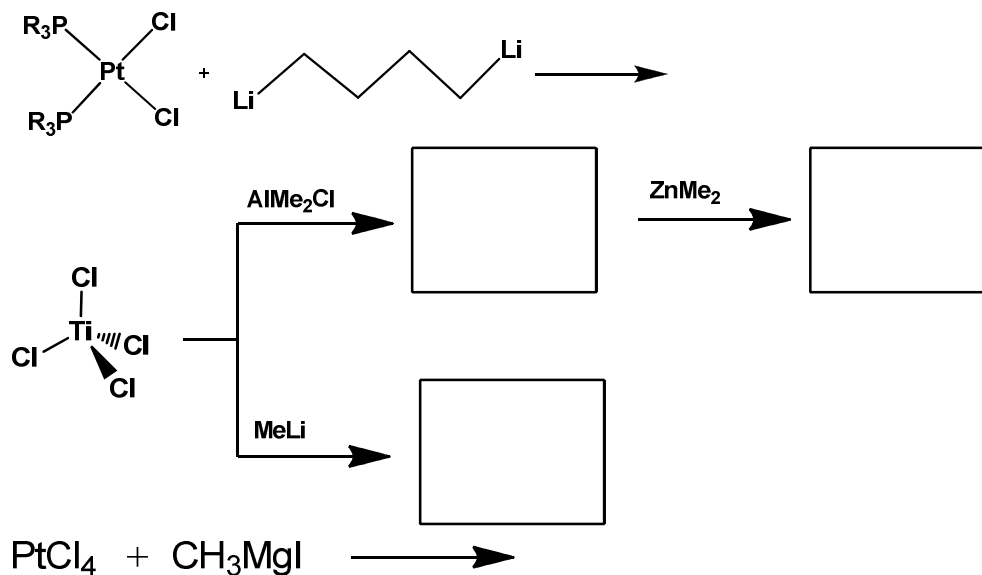


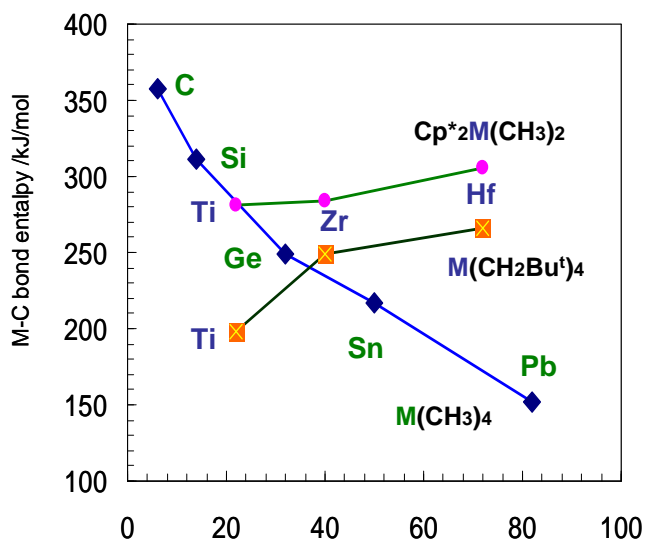
T2. OMCh Problems

1 The alkylating strength decreases as follow: $\text{LiR} > \text{RMgX} > \text{Al}_2\text{R}_6 > \text{R}_2\text{Zn}$
Explain

2 Predict the products of the following reactions:



3 Explain the graphic. Mean Metal-Carbon bond enthalpies vs atomic number.



-
- 4** Explain the difference in stability between the tetraalkyls of titanium and lead:
- | | |
|-------------------|--------------------|
| TiMe ₄ | >-50 °C |
| TiEt ₄ | existence doubtful |
| PbMe ₄ | > 200 °C |
| PbEt ₄ | > 100 °C |
-
- 5** Suggest preparative methods of stable M-alkyls complexes where β-elimination can be suppressed when
- The formation of leaving olefin is either sterically or energetically unfavorable.
 - The organic ligand have no hydrogen atom in the β position.
 - The central atom is coordinatively saturated.
 - Using chelating ligands.
-
- 6** The reaction of W(CO)₆ with LiC₆H₄-4-CMe₃ gives the compound [Me₄N][[(CO)₆WC₁₀H₁₃]. Suggest the structure of anion from its spectroscopic data
- IR: 2042 cm⁻¹(weak), 1901 cm⁻¹ (strong), ~1600 cm⁻¹
¹H NMR δ (relative intensity): 7.54 (2H), 7.35 (2H), 1.31 (9H)
¹³C NMR δ: 279.3, 209.0, 204.7, 155.5, 152.2, 126.4, 125.2, 31.7
- (K. A. Belsky, M. F. Asaro, S. Y. Chan, and A. Mayr, *Organometallics* **1992**, *11*, 1926), in Douglas, McDaniel, Alexander *Concepts and Models of Inorganic Chemistry*, Wiley, New York, 1994
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- 7** In the ¹³C NMR spectrum of CH₃Mn(CO)₅ the CO's cis to methyl group absorb at 213.8 ppm and the trans CO absorbs at 211.3 ppm. A sample of CH₃¹³C(O)Mn(CO)₅ was prepared by reaction of CH₃¹³C(O)Cl with [Mn(CO)₅]⁻
- $$\text{Mn(CO)}_5^- + \text{H}_3\text{C}-\overset{\text{O}}{\parallel}{\text{C}}-\text{Cl} \longrightarrow \text{H}_3\text{C}-\overset{\text{O}}{\parallel}{\text{C}}-\text{Mn(CO)}_5 + \text{Cl}^-$$
- When this labelled sample was heated, CH₃Mn(CO)₅ was produced. The ¹³C NMR spectrum of the product showed dramatic signal enhancement at only the 213.8-ppm position. What conclusions can you draw about the mechanism of the CO loss?
- (T. C. Flood, J. E. Jensen, and J. A. Statler, *J. Am. Chem. Soc.* **1981**, *103*, 4410.), in Douglas, McDaniel, Alexander *Concepts and Models of Inorganic Chemistry*, Wiley, New York, 1994
-

Additional problems

Crabtree, *The Organometallic Chemistry of Transition Metals*, 4 ed, Wiley, Hoboken, 2005. Chap. 3: 1, 3, 7, 11.