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Oxidative Cycloaddition of 1,1,3,3-Tetramethyldisiloxane to Alkynes Catalyzed by Supported Gold Nanoparticles


Cycloaddition of Tetramethyldisiloxane to Alkynes with $[\text{Au}]/\text{TiO}_2$

Selected examples:

- $2a$ (30 min, 84% isolated yield)
- $2b$ (40 min, 99% isolated yield)
- $2c$ (40 min, 96% isolated yield)
- $2d$ (40 min, 81% isolated yield)
- $2e$ (20 min, 85% isolated yield)
- $2f$ (20 min, 91% isolated yield)
- $2g$ (30 min, 98% isolated yield)
- $2h$ (30 min, 72% isolated yield)
- $2i$ (1 h, 87% isolated yield)
- $2j$ (40 min, 78% isolated yield)
- $2k$ (1 h, 42% isolated yield)
- $2l$ (24 h, 88% isolated yield)

Proposed reaction pathway:

Significance: TiO$_2$-supported gold nanoparticles ($[\text{Au}]/\text{TiO}_2$) catalyzed the oxidative cycloaddition of 1,1,3,3-tetramethyldisiloxane (TMDS) to alkynes 1 to give the corresponding cycloadducts 2 in up to 99% isolated yield (22 examples, eq. 1).

Comment: The authors proposed a reaction pathway for the present oxidative cycloaddition as follows (eq. 2): (1) oxidative addition of TMDS to [Au] giving H-[Au]-Me$_2$SiOSiHMe$_2$ (A); (2) insertion of alkynes 1 into the Si–Au bond forming gold adducts B; (3) intramolecular elimination of H$_2$ and [Au] to give cycloadducts 2.