

The 16 and 18 Electron Rule in Organometallic Chemistry and Homogeneous Catalysis

The 16 and 18 Electron Rule.-Two postulates or rules for organometallic complexes and their reactions are proposed.

1. Diamagnetic organometallic complexes of transition metals may exist in a significant concentration at moderate temperatures only if the metal's valence shell contains 16 or 18 electrons. A significant concentration is one that may be detected spectroscopically or kinetically and may be in the gaseous, liquid, or solid state.
2. Organometallic reactions, including catalytic ones, proceed by elementary steps involving only intermediates with 16 or 18 metal valence electrons.

from C. A. Tolman, *Chemical Society Reviews*, 1972, 1, 337.