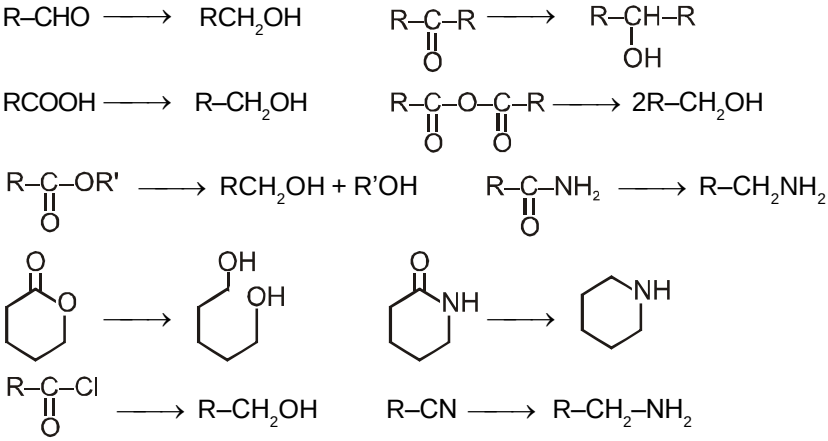
• Points to remember in Reduction

(1) $LiAlH_4$



C = C / C≡C ⟶ No reaction

Exception : **Ph–CH=CH–COOH ⟶ Ph–CH_2–CH_2–CH_2OH**

(2) $NaBH_4$, EtOH

Aldehyde ⟶ 1° Alcohol

Ketone ⟶ 2 °Alcohol

Acid halide ⟶ 1° Alcohol

(3) Na/EtOH (Bouvealt Blanc reduction)

Aldehyde $\longrightarrow$ 1° Alcohol Ketone $\longrightarrow$ 2° Alcohol

Acid halide $\longrightarrow$ 1° Alcohol Ester $\longrightarrow$ Alcohol + Alcohol

RCN $\longrightarrow$ RCH_2NH_2

(4) Na–Hg/HCl or $Al[OCHMe_2]_3$ (MPV Reduction)

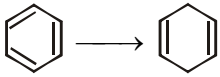
Aldehyde $\longrightarrow$ 1° Alcohol Ketone $\longrightarrow$ 2° Alcohol

(5) Rossenmund's Reduction

$$R-\underset{\underset{O}{\|}}{C}-Cl \xrightarrow{H_2/Pd/BaSO_4} R-CH=O$$

(6) Birch reduction (Li/Na/K + Liquid NH_3)

$$R-C\equiv C-R \longrightarrow \underset{H}{\overset{R}{}}C=C\underset{R}{\overset{H}{}} \text{ (trans alkene)}$$



Note : Terminal alkynes not reduced

(7) Stephen's Reduction

$$R-C\equiv N \xrightarrow[(2)\ H_2O]{(1)\ SnCl_2/HCl} R-CH=O$$

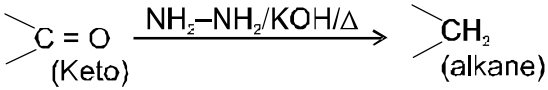
Note : DIBAL-H is also used for same conversion.

(8) Clemmensen Reduction

$$\diagdown C=O \text{ (Keto)} \xrightarrow{Zn\text{-}Hg/HCl/\Delta} \diagdown CH_2 \text{ (alkane)}$$

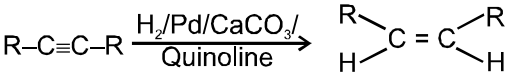
Avoid if acid sensitive groups are present in molecule.
e.g. C=C,C≡C,OH, OR,

(9) Wolff-Kishner Reduction



Avoid if base sensitive groups are present in molecule. e.g.COOR,COX,$CONH_2$, –CO–O–CO–, R-X

(10) Lindlar Catalyst



Syn addition
(Cis alkene)

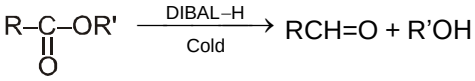
Note : H_2, Pd, $BaSO_4$ is also used for same conversion.

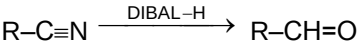
(11) Red Phosphorus and HI

Almost all functional groups contaning compounds converts into corresponding alkane by red P + HI.

- $R–CH_2OH \longrightarrow R – CH_3$
- $R–CHO \longrightarrow R – CH_3$
- $R_2CO \longrightarrow R_2CH_2$ (Alkane)

(12) DIABAL-H reduction





At ordinary temperature esters reduced to alcohols but at low temperature esters reduced to aldehyde.