The Takai–Oshima–Lombardo Methylenation of Carbonyl Compounds

**Significance:** The Takai–Oshima–Lombardo methylation is a synthetically important reaction to convert carbonyl compounds into alkenes. Initially introduced by Takai, Oshima and co-workers in 1978, this transformation was further elaborated by Lombardo in 1982. The Zn/CH₂Br₂/TiCl₄ system is also known as the Lombardo–Oshima reagent.

**Comment:** The highly electrophilic methylation reagent is formed in situ and stable at low temperatures. In contrast to the Wittig reaction, this protocol is applicable to base-sensitive substrates, as demonstrated by the olefination of enolizable gibberellin derivatives without erosion of enantiomeric excess. The structure of the active species is assumed to be a gem-dimetallic species (see path a).