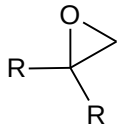
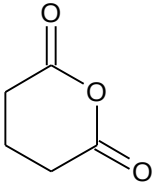
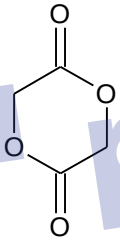
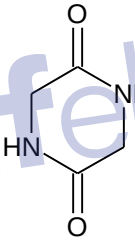
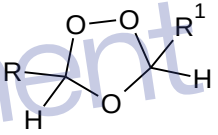
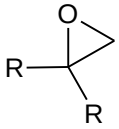
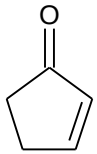
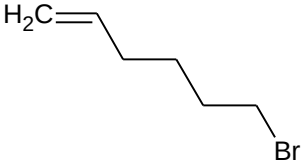
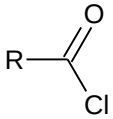
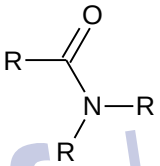
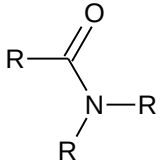
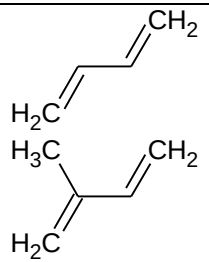
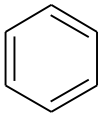
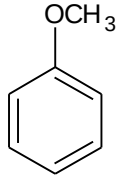
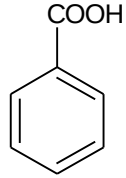
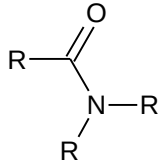
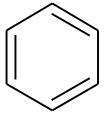
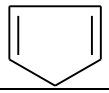
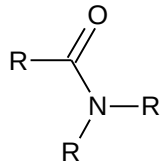
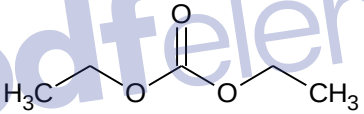
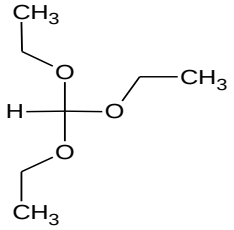
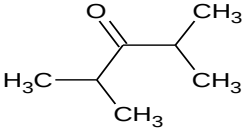
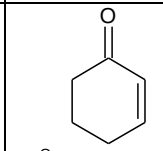
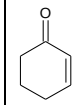
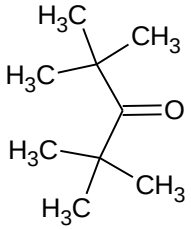
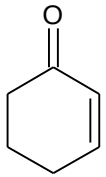
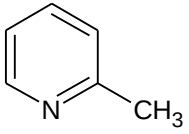
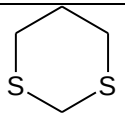
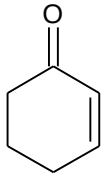
REDUCING AGENTS **Prepared By: Mr O P Sir**

$LiAlH_4$ in Dry Ether	$R-X(1^{\circ})$ $R-X(2^{\circ})$ $R-X(3^{\circ})$	$R-CHO$ $RCOR'$	$R-COCl$	$R-COOH$ $RCOO^{-}$		$R-COOR'$
	$R-COOCOR'$ 	$R-CH=CH-CHO$ $Ph-CH=CH-CHO$	$R-NO_2$ $Ph-NO_2$	*AMIDES*	$R-CN$	$R-N_3$
	$R-N=C=0$ *Alkyl ISOCYANATE*	 *LACTIDE*	 $2,5-diKeto\ piperazine$			
$NaBH_4$ in $R-OH$	$R-X(1^{\circ})$ $R-X(2^{\circ})$ $R-X(3^{\circ})$	$R-CHO$ $RCOR'$	$R-COCl$		$R-CH=CH-CHO$ $Ph-CH=CH-CHO$ 	*All other Fuctional groups*

nBu_3SnH *or* Ph_3SnH	$R-X\,(any)$ $Ar-X\,(any)$					
$NaBH_3CN$ *in slightely* *acidic medium*	*IMINE* $R-CH=NH$ $R_2C=NH$	$R-CHO$ $RCOR'$				
DIBAL $AT-78^{\circ}C$	$RCOOH$ $RCOCl$ $RCOOR'$	$RCOO^{-}$	 $R-CN$ $RCOO^{-}$			
DIBAL *AT RT*	$R-CHO$ $RCOR'$	$RCOOH$ $RCOCl$ $RCOOR'$		 $R-CN$		
$Na\,/\,NH_{3(liq)}$ *or* $Na\,/\,ROH$	*ALKANA* *ALKENE* $R-O-R$	$R-C\equiv C-H$ $R-COOH$	$R-C\equiv C-R$	$RCHO$ $RCOCl$	$Ph-CHO$	$RCOOR'$ Bouveault Blanc reduction

	$R-NO_2$	*RCN*				
$BH_3 \bullet THF$	$R-COOH$	*ALKENE* *ALKYNE* Hydroboration	$RCHO$ $RCOR'$		*RCN*	$RCOOR'$
	RCOCl	RNO_2	$PhNO_2$			
$H_2, Ni / Pt / Pd$	*RCOCl*	RNO_2 $PhNO_2$	*ALKENE* *ALKYNE* If Ni Sabatier Senderens reduction	*RCHO*	*RCOR*	$Ar-CH_2-OR$ $Ar-CH_2-NHR$
	RCN RNO_2 $ArNO_2$		*Carboxylic acids* *Esters* *Amides*	*Carboxylic acids* *Esters* *Amides* *With* $H_2, Ru-C$ *Or Mixed oxide of* Ba, Cu & Cr		

$H_2 / Pd - BaSO_4$ Quinoline	$R-C\equiv C-H$	$R-C\equiv C-R$	$R-C\equiv C-R'$	RCOCl Rosenmund Reduction	All other functional groups	
$R-MgX$ In dry ether Grignard Reagent	ACTIVE SITE LIKE $C\equiv CH, NH, OH, SH, RCOCH_2COR, RCOCH_2COOR,$ 	$R-X$	RCHO RCOR	RCOCl		RCN
	$RCOO^-$	CO_2 (Dry ice)	 Diethyl carbonate	 Ethyl ortho formate	 WITH $(CH_3)_2CHMgBr$	  Along with Cu_2Cl_2
RLi	$RCOO^-$					

$R_2CuLi\,(Gilman)$ Or R_2Cd	$R-X$ Corey House Synthesis	$RCOCl$		Carbonyl compounds and All other functional groups		
$BrZnCH_2COOR$ Reformatsky Reaction	$RCHO$ $RCOR$	All other functional groups				

➢ 1. $H_2 / Pd - BaSO_4; Quinoline$

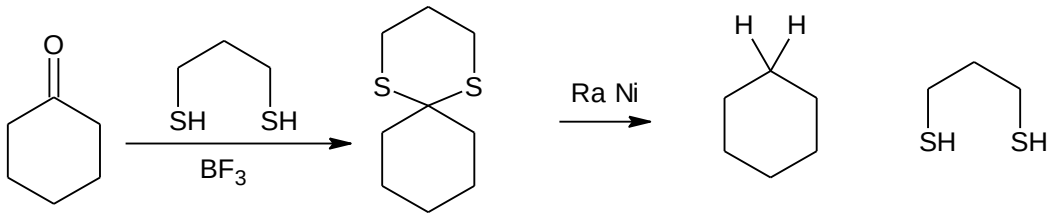
2. $N_2H_4(1.0eq) / H_2O_2 \Rightarrow N_2H_2(Di\,IMIDE)$

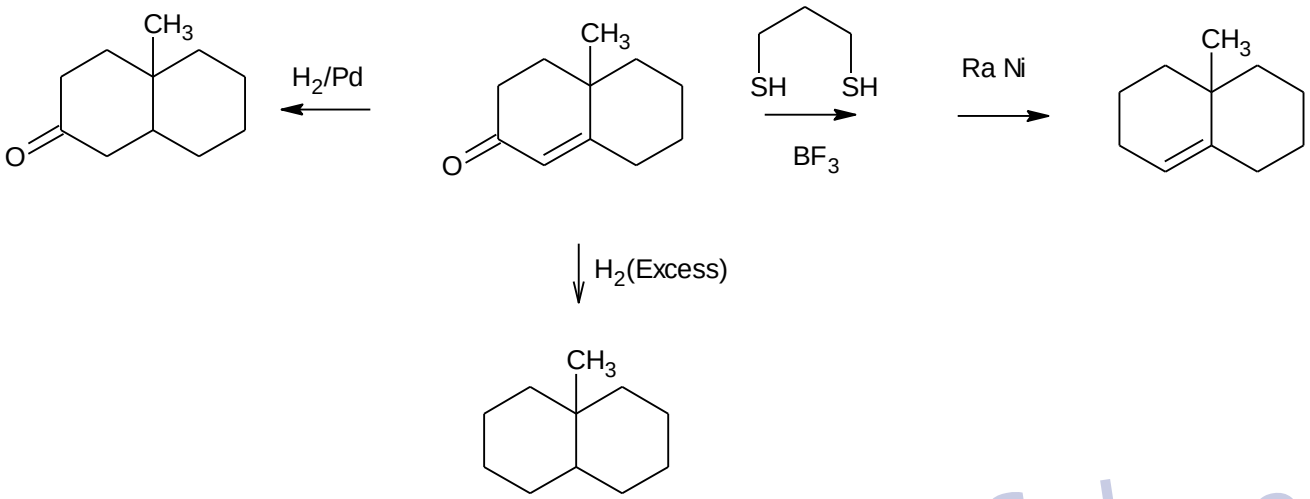
3. $Ni_2B(P-2\,Catalyst)$

4. Sia_2BH, CH_3COOH

These four reagents are useful to convert selectively internal alkynes to cis-alkenes .

Raney Ni is selectively used for HYDROGENOLYSIS





- Wilkinson's catalyst $(PPh_3)_3RhCl$ is a HOMOGENEOUS Catalyst, gives syn addition, used to convert both

  $C=C \longrightarrow CH-CH \; Or \; C\equiv C \longrightarrow CH_2-CH_2$

- $HI \;\&\; \mathrm{Re}\, d \; P$ is a power full reducing agent ,Converts

  $\mathrm{R}-X \; or \; R-OH \; or \; RCHO \; or \; RCOR \; or \; RCOOH \; (Vigrous) \; or \; RCOCl \; or \; RCOOR or \; RCOOCOR$ to corresponding alkane(s)

- $SnCl_2+HCl$ is milid reducing agent than $Sn+HCl$

  $$R-C\equiv N \xrightarrow{SnCl_2+HCl} R-C\equiv N \xrightarrow{SnCl_2+HCl} RCH=NH \xrightarrow{H_3O^+} RCHO \; (Stephen \; aldehyde \; synthesis)$$

  $$R-C\equiv N \xrightarrow{Sn+HCl} RCH_2NH_2$$

- Nitro benzene reduced to aniline by means of $H_2, Ni/Pt/Pd$ or $Sn+HCl$ Or $Zn+HCl$ or $Fe+HCl$ or

  $NaHS \; or \; (NH_4)_2 \; S \; or \; Poly \; sulfides \; (Zinin \; \mathrm{Re} \; duction)$

- $C_6H_5-NO_2 \xrightarrow{Zn+NH_4OH} C_6H_5-NH-OH$
- $C_6H_5-NO_2 \xrightarrow{Zn+KOH} C_6H_5-NH-NH-C_6H_5$
- $C_6H_5-NO_2 \xrightarrow{LiAlH_4} C_6H_5-N=N-C_6H_5$