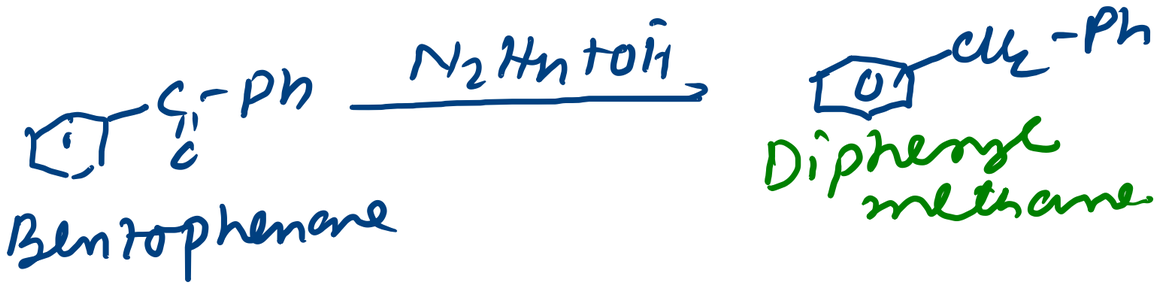
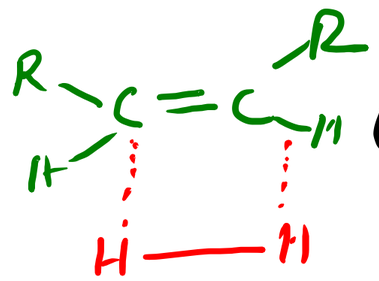
: Reduction :

JM / Advance.

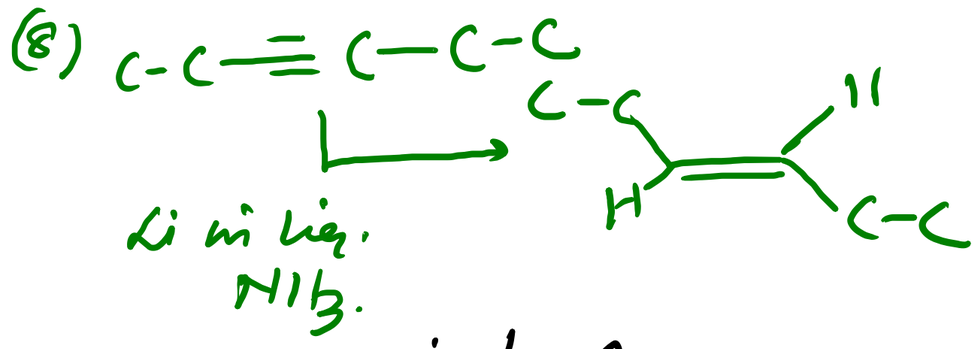
(1) $Ph-\overset{O}{\overset{\|}{C}}-Cl \xrightarrow{H_2\ (Pd\text{-}BaSO_4)} PhCH=O$.

(2) $R-C\equiv C-R \xrightarrow[Pd\text{-}CaCO_3]{H_2\ (Lindlar}} \underset{H}{\overset{R}{}}\!\!>C=C<\!\!\overset{R}{\underset{H}{}}$.

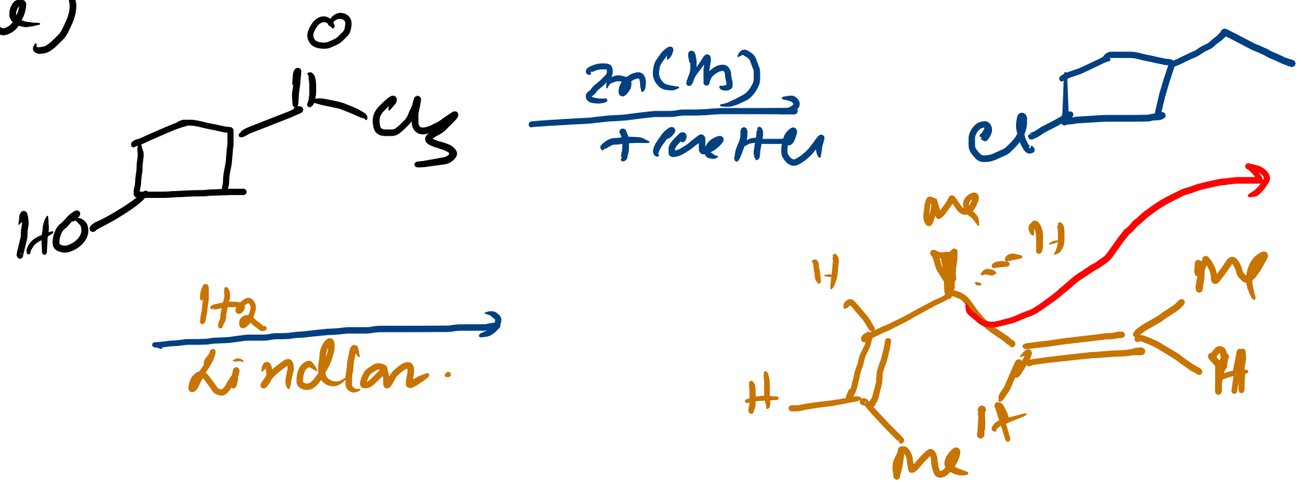
(3) 

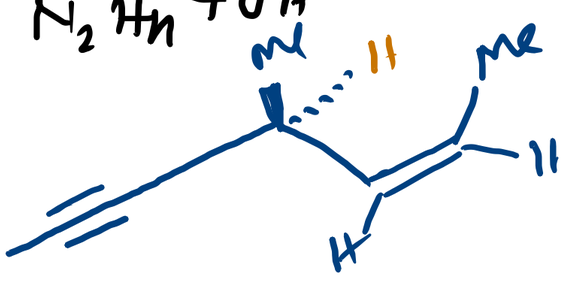
(4)  (least crowded alkene) → Hydrogenation rate is fast.

(5) $N_2H_4 + OH$

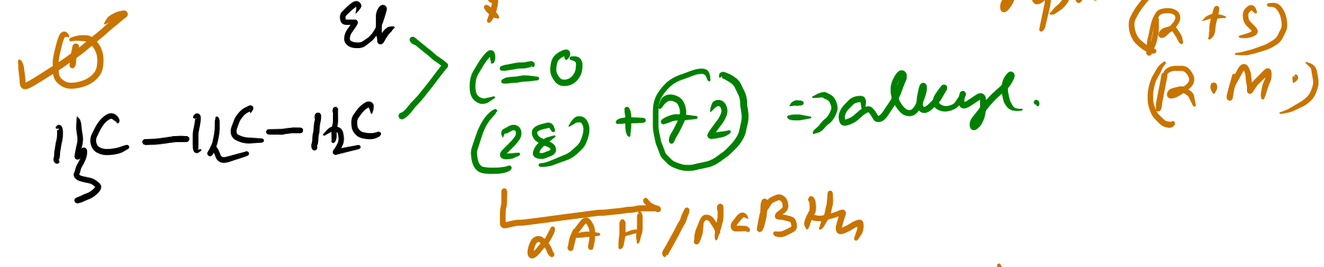
(6) 

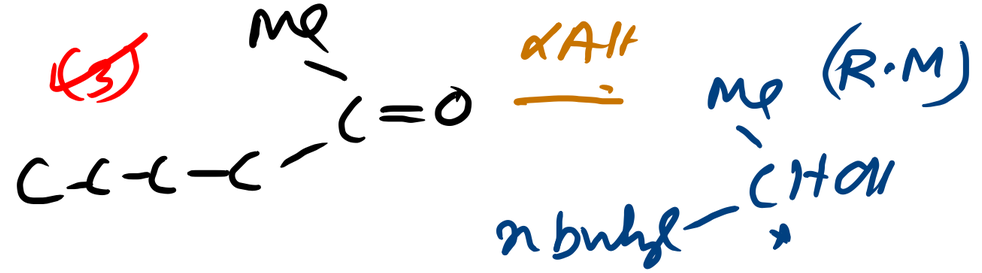
(7) $CH_2=CH-\overset{O}{\overset{\|}{C}}-OH \xrightarrow{LiAlH_4} CH_2=CH-CH_2OH$

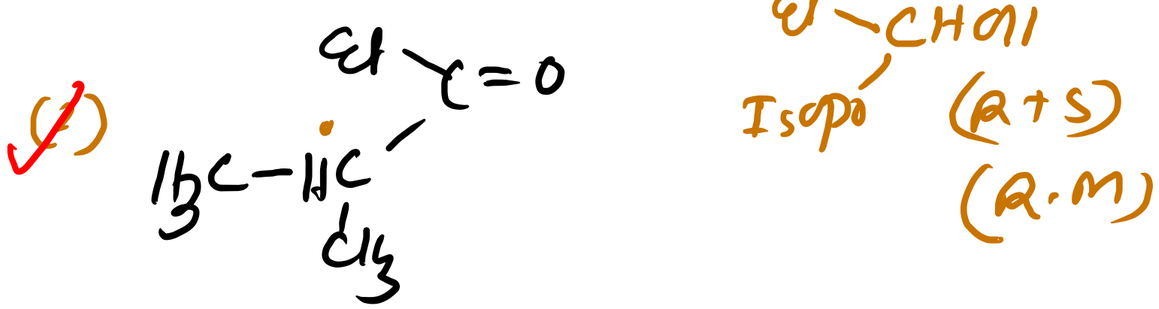
(8) 

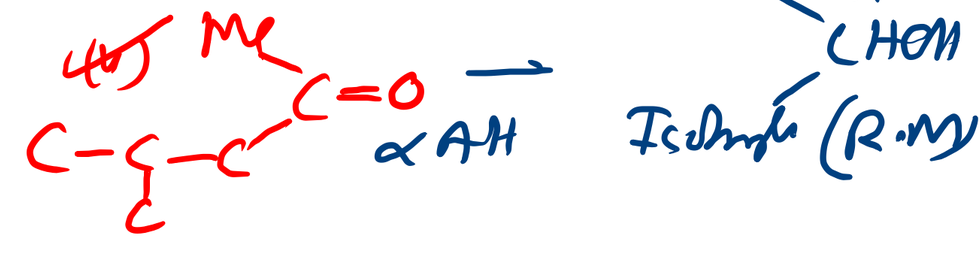
(9) 

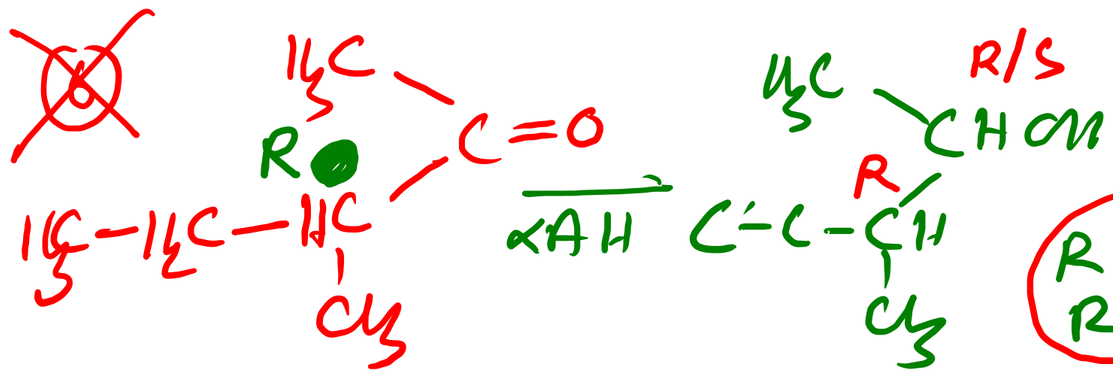
12 M.wt = 100. C_5H_{12} = 72.

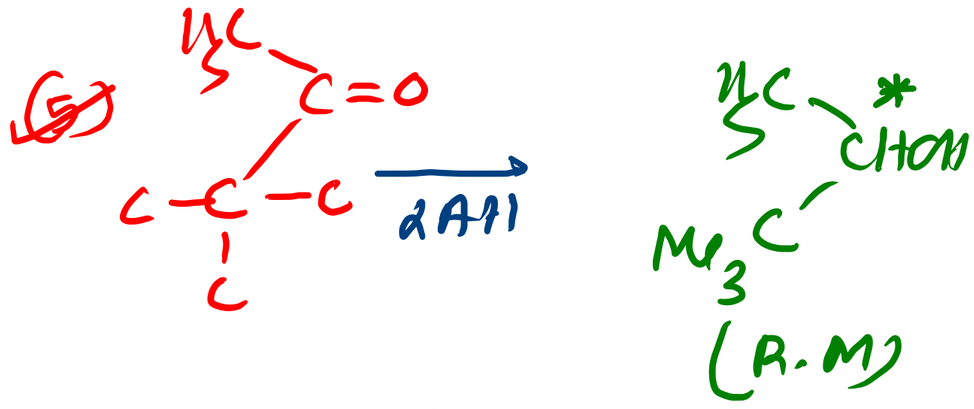




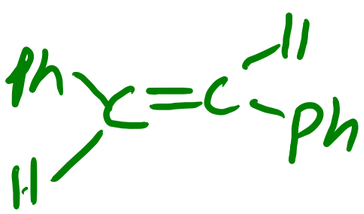


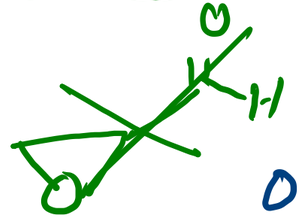




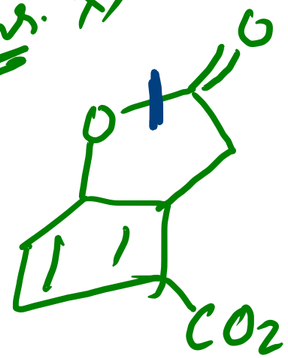


13 $CH_3CO_2H \xrightarrow{LAH} CH_3CH_2OH \xrightarrow{PCl_3} CH_3CH_2Cl \xrightarrow[alc.KOH]{E2} CH_2=CH_2$

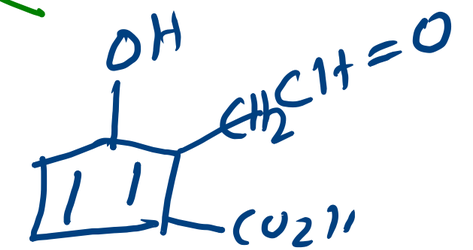
14) $Ph-C\equiv C-Ph \rightarrow$  (Li in liq. NH_3)



(15) Baeyer. xx



$\xrightarrow[\text{can not reduce } -CO_2H]{DIBALH.}$ but can reduce cyclic ester.



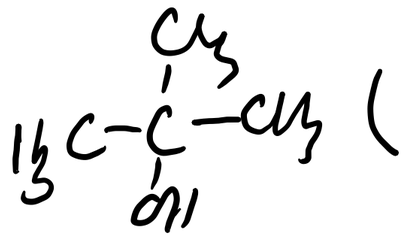
JEE Mains: (Alcohol)

(1) $CH_3CH_2OH \xrightarrow[PI_3]{P+I_2} CH_3CH_2I \xrightarrow[(D.E)]{Mg} CH_3CH_2MgI \xrightarrow[H_2O.]{HCH=O}$ $CH_3CH_2CH_2OH$

(2) Ethanol
↓ conc. H_2SO_4 + X (liq)
Fruity smell.

(A). liquid must be CH_3CO_2H.
Esterification takes place.

(3) HCl + $ZnCl_2$: Lucas reagent SN1 3° Alcohol reacts fastest (within seconds) instant turbidity.



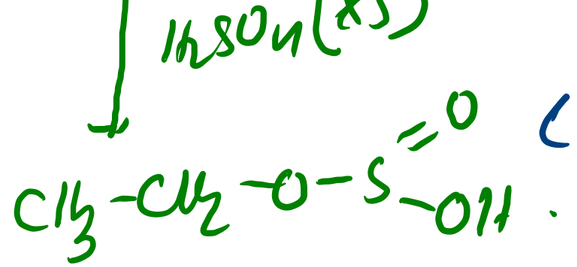
(2 methyl propan-2-ol)

(4) CH_3CH_2OH $\xrightarrow[170°-180°C]{Conc.\ H_2SO_4}$ $CH_2=CH_2$ (Ethene)

$\xrightarrow[140°C]{Conc.\ H_2SO_4}$ $CH_3-CH_2-O-CH_2-CH_3$ (Ethoxy ethane)

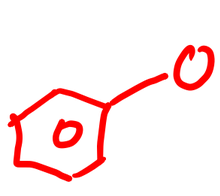
Alkyne/Acetylene can't be formed

$CH_3CH_2OH + H_2SO_4$ (xs)



(Ethyl Hydrogen sulfate)

5) SN1. 3°.

6) $CH_2=CH-CH_2-Br$ +  $\xrightarrow{SN2}$  (Williamson ether synthesis)

Allyl halide (more)

=> Alcohol Identification (Victor Mayer Test)

RCH_2OH (1° Alcohol)

red P + I_2 / PCl_3

$AgNO_2$:

dil. HNO_2 (NO^+)

RCH_2Cl

∝

RCH_2NO_2

(∝ H)

$RCH(-NO_2)-N=O$

⇅

$R-C(-NO_2)=N-OH$

(nitrolic Acid)

NaOH

$R-C(-NO_2)=N-O^-$

(Red color soluble)

R_2CHOH (2° Alcohol)

R_2CHCl.

∝

R_2CHNO_2

$R_2C(-NO_2)-N=O$

⇅ nitro-nitroso tautomerism

(exist)

(Blue soluble)

R_3C-OH. (3° Alcohol)

R_3C-Cl.

∝

R_3C-NO_2 ×

no reaction

no observation

(color less solution observation)

RBC

Red color (1° Alcohol)

Blue color. (2° Alcohol)

colorless soln.. (3° Alcohol)

	RCH_2OH	R_2CHOH	R_3C-OH
$HCl + ZnCl_2$	no turbidity at room temp.	white turbidity after 5-10 mins.	white turbidity is formed immediately.
$KMnO_4/H^+$	$MnO_4^- \rightarrow Mn^{2+}$ (Pink → colourless)	$MnO_4^- \rightarrow Mn^{2+}$ (Pink → colourless)	no observation. can't be oxidised
$MnO_4^-/\bar{O}H$	$MnO_4^- \rightarrow MnO_2$ Pink /purple → reddish brown ppt.	$MnO_4^- \rightarrow MnO_2$ Pink /Purple → reddish brown ppt.	no observation (can't be oxidised) no observation can't be oxidised

CAN solution : Ceric ammonium nitrate : $(NH_4)_2[Ce(NO_3)_6]$

It reacts with all types of alcohol to give red coloration.

Test for alcoholic -OH. (1°/2°/3° Alc.)

8) (3)

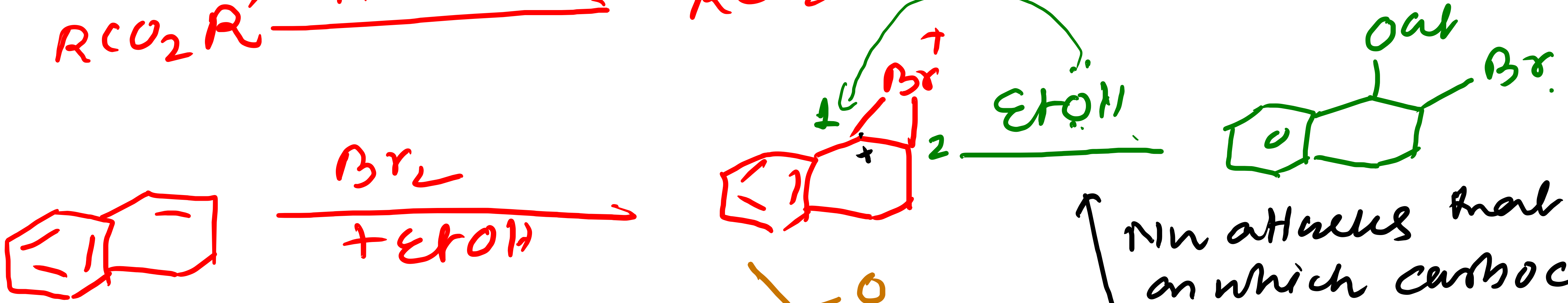
14) done

(9). $CH_3OH + CH_3MgBr \longrightarrow CH_4$ (methane gas)

(Base, written under CH_3MgBr)

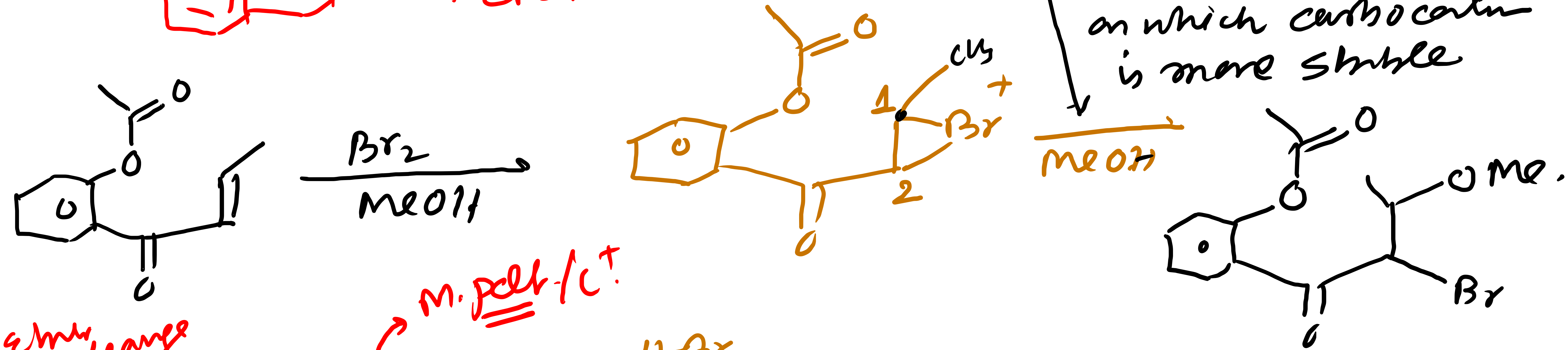
(10) $RCO_2R' \xrightarrow{Na + EtOH} RCH_2OH + R'OH$.

(11).



Nu attacks that carbon on which carbocation is more stable

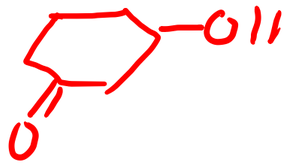
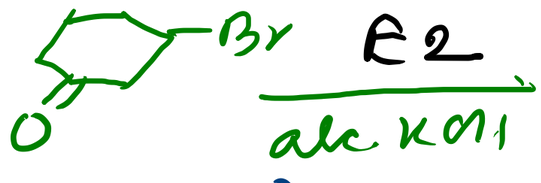
(12)

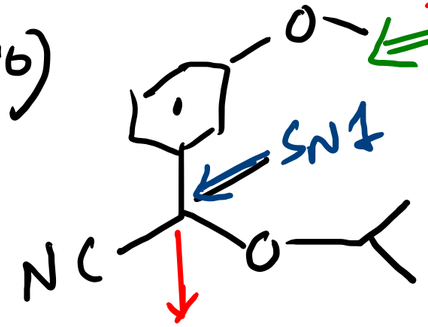
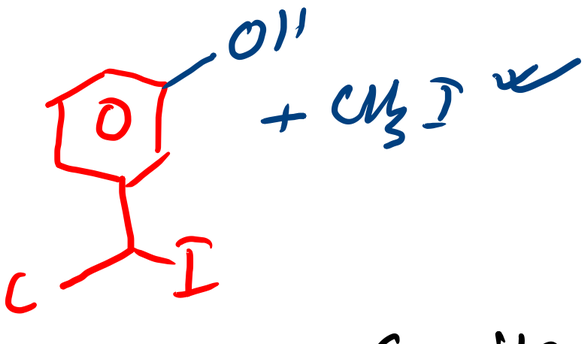


ether cleavage

M. pdt / C+

13) $H_3CO-C_6H_4-\underset{1}{CH}=\underset{2}{CH}-CH_3 \xrightarrow{HBr} CH_3Br + HO-C_6H_4-\underset{Br}{CH}-CH_2-CH_3$

15)  $\xrightarrow[PBr_3]{SN2}$  $\xrightarrow[alc\ KOH]{E2}$  (extended conjugation)

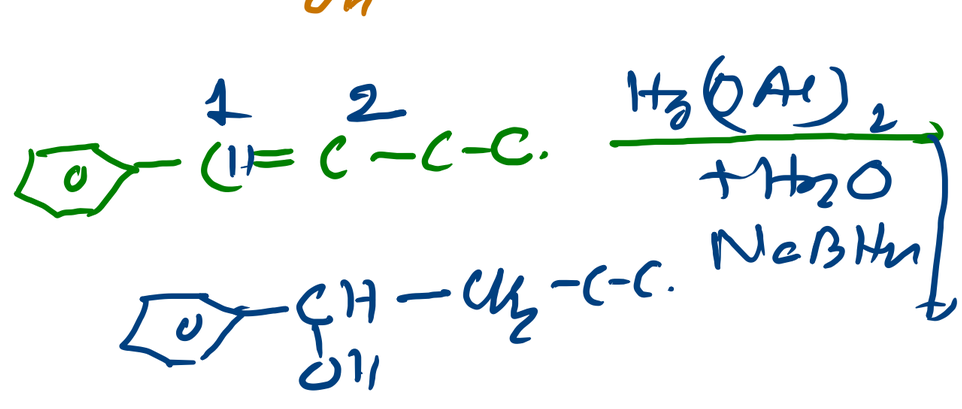
16)  $\xrightarrow[(XS)]{HI}$ 

SN2 I⁻ attacks which is less crowded.

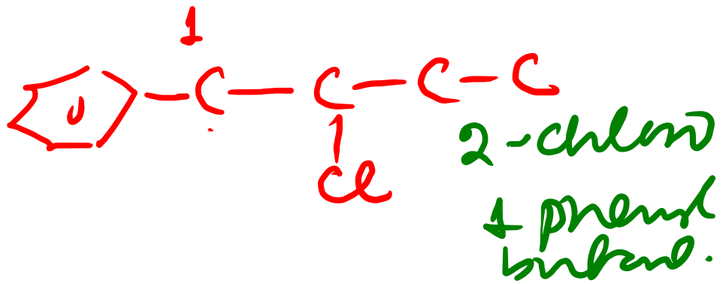
SN1

I⁻ attacks front carbon

+ CH_3I

17) $CH_3C\equiv CH \xrightarrow[Kucherov.]{} CH_3-\underset{O}{C}-CH_3 \xrightarrow{2AH} CH_3\underset{OH}{CH}-CH_3 \xrightarrow[+HCl]{ZnCl_2}$ 

white turbidity within 5-10 min.

18)  $\xrightarrow[+EtOH]{EtO^-}$

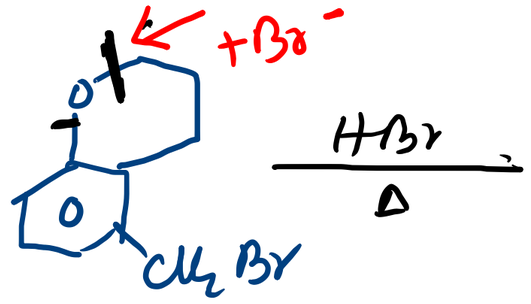
2-chloro + phenyl butane.

E2

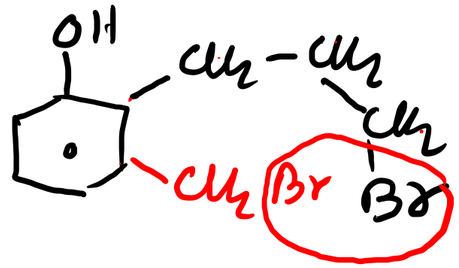
$\xrightarrow[+H_2O]{Hg(OAc)_2}$

$\xrightarrow{NaBH_4}$

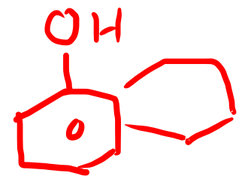
19)



$\xrightarrow[\Delta]{HBr}$



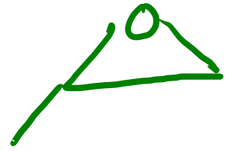
$\xrightarrow[(Ether)]{Na}$



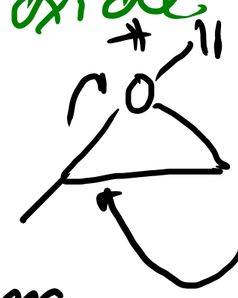
(d)

Intramolecular Wurtz reaction

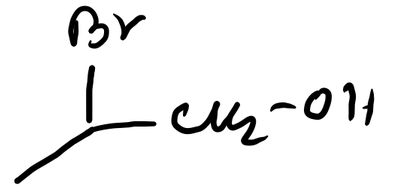
20) 1 methyl ethylene oxide



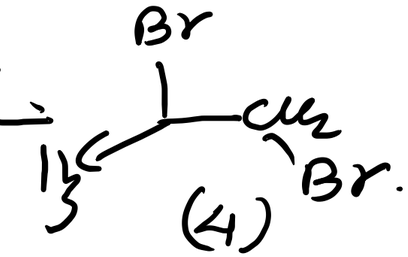
$\xrightarrow[\text{Protonation}]{H-Br}$



$\xrightarrow[S_N1 \text{ type}]{Br^{\ominus}}$



$\xrightarrow{HBr}$



In acidic (Shy) medium,

Next class. Halogen derivatives

Reduction (remaining part) ✕ Red

Oxidation (complete)

Haloform reaction:

$CHCl_3$: chloroform (anaesthetic) [colorless liq, should not be exposed in sunlight. $CHCl_3 + [O] \rightarrow COCl_2 + HCl$ (Poisonous gas.)

$CHBr_3$: Bromoform. (pale yellow ppt)

CHI_3 : Iodoform. (dark yellow ppt) In presence heating / sodium

(It is used as antiseptic)

few drops of alcohol should be added

Aldehyde & ketone have ketomethyl grp $\left(-\overset{\overset{O}{\|}}{C}-CH_3\right)$ or alcohol having $\left(-\underset{OH}{\underset{|}{CH}}-CH_3 \text{ grp}\right)$ participitates in haloform reaction.

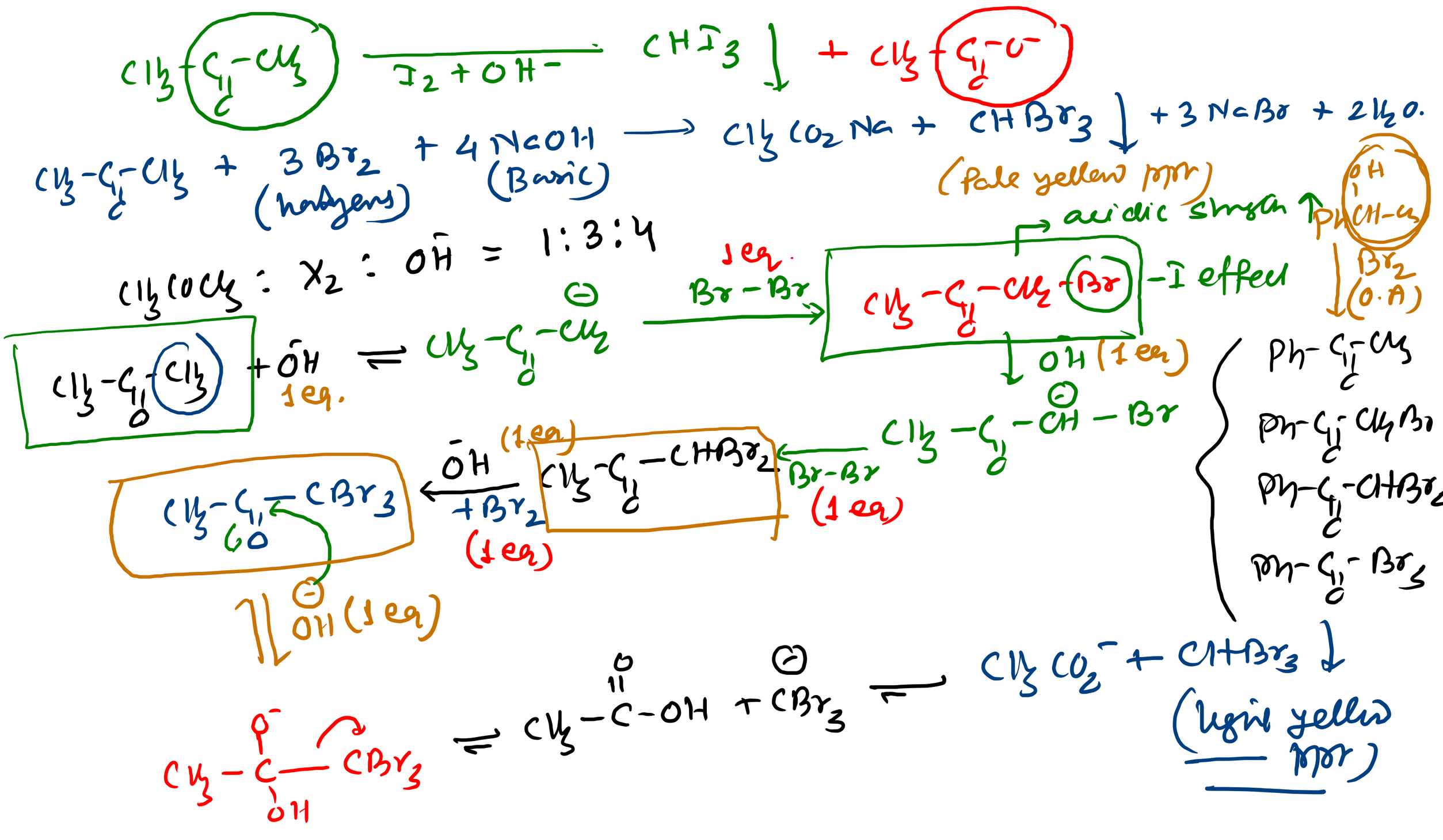
$CH_3-\overset{\overset{O}{\|}}{C}-H$; $CH_3-\overset{\overset{O}{\|}}{C}-CH_3$; $CH_3-\overset{\overset{O}{\|}}{C}-CH_2-CH_3$

$CH_3-\underset{OH}{\underset{|}{CH}}-CH_3$; $CH_3-\underset{OH}{\underset{|}{CH}}-H$ Ethanol

They all give +ve iodoform test.

$COCl_2 + EtOH \rightarrow O=C(OEt)-OEt$.

Poisonous action of phosgene is lost.


I2 + OH-
CHI3 ↓
(Pale yellow ppt)
3 Br2 (halogens)
4 NaOH (Basic)
3 NaBr + 2 H2O.
1 : 3 : 4
1 eq.
Br - Br
acidic strength
-I effect
OH (1 eq)
(1 eq)
(1 eq)
(1 eq)
Br2 (O.A)
(Light yellow ppr)

distinguish

(i) $HCH=O$ vs $CH_3-\overset{O}{\overset{\|}{C}}-H$

Tollens	Fehling	2,4-D.N.P	I_2+OH^-
×	×	×	✓

−ve test | +ve test

(distinguish)

ii) $CH_3-\overset{O}{\overset{\|}{C}}-CH_2-CH_3$ vs $CH_3-CH_2-\overset{O}{\overset{\|}{C}}-CH_2-CH_2-CH_3$

Tollens	Fehling	I_2+OH^-
××	××	✓

+ve test | −ve test

distinguish

iii) CH_3OH vs CH_3-CH_2-OH

Victor Meyer	Lucas	$KMnO_4$	I_2+OH^-
××	××.	××.	✓

−ve iodoform test | +ve iodoform

So iodoform reaction can be used.

To distinguish
i) Aldehyde vs aldehyde
ii) ketone vs ketone
iii) Alcohol vs Alcohol.

Which cpds give +ve iodoform test

a) 2 hexanol (+ve)

b) 2 pentanone (+ve)

c) 3-hexanone (-ve)

b) 3-hexanol (-ve)

e) Acetophenone (+ve)

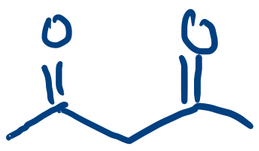
f) Benzophenone (-ve)

g) CH_3CO_2H (-ve)

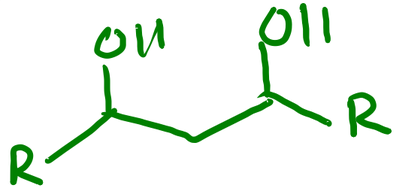
h) $CH_3-CH(O)-CH_2-CH_3$ (-ve)

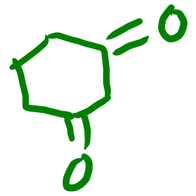
i) CH_3CH_2Cl (+ve)

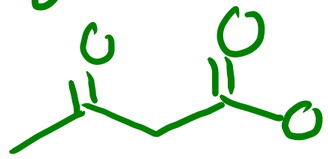
j) $CH_3CH(Cl)-Cl$ (+ve)

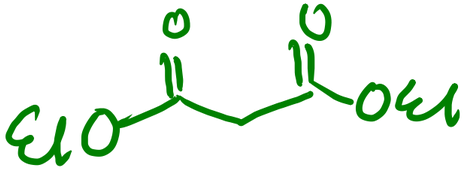
k) 

l) 

m) 

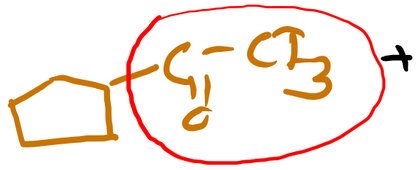
n) 

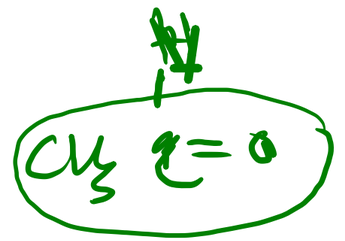
o) 

p) 

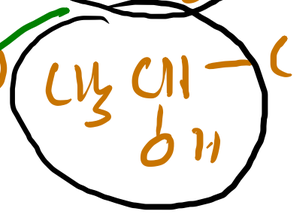
q) 

r) 

s) 

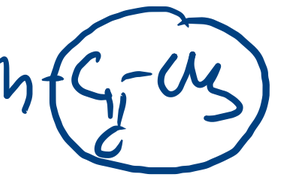
t) $CH_3CH=NH \xrightarrow{H_2O}$ 

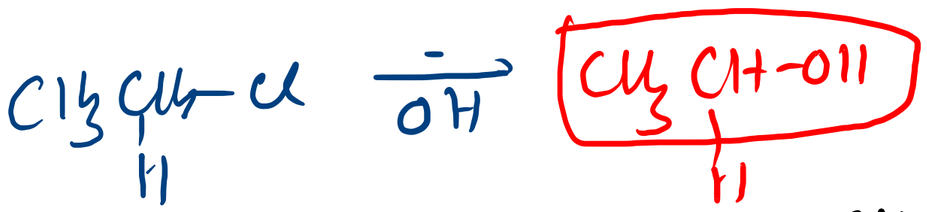
u) 

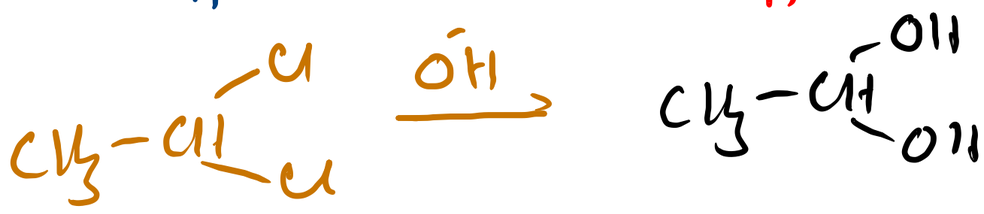
v) 

Acid or its derivative give +ve iodoform test.

Pyruvic acid







** dicarbonyl system undergoes +ve iodoform