Silylium Ion Catalyzed C–H Arylation of Hydrocarbons

Selected examples:

\[
\begin{align*}
\text{Ph} & \quad \text{Ph} \quad \text{Me} \quad \text{Br} \\
56\% \text{ GC yield} & \quad 49\% \text{ isolated yield} & \quad 42\% \text{ GC yield} & \quad 32\% \text{ isolated yield}
\end{align*}
\]

Proposed catalytic cycle:

**Significance:** The Nelson group reports a silylium ion catalyzed arylation of C(sp\(^2\))–H and C(sp\(^3\))–H bonds. By employing 2–5 mol\% of precatalyst A in the presence of a trialkylsilane initiator, various aliphatic and aromatic hydrocarbons were arylated with variously functionalized trimethylsilyl fluorobenzenes.

**Comment:** Previously, catalytic reactions involving highly reactive phenyl cation equivalents were limited to intramolecular transformations. The authors describe the formation of a \(\beta\)-silicon-stabilized phenyl cation (equivalent) II, which is proposed to subsequently undergo intermolecular insertion into the C–H bond of a hydrocarbon present in large excess. Desilylation of the resulting Wheland intermediate furnishes the product and regenerates the catalytically active species I.

**SYNFACTS Contributors:** Benjamin List, Lucas Schreyer

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