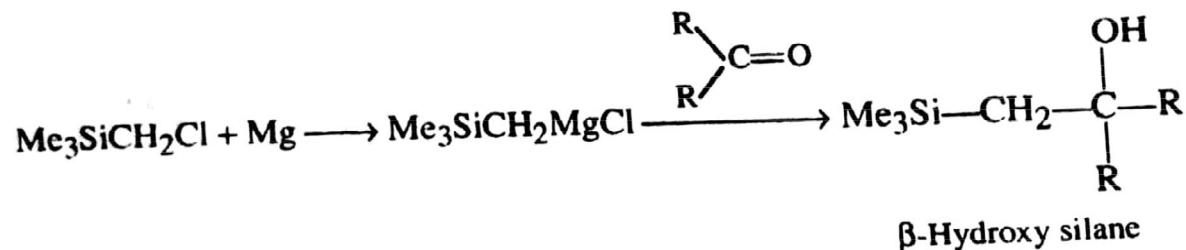
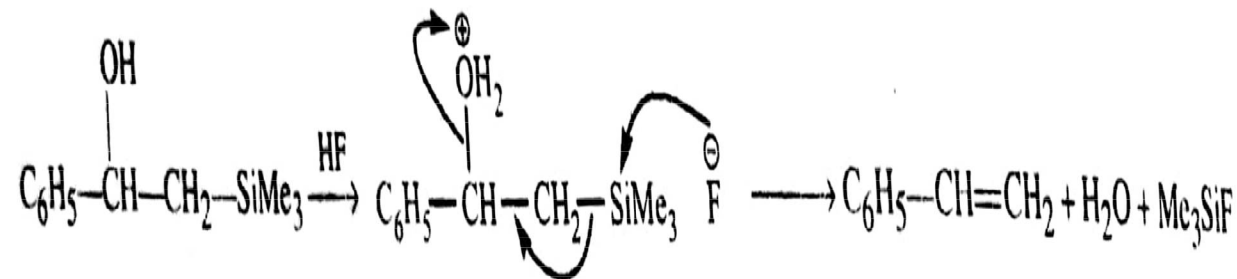


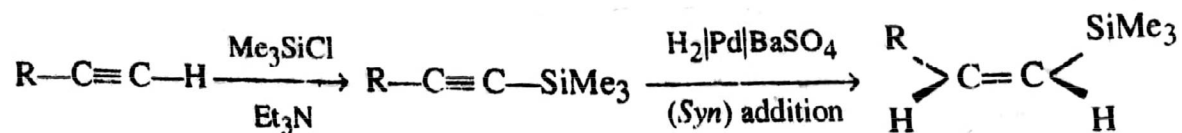
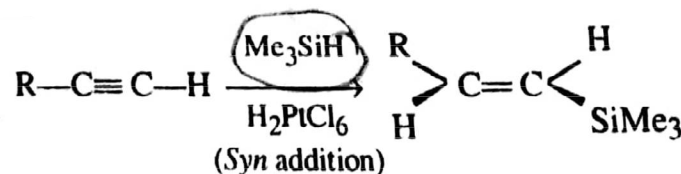
PETERSON REACTION

Synthesis of Alkenes: PETERSON REACTION

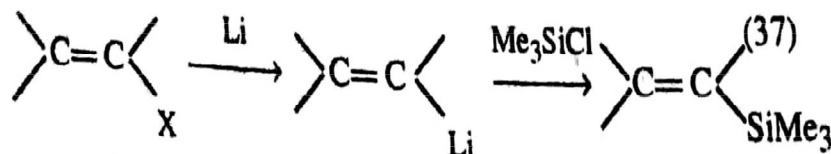
- In many reactions Trimethylsilyl group acts like a proton and is readily removed by hard nucleophiles particularly F⁻ and RO⁻ and promote elimination. This reaction is known as Peterson Reaction.
- It is fully regioselective and advantageous over methods leading to mixture of regioisomers
- Particularly useful for making terminal or exocyclic double bonds



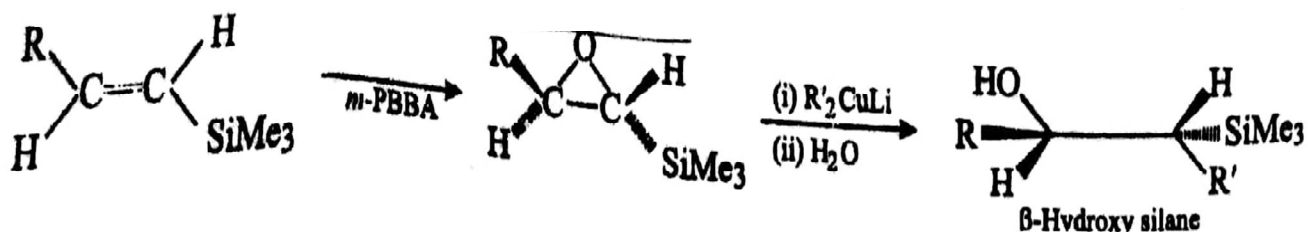
- Starting material is beta-hydroxyl silane which can be prepared from terminal alkynes. Terminal alkyne is first converted to vinyl silane



- Vinyl silane can also be obtained from vinyl halides



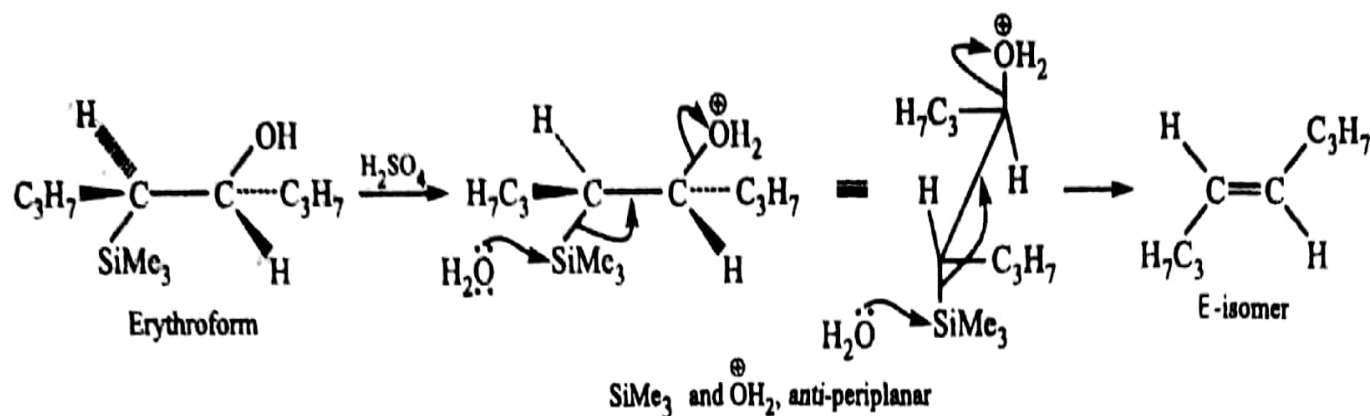
- Vinyl silanes then converted to alpha-beta epoxysilane, which is converted to Beta-hydroxyl silane by the use of Gilman reagent



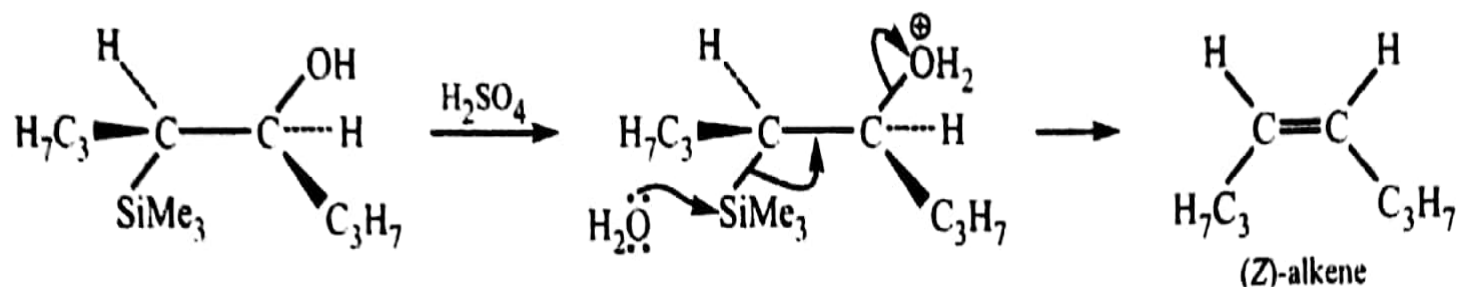
- The reaction is stereospecific because it is an E2 elimination reaction. The reaction is promoted in the presence of acid as well as base

PETERSON REACTION in presence of Acid

- Proceeds via an anti-periplanar transition state

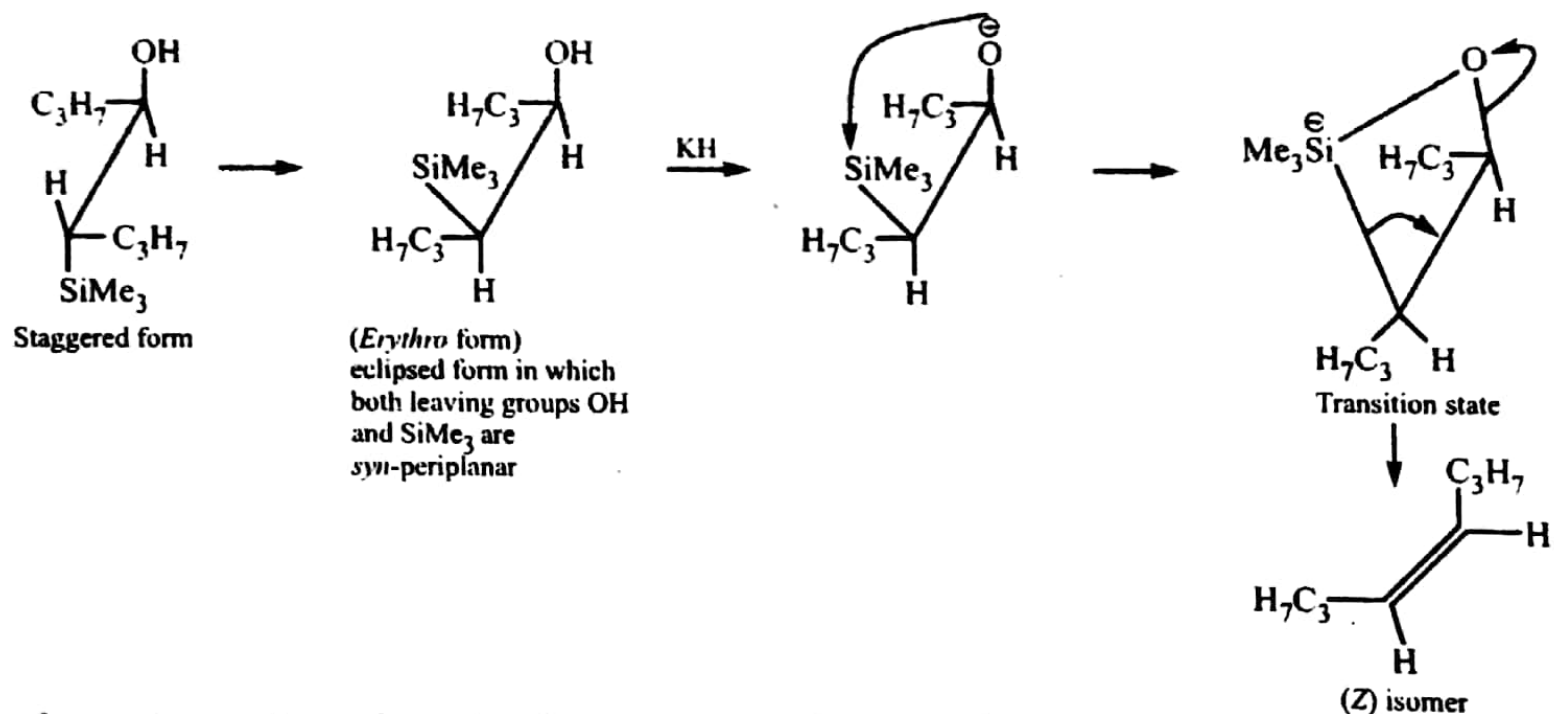


- Threo form of the above compound gives Z-alkene

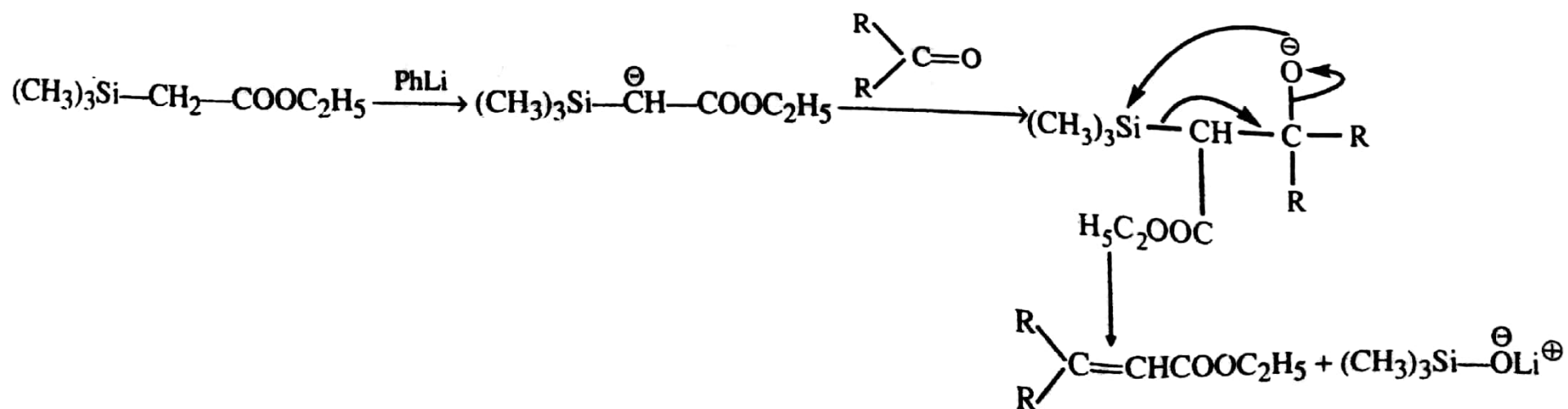


PETERSON REACTION in presence of Base

- When base is added, the hydroxyl group is deprotonated and the oxyanion attacks the silicon atom intramolecularly
- Elimination takes place via **syn periplanar transition state**, the oxygen and the silicon are now bonded together and it is the strength of this bond that drives the syn elimination forward

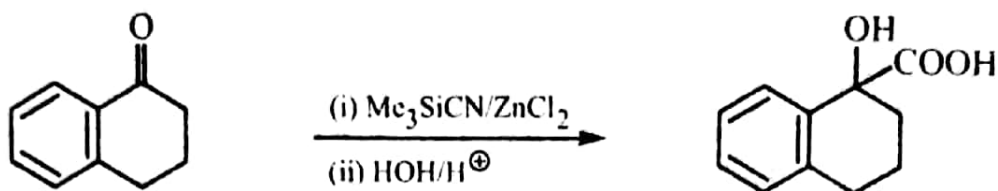
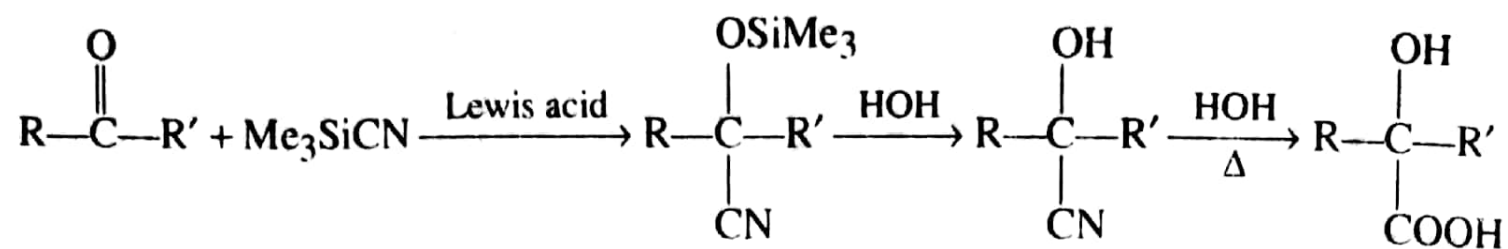


- Unlike the two steps (above) involved for the synthesis of an alkene, the reaction can lead directly to an alkene
- This requires the presence of a CH group adjacent to both a silicon containing substituent ex; SiMe₃ and group of -I type in a substrate
- This reacts in the presence of a base with an aldehyde or a ketone to give the alkene directly



Trimethylsilyl cyanide

- This derivative can be prepared from chlorotrimethylsilane and NaCN
- It reacts with ketones in the presence of Lewis acid to give O-trimethylsilyl cyanohydrin which on further hydrolysis gives the corresponding cyanohydrin or hydroxyl acid in good yield

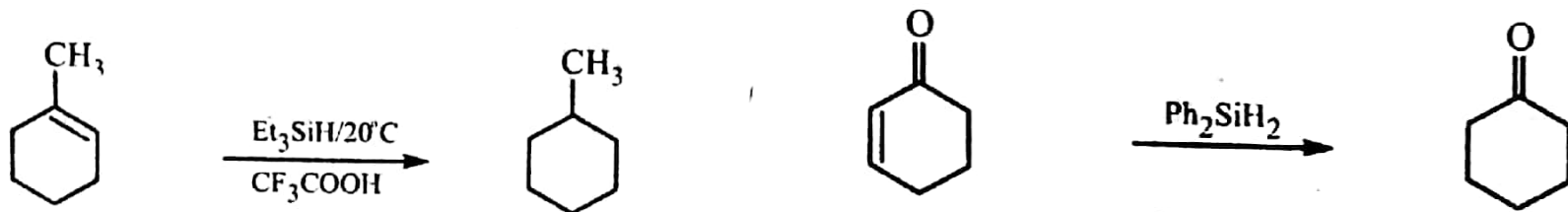


Trialkylsilane

- The main use of this reagent is as reducing agent and the reaction is known as hydrosilation
- Hydrosilation provides a powerful and selective method for the reduction of many functional groups

Reduction of Alkenes

- Silane in the presence of CF_3COOH reduces alkenes into alkanes
- Silanes are used for the selective reduction of olefinic bond in the conjugated carbonyls probably via formation of a silyl enolate



- In the acidic medium, silanes reduces aldehydes and ketones to the corresponding alcohols
- Selective reduction of aldehyde group is achieved when conjugated aldehyde is treated with $(\text{EtO})_2\text{SiHMe}$ in the presence of KF

