Day 2: Elementary Reactions towards Catalytic Cycles

TODAY’S TOPICS
- trans effect (trans influence)
- crystal field theory
- back-bonding
- elementary steps
  - ligand exchange
  - oxidative addition
  - reductive elimination

QUOTE OF THE DAY

PROBLEMS OF THE DAY

#1

\[
\begin{align*}
\text{L}^2 & = \text{SPh, PPh}_2, \text{N} \\
\text{Pd} & - \text{L}^1 - \text{Fe} - \text{Ph} - \text{Ph}
\end{align*}
\]

Arrange in order of expected \(^{13}\text{C}\) NMR shift of the carbon atom indicated.

*Organometallics* 2003, 22, 1255.

#2

\[
\begin{align*}
\text{starting material(s)?} \\
\text{[X-ray]} \\
\text{coordination number?} \\
\text{oxidation state?} \\
\text{d-electron count?} \\
\text{overall electron count?} \\
\text{type of complex?} \\
\text{BAr}^+_4 \text{ structure?}
\end{align*}
\]


#3

Predict the geometry of the following complexes. Explain your reasoning.

\[
\begin{align*}
Pd(CO)_4 \\
PtCl_2(PEt_3)_2 \\
NiBr_2(PMePh_2)_2
\end{align*}
\]

#4

\[
\begin{align*}
Pd & \text{TMS} \\
\text{TMS} \\
\text{Ar–Br (1 equiv)} \\
\text{pentane, rt}
\end{align*}
\]

Product?


CHEMIST OF THE DAY

Lauri Vaska (1925–2015)
Born: Rakvere, Estonia
Mellon Institute (now CMU) Clarkson University

Known for:
- Vaska’s complex
- foundations of homogeneous catalysis