Highly E- and Z-Selective Hydrogenation of Alkynes Using Chromium and Cyclic Carbene Ligands

Significance: Achieving stereoselective control in the hydrogenation of alkynes to generate alkenes is a long-standing challenge. Common strategies to synthesize both the E- and Z-olefins selectively from an alkyne utilize two separate metal catalysts. Zeng and co-workers report a ligand-controlled stereodivergent hydrogenation of alkynes using the same metal to access both isomers of the desired alkenes.

Comment: The authors collect the reaction profile for both ligands. It is noted that the initial formation of the Z-olefins is favored, and in the case of CAAC-P-Cr, product isomerization takes place to yield the E-olefins. This result is due to the less bulky and more electron-rich nature of CAAC-P compared to that of CAAC-N-Cr.

Selected scope examples:

- up to 95% yield
- E/Z selectivity >99:1
- gram scale

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