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Monotrifluoroacetoxyborane-Amine Complexes for Reductive Amination and Reduction of Imines and Enamines

Single-step trifluoroacetoxyborane-amine catalysts enable high-yield reductive amination under mild conditions.

Researchers at Purdue University have developed reagents, catalysts, and reaction conditions for chemoselective reductive amination of ketones and aldehydes, reductive amination-lactamization of keto acids, and reductive alkylation of amino acids. Current methods for reductive amination involve two steps, first converting carbonyls to imines and then reducing the imines to amines. Using the Purdue researchers' reagents and catalysts, carbonyls are reductively aminated in one step. The catalysts are synthesized via reaction of an amine-borane compound with trifluoroacetic acid in the presence of an organic solvent, creating a trifluoroacetoxyborane-amine compound. Reductive amination occurs by reacting a ketone, aldehyde, or keto acid with an amine in the presence of the catalyst. The catalyst preparation and reduction reactions can be carried out at room temperature.

Technology Validation: Via reductive amination-lactamization of keto acids, the researchers obtained excellent yields of aromatic and aliphatic lactams of different ring sizes.

Advantages:

- Highly selective reagent

- One-step reaction

- High yield reaction

- Room temperature reaction

Applications:

Technology ID
2022-RAMA-69902

Category
Chemicals & Advanced Materials/Specialty & Performance Chemicals
Pharmaceuticals/Drug Discovery & Development

Authors
Padinjaremadhom V Ramachandran

Further information
Aaron Taggart
adtaggart@prf.org

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- Reduction of imines, enamines, and amino acids and reductive amination of carbonyls, producing chemicals for the pharmaceuticals, plastics, and agrochemical industries

- Preparation of lactams for pharmaceutical applications

Related Publication:

Monotrifluoroacetoxyborane-amines: chemoselective reagents for challenging reductive aminations.

Chemical communications (Cambridge, England), 2022, Vol.58 (84), https://doi.org/10.1039/d2cc04173a

TRL: 3

Intellectual Property:

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