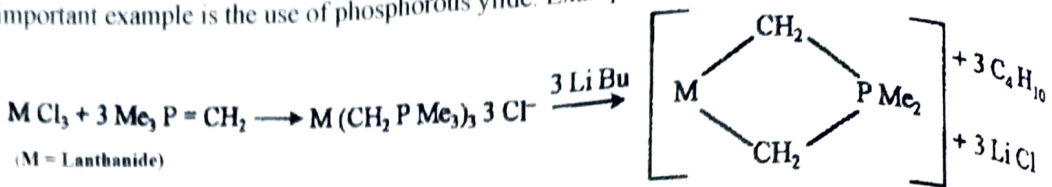


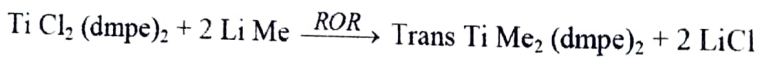
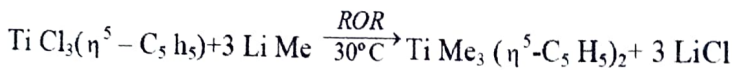
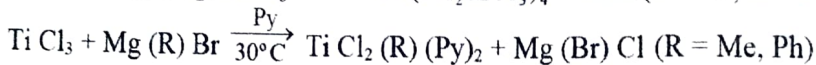
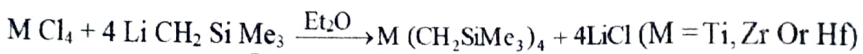
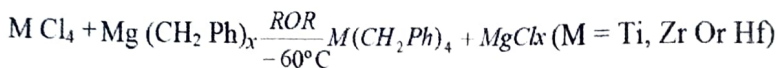
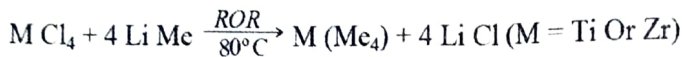
Transition Metal-Aryl and Alkyl Complexes

(ii) **Ylide synthesis:** Chelating ligands stabilizes transition metal-alkyl bond. One such important example is the use of phosphorous ylide. Example:

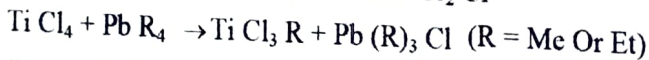
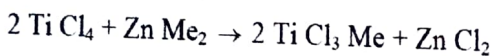


2. **Group 4 - d² Metals:** Ti [Oxidation Number +2: Coordination Number: 2(sp) Example: Ti(CH₂Ph)₂; Oxidation Number +3: Coordination Number: 3(sp²) Example: Ti(CH₂SiMe₃)₃; 5(dsp³) Example: TiCl₂R(Py)₂ (R = Me, Ph); Oxidation Number +4: Coordination Number: 4(sp³) Example: TiMe₄, 4(dsp²) Example: TiMe₂(DMPE)₂, 5(dsp³) Example: [TiMe₅]], Zr [Oxidation Number +4: Coordination Number: 4(sp³) Example: ZrMe₄] and Hf [Oxidation Number +4: Coordination Number: 4(sp³) Example: Hf(CH₂^tBu)₄, 6(d²sp³) Example: [HfMe₆]²⁻] are present in this group. General methods for synthesis are:

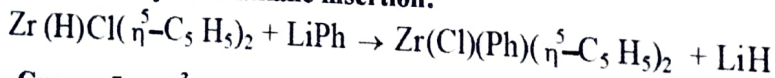
(i) **Halide exchange:**



(ii) **Transmetalation:** These reactions are opposite to halide exchange reactions giving heteroleptic alkyls or aryls.



(iii) **Metal hydride alkane insertion:**



3. **Group 5 - d³ Metals:** V [Oxidation Number +2: Coordination Number: 4(dsp²) Example: *Trans*-VMe₂(dmpe)₂, 6(d²sp³) Example: [VPh₆]⁴⁻; Oxidation Number +3: Coordination Number: 3(sp²) Example: V(CH₂SiMe₃)₃; Oxidation Number +3: Coordination Number: 6(d²sp³) Example: VPh₃(THF)₃; Oxidation Number +4: Coordination Number: 4(dsp²) Example: VMe₄], Nb [Oxidation Number +4: Coordination Number: 4(sp³) Example: Nb(C₆F₅)₄; Oxidation Number +5: Coordination Number: 5(dsp³) Example: NbMe₅; Oxidation Number +5: Coordination Number: 6(d²sp³) Example: [NbPh₆]] and Ta [Oxidation Number +5: Coordination