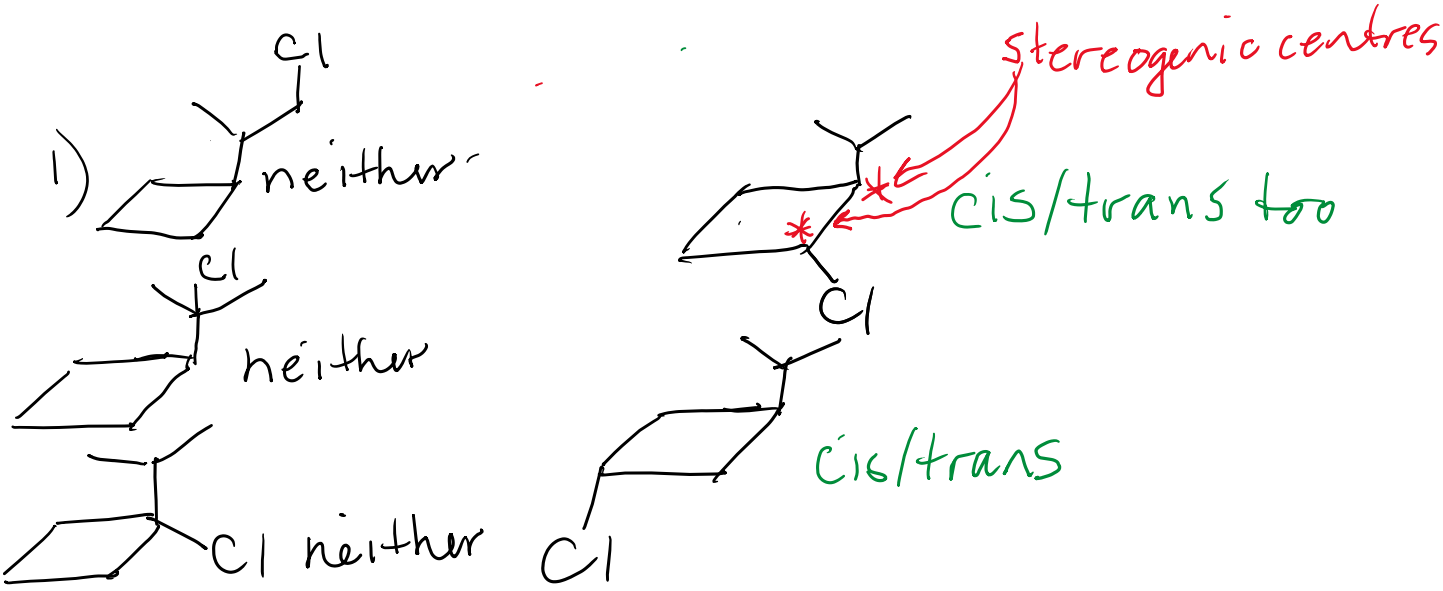
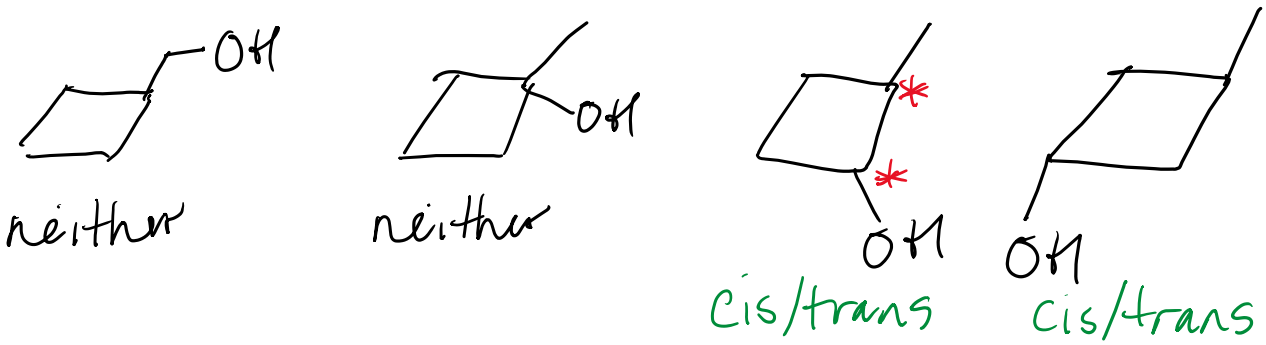
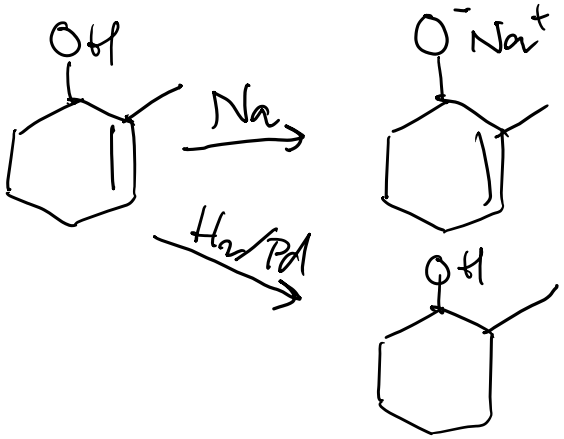


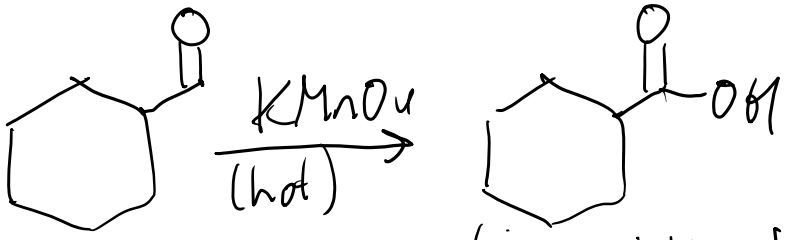
2) $C_5H_{10}O$ has an IHD of 1, so only 1 ring and no double bonds in structures:



3) $C_7H_{12}O$ has an IHD of 2, so rings + double bonds + 2 × triple bonds = 2.

a)



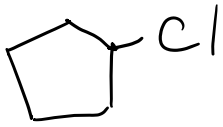
b) 

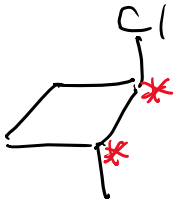
No OH, so no reaction with Na

c) 

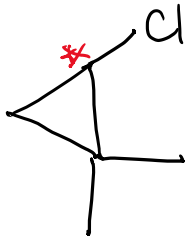
No C=C and no H attached to C with O attached, so no reaction w/ $KMnO_4$.

4) C_5H_9Cl has an IHD of 1, so rings + double bonds = 1.

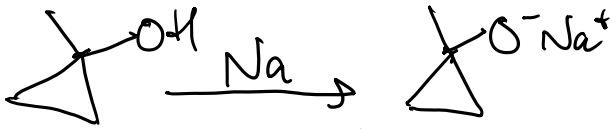
a) 

b) 

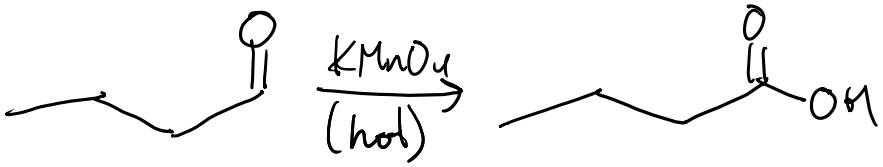
c) 

d) 

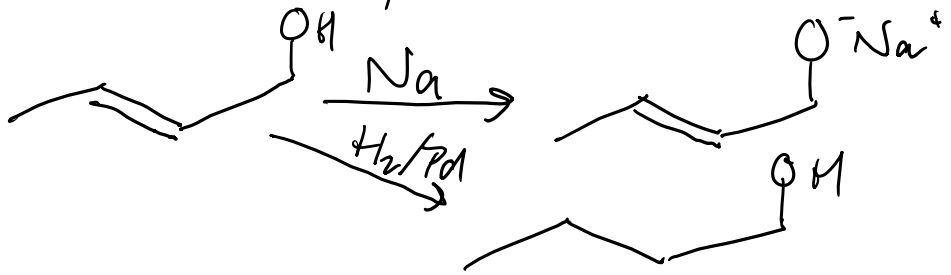
5) C_4H_8O has an IHD of 1, so rings + double bonds = 1

a) 

No H attached to C with O, so no reaction with $KMnO_4$.

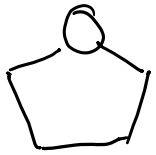
b) 

No OH, so no reaction with Na.

c) 

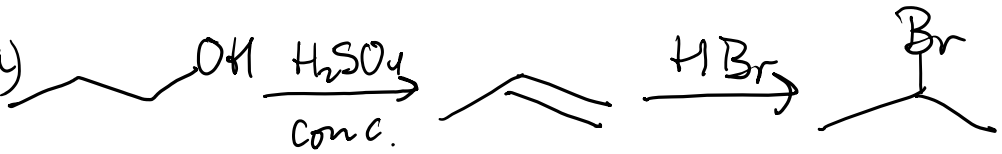
d) 

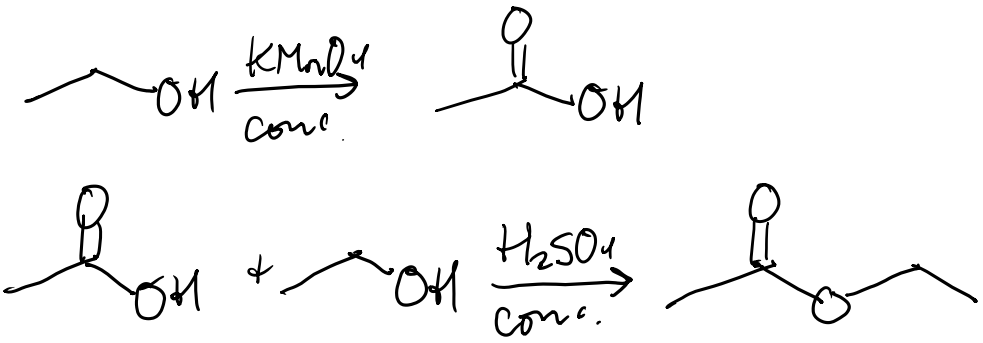
No H attached to C with O attached, so no reaction with $KMnO_4$.

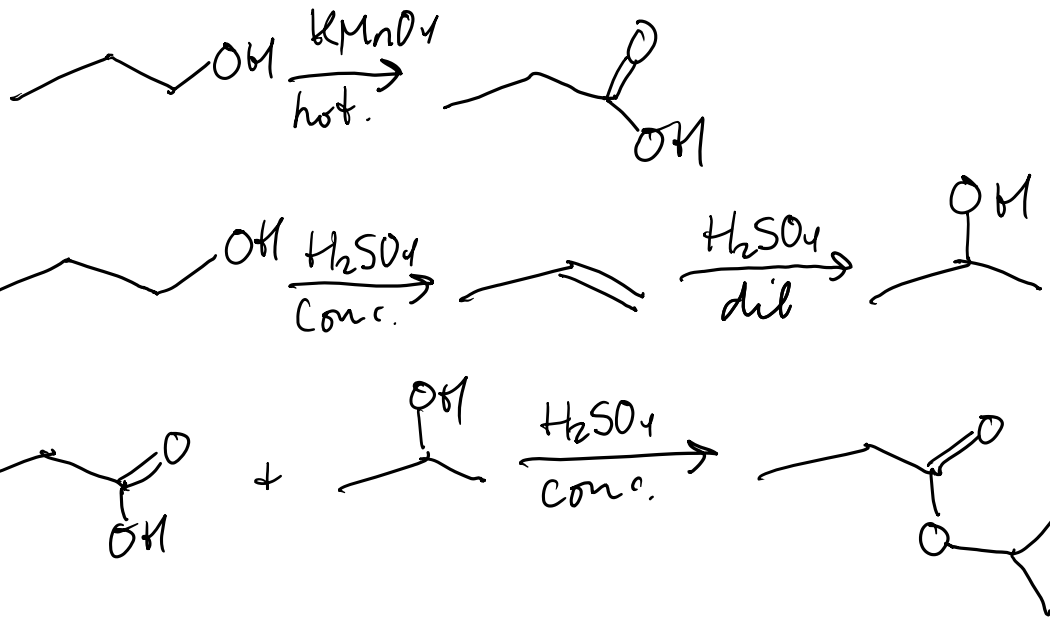
e) 

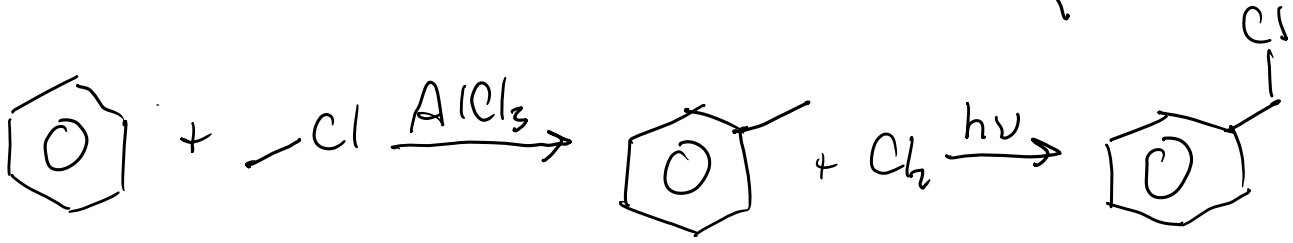
No C=C or C=O, so no reaction with H_2

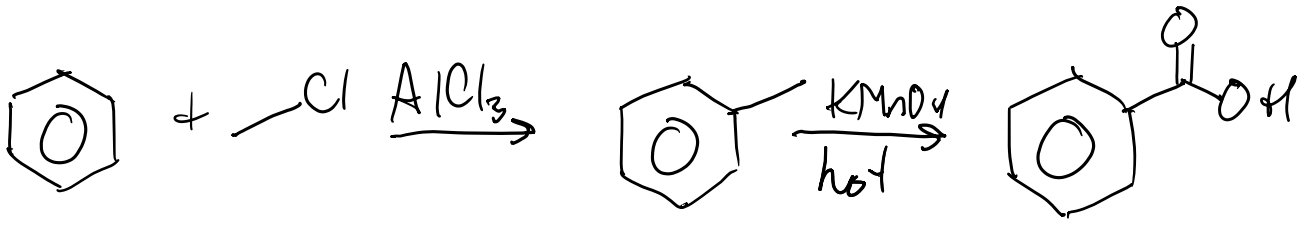
No OH, so no reaction with Na

6) a) 
OH
H_2SO_4
conc.
HBr
Br

b) 
OH
KMnO4
conc.
OH
OH
+
OH
H_2SO_4
conc.

c) 
OH
KMnO4
hot.
OH
OH
H_2SO_4
Conc.
H_2SO_4
dil
OH
OH
+
OH
H_2SO_4
conc.

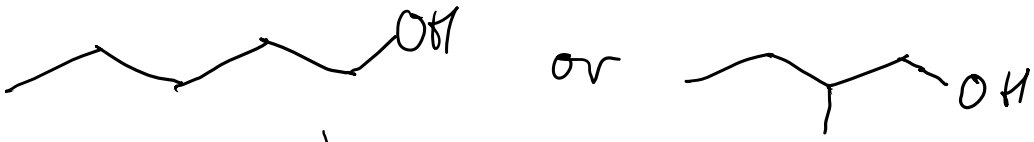
d) 
+
Cl
$AlCl_3$
+
Cl_2
hν
Cl

e) 
+
Cl
$AlCl_3$
KMnO4
hot
OH

7) $C_5H_{12}O$ has an IHD = 0.

Tollens + and Brady's + ⇒ product is an aldehyde.

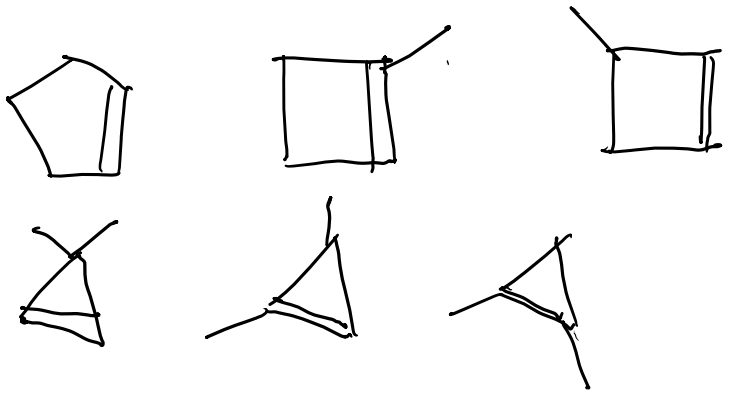
∴ OH in the alcohol must be on first C.

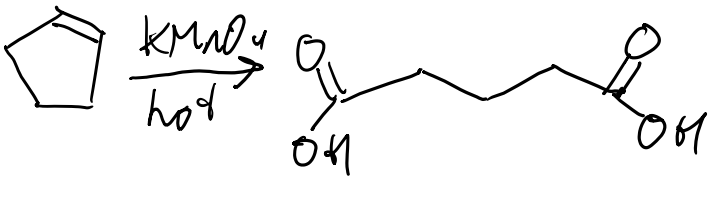


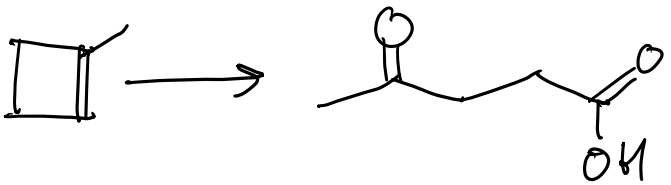
(and others)

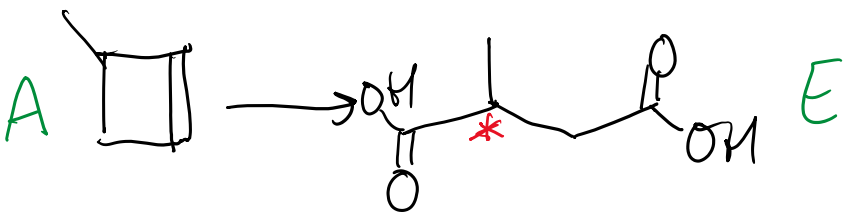
8) C_5H_8 has IHD = 2 ∴ 1 C=C + 1 ring

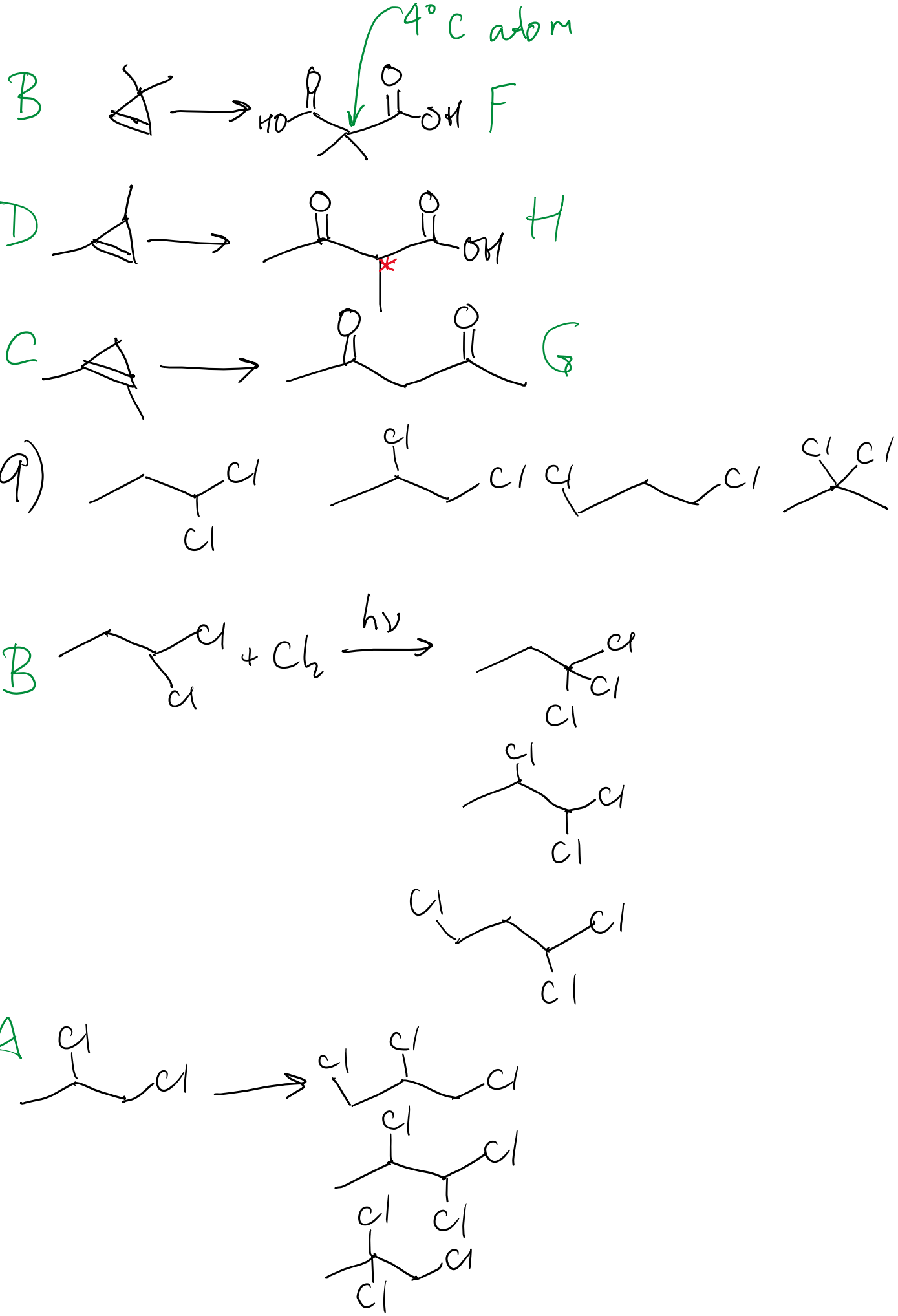
(since those are in description)

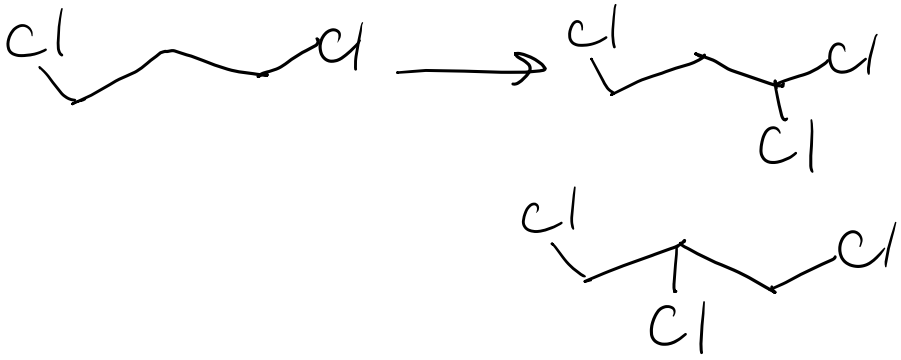




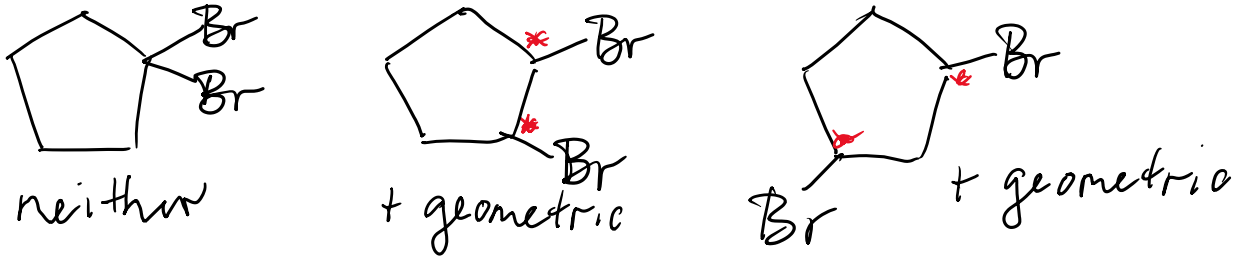


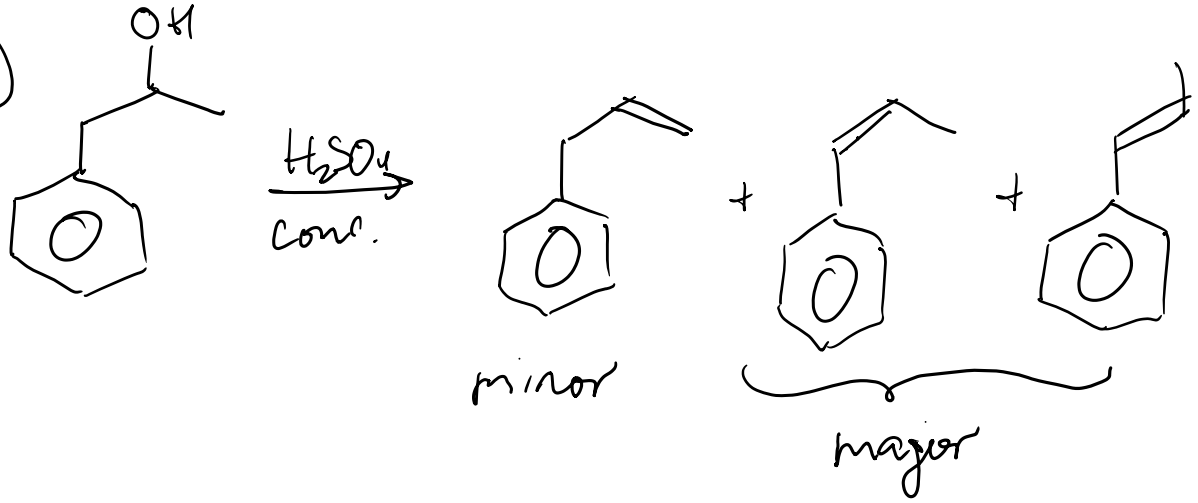



4° C atom
B
F
D
H
C
G
9)
B
+ Cl2
hν
A

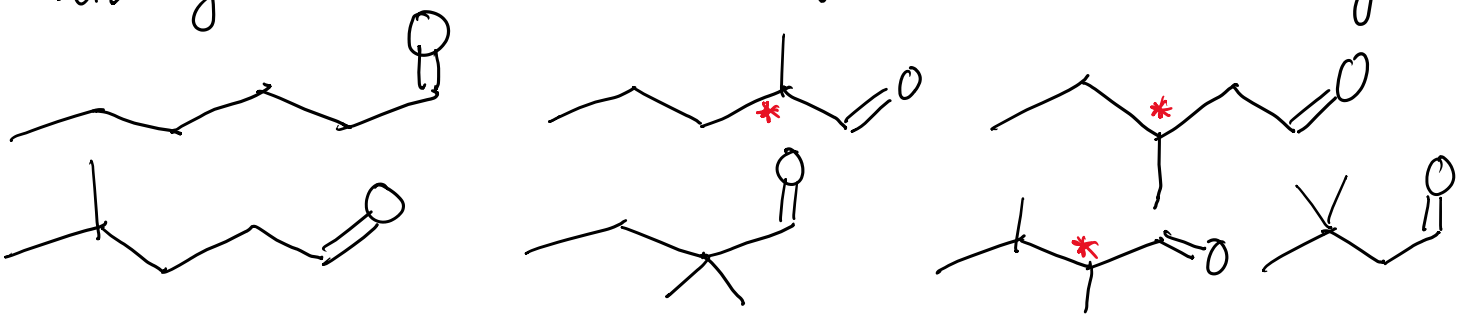
D 

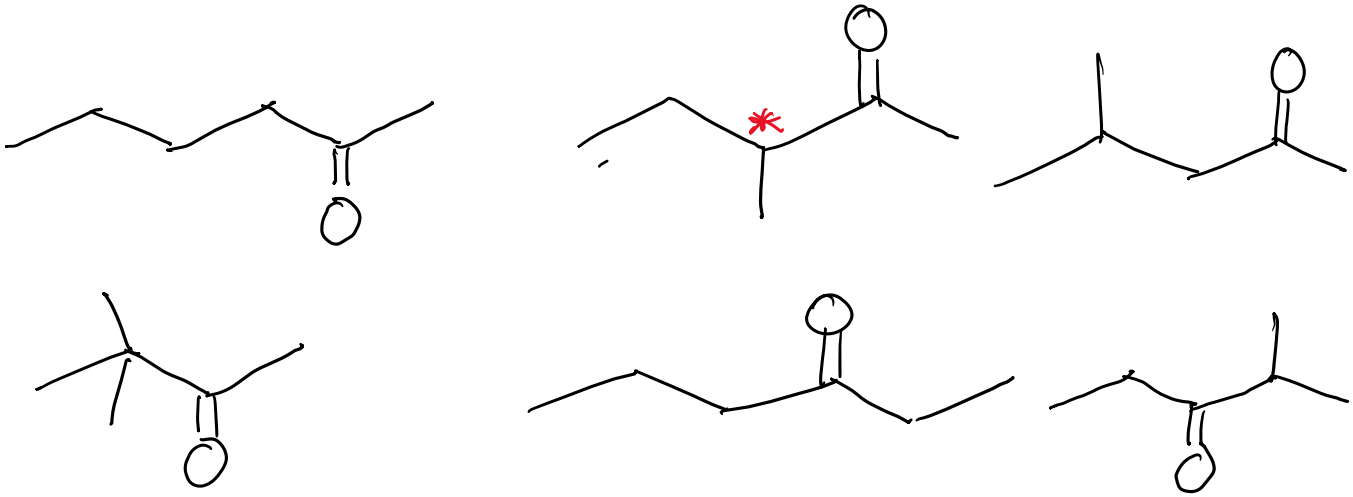
C 

10) 

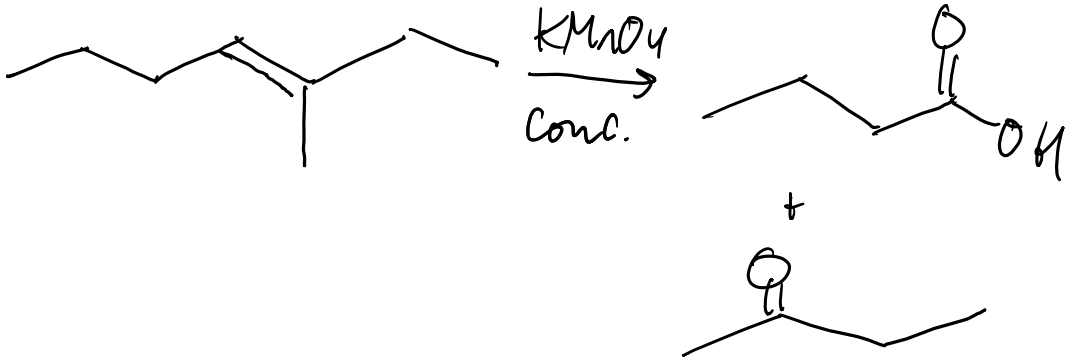
11) 

12) $C_6H_{12}O$ has an IHD of 1, so the C=O in the aldehyde or ketone is the only double bond or ring.

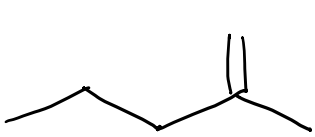




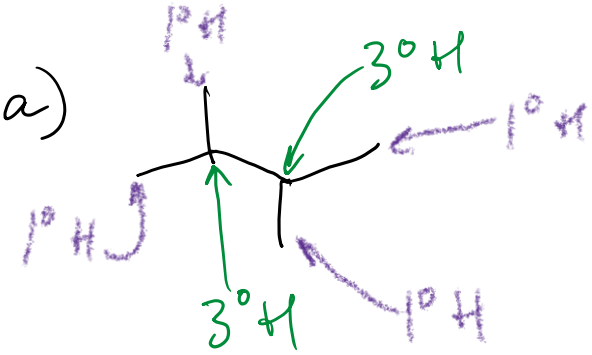
13) a)



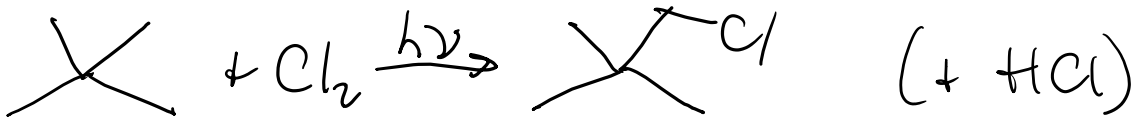
b)

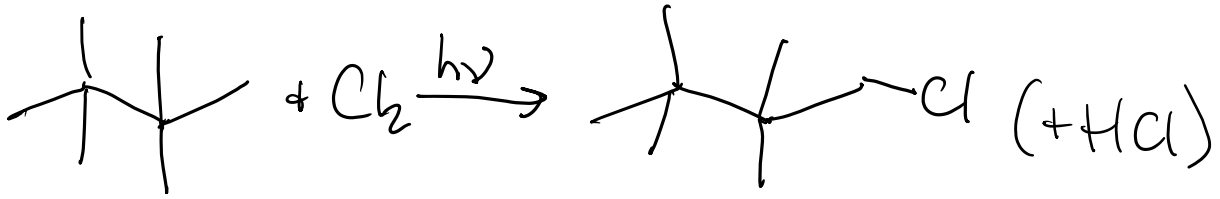


14 a)

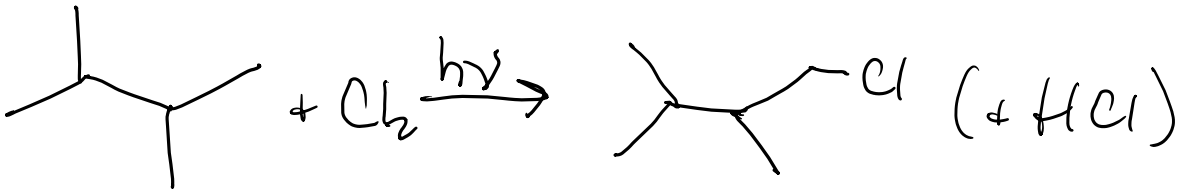


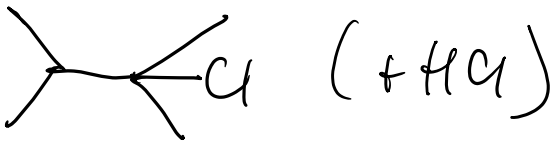
b) $12 \cdot n + 1 \cdot (2n+2) = 72 \Rightarrow n = 5$ carbons.



c) 

d) $12 \cdot n + 1 \cdot (2n+2) = 86 \Rightarrow n = 6$





15). benzene present: IHD = 4, which is the benzene ring.