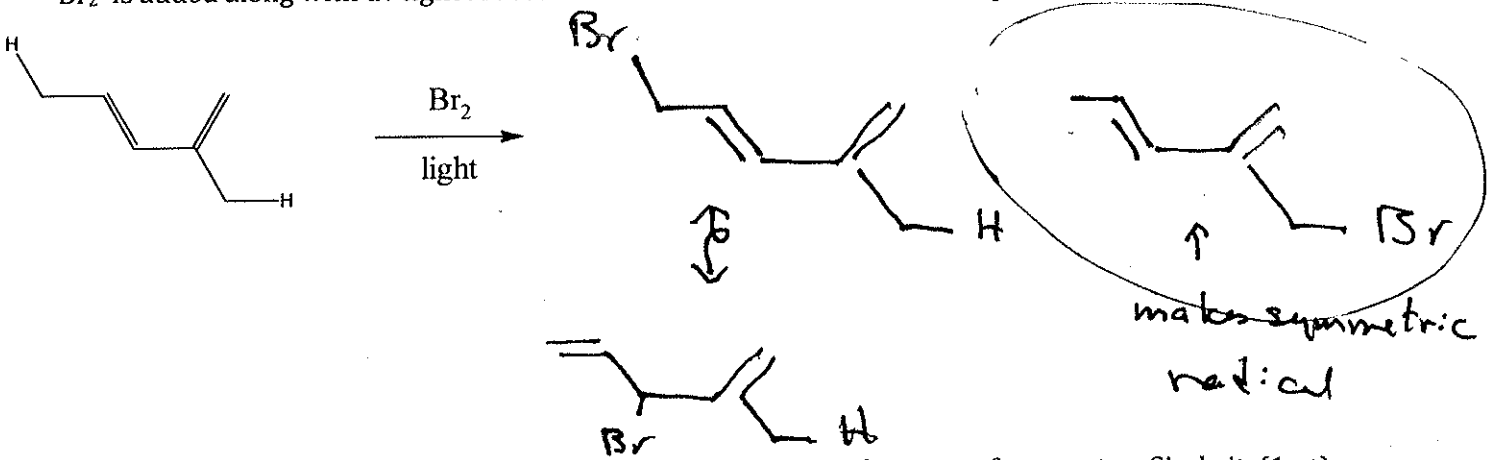


2.3.3. Classic Diene Chemistry (6 pts)

a) Predict the unique monobromo addition products of the carbocation- based reaction below (1 pt each)



b)The diene below undergoes radical substitution of the indicated H atoms when a low concentration of Br_2 is added along with uv light . Predict all the monobromo-substitution products. (3 pts)



b) One of the products above is expected to be most likely to form because of symmetry. Circle it (1 pt)

_____/12

2.4 Aromaticity: the big picture (10 pts)

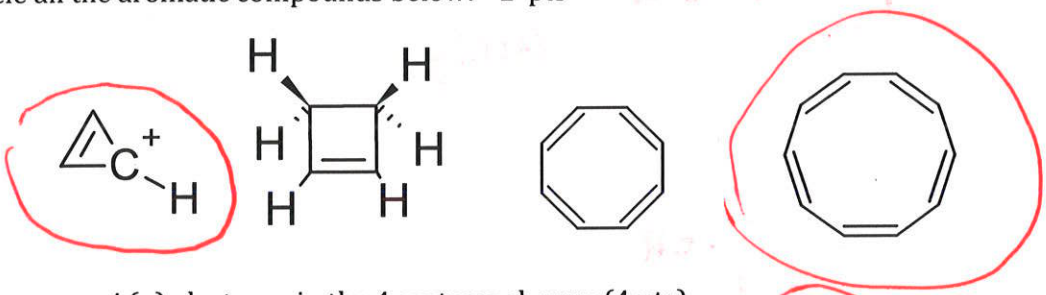
1) What 3 criteria must be met for a molecule to exhibit aromatic character ? (3 pts)

a) rigidly flat

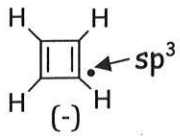
b) alternate double-single bonds

c) πe^- count $= 4n+2$ $\quad n = 0, 1, 2 \ldots$

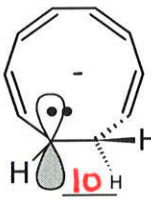
2) Circle all the aromatic compounds below: 2 pts

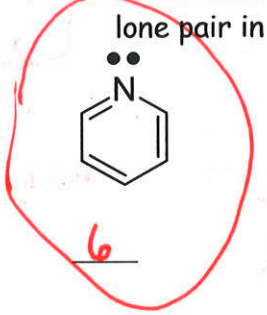


4) How many pi (π) electrons in the 4 systems shown: (4 pts)

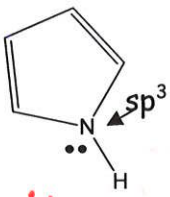


4





6



4

π electrons

5) circle the compound(s) in above that is/are also aromatic (1 pt)

2.5. Aromatic, Electrophilic Reactions (30 pts)

2.5.1. Making Lewis acids for electrophilic aromatic substitution (1 pt each/2 pts total)

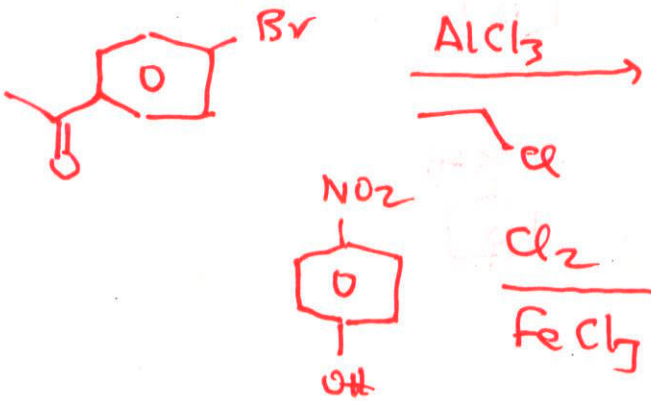
a) How do you make CH_3^+ ?

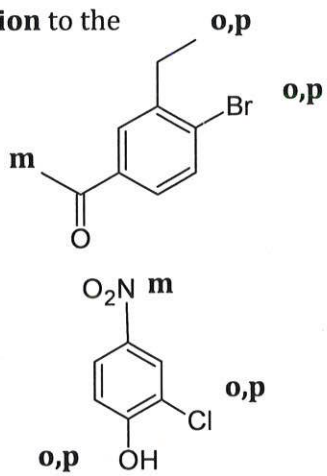
$$CH_3Cl + AlCl_3 \rightarrow CH_3^+ + AlCl_4^-$$

b) How do you make HSO_3^+? $\quad SO_3 + H_2SO_4 \rightarrow HSO_3^+ + HSO_4^-$

2.5.2 One Step Programs (4 pts)

Given the directing properties by each group, provide the most likely **one step reaction** to the compounds on the right: (2 pts each/4 pts total)

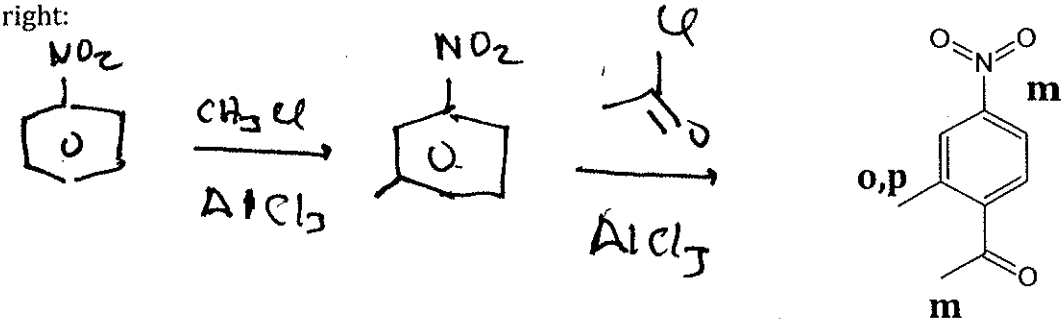




_____/16

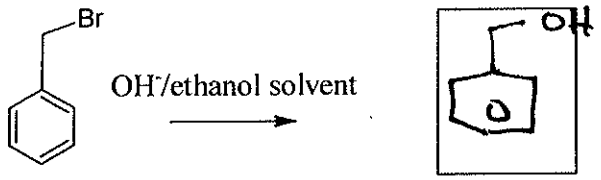
2.5.3. Two step program (3 pts)

Given the directing properties by each group, provide the most likely **two step reaction** to the compound on the right:

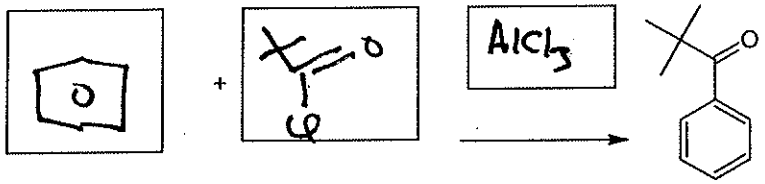


2.5.4. Aromatic Reaction Boxing (21 points)

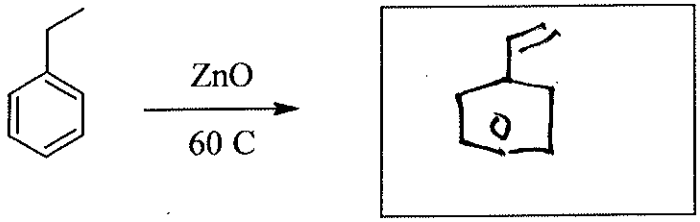
1)



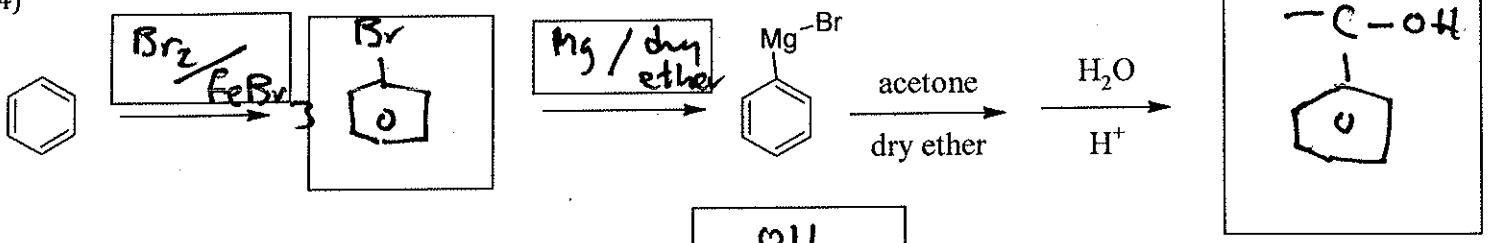
2)



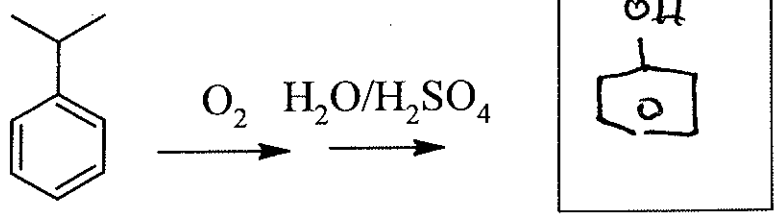
3)



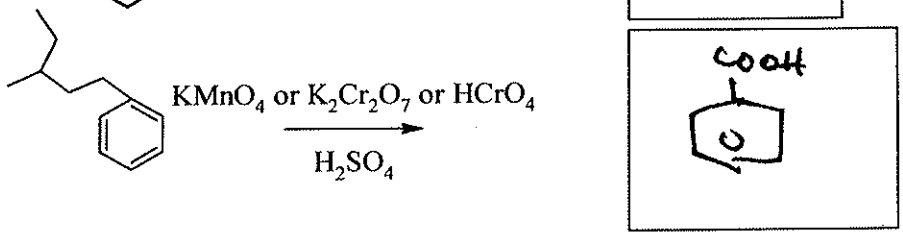
4)

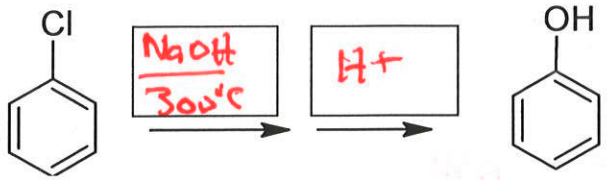


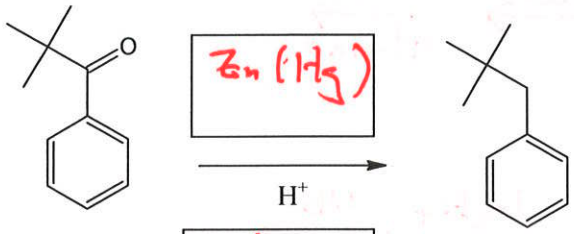
5)

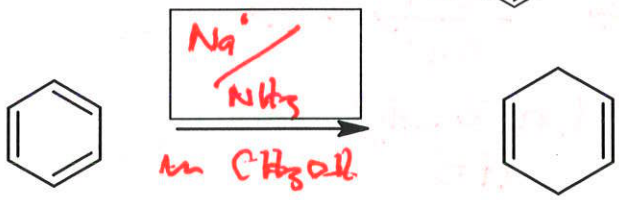


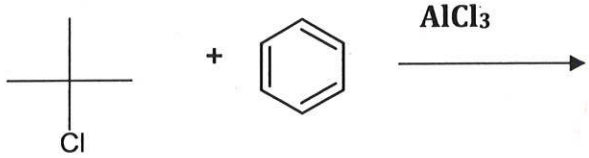
6)

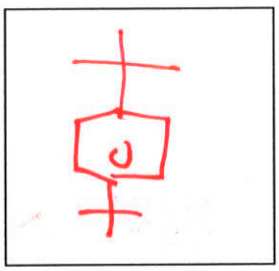


7) 

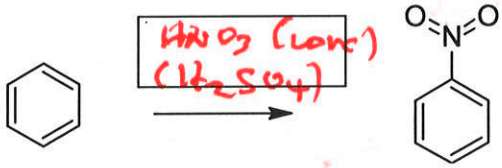
8) 

9) 

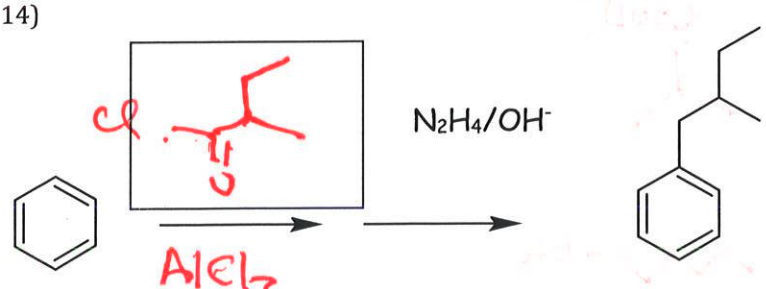
11) **2** 

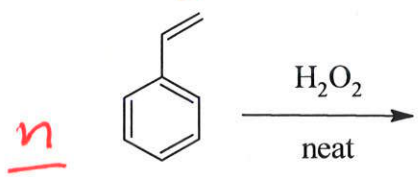


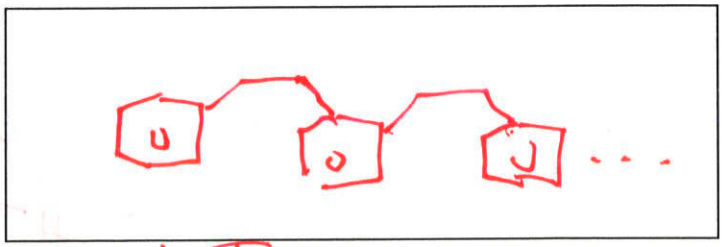
remember that t-butyl is o,p directing

12) 

13) 

14) 

15) 



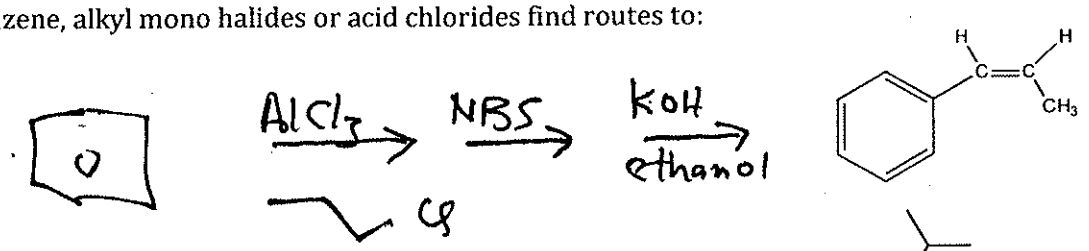
name me : polystyrene

__/10

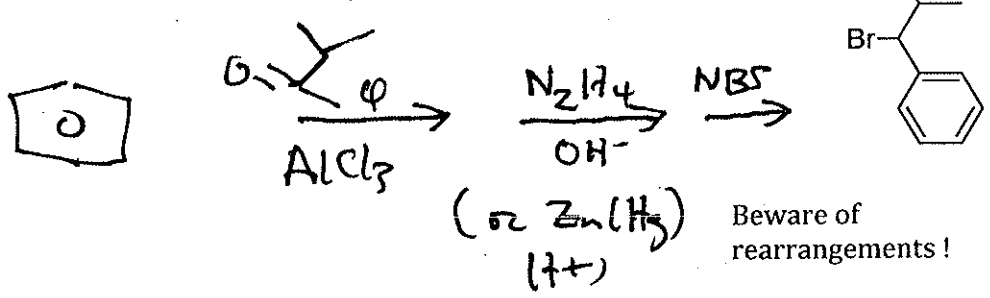
2.5.5 Building Hooks and Handles 5 pts each (15 points total)

Starting from benzene, alkyl mono halides or acid chlorides find routes to:

1)

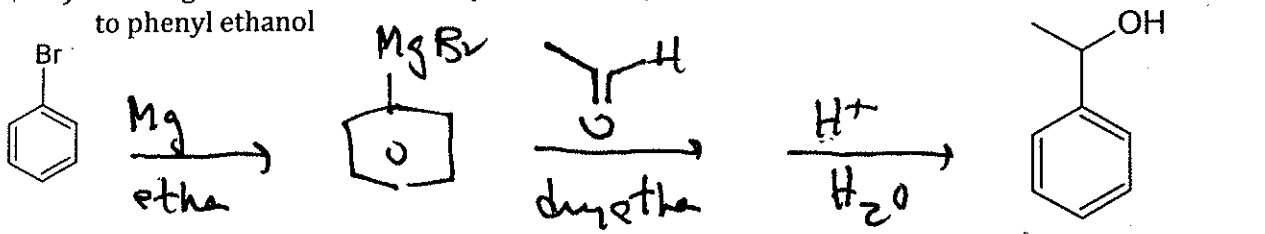


2)



Beware of rearrangements !

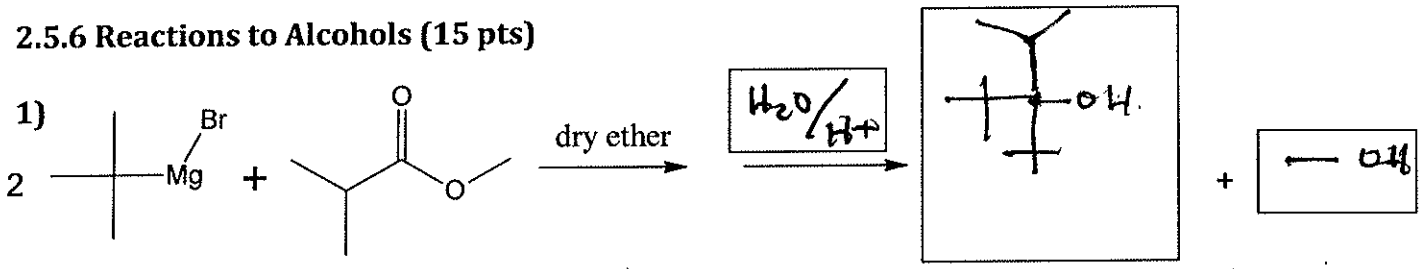
3) Starting from bromobenzene (shown below) and any other compounds you might need, suggest a route to phenyl ethanol



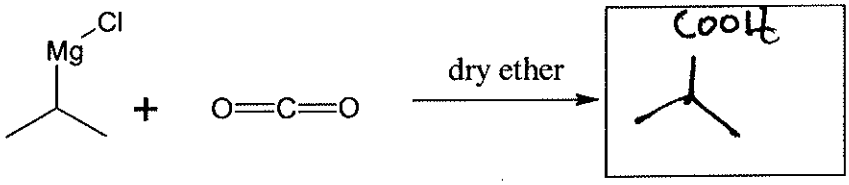
phenyl ethanol

2.5.6 Reactions to Alcohols (15 pts)

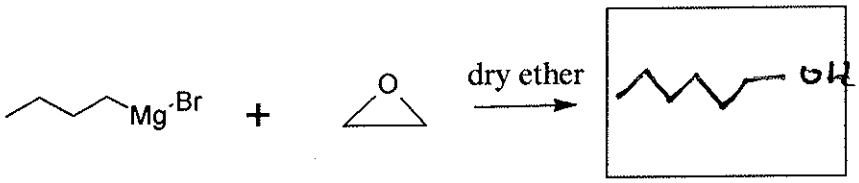
1)



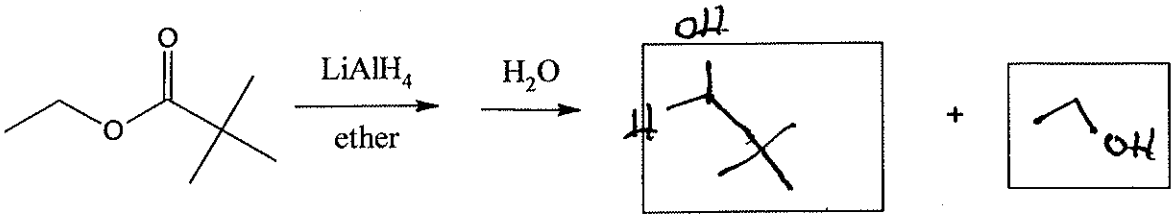
2)



3)



4)



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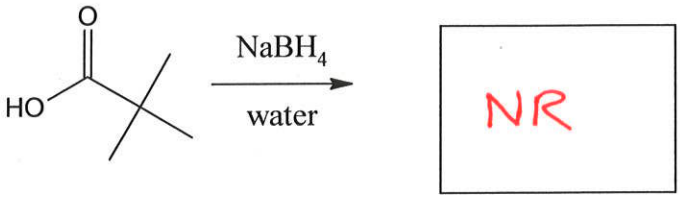
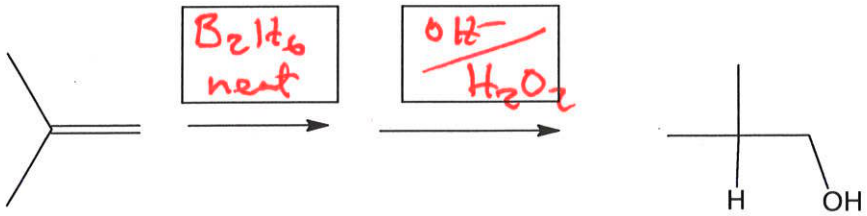
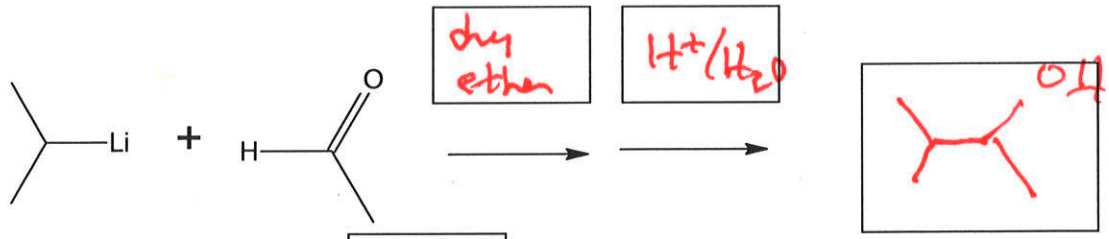
5)


O
HO
NaBH4
water
NR

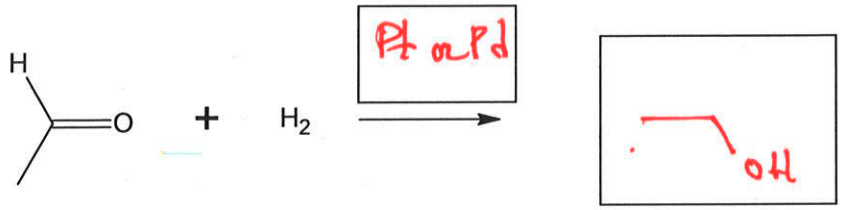
6)


B2H6
neat
OH−
H2O2
H
OH

7)


Li
+
H
O
dry
ether
H+/H2O
OH

8)


H
O
+
H2
Pt or Pd
OH

__/8