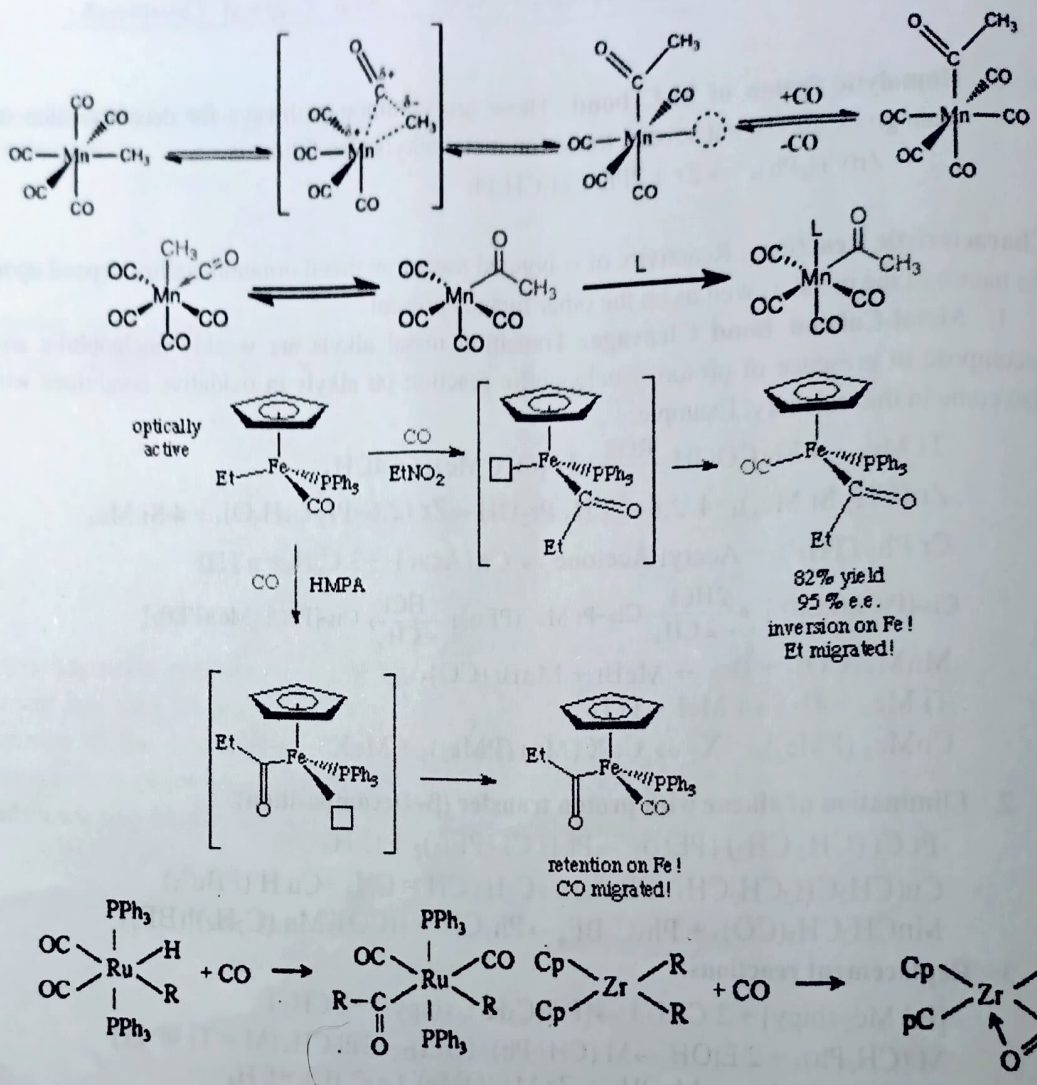


ii. **CO_2, SO_2 or CS_2 insertion:**

$$Cu\,Me(PPh_3)_3 \xrightarrow{CO_2} Cu\,(O_2C\,Me)(PPh_3)_3$$

$$Cu\,Me\,(Et_2O)\,(PPh_3)_2 \xrightarrow{CO_2} Cu(O_2C\,Me)(Et_2O)(PPh_3)_2$$

$$Au\,Me\,(PMe_3)_3 \xrightarrow{SO_2} Au(SO_2\,Me)(PMe_3)_3$$

$$Au\,Me_3\,(PMe_3) \xrightarrow{SO_2} Cis\text{-}Au\,Me_2\,(SO_2Me)\,(PMe_3)$$

$$Ti\,Me_2(\eta^5\text{-}C_5H_5)_2 \xrightarrow[-78^\circ C]{2SO_2} Ti\,(\eta^1\text{-}O_2\,SMe)_2\,(\eta^5\text{-}C_5H_5)_2$$

Organo-Copper in Organic Synthesis: Most important organocopper reagent is lithium dimethyl cuprate, $Li[Cu(CH_3)_2]$, prepared by the action of methyl lithium with cuprous iodide:

$$4\,LiCH_3 + Cu_2I_2 \rightarrow 2\,Li[Cu(CH_3)_2] + 2\,LiI$$

A.K.P.

Typical characteristics of lithium dimethyl cuprate, $Li[Cu(CH_3)_2]$ are

1. Strong nucleophilicity towards carbon atom and very high affinity for reaction at alkene or halide sites compared to carbonyl groups.
2. Inertness towards groups like cyano- or ester- etc.
3. In, α,β– unsaturated carbonyl systems, it selectively attaches with β– Carbon atom.
4. It has special ability to replace various types of halogen atoms by methyl groups.
5. It reacts with allylic acetates by SN^2 mechanism.
6. Reacts with epoxides to form open ring alkylated alcohols.
7. It adds to acetylene-esters.

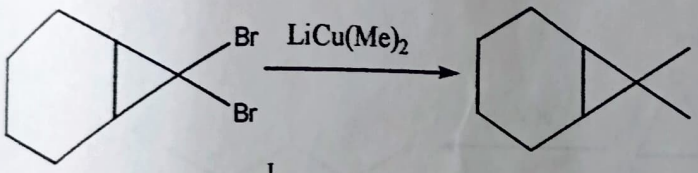
In addition, there are examples of similar reactions involving branched alkyl, phenyl and vinyl copper reagents.

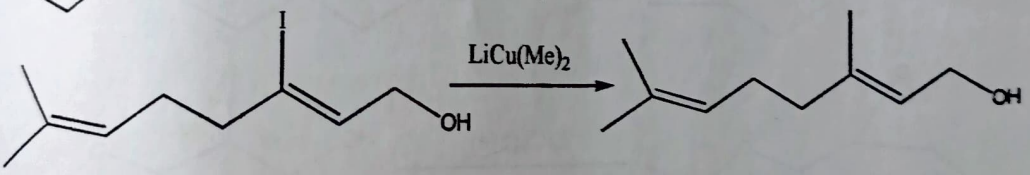
- **Halogen Substitution:**

Trans-PhCH=CHBr + $LiCuMe_2$ → *Trans*-PhCH= CHMe

$C_6H_5I + LiCuMe_2 \rightarrow C_6H_5Me$

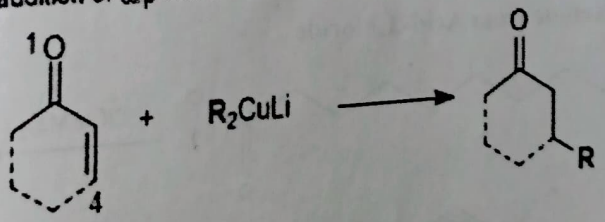
$C_5H_{11}Br + Li[Cu^tBu2] \rightarrow {}^tBu(CH_2)_4CH_3$

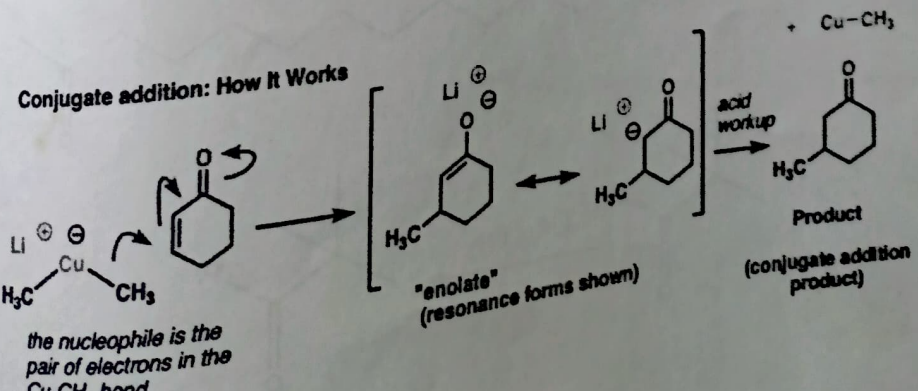




- **Conjugated Additions:**

1,4-addition of α,β-unsaturated carbonyl compounds





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