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SOLVENT-DEPENDENT PREPARATION OF AMINE-BORANES VIA WATER-MEDIATED REACTION

Water-mediated, solvent-dependent synthesis of amine-boranes offers a green, low-cost, scalable route for reagents in organic and materials chemistry.

Researchers at Purdue University have developed an economical and environmentally friendly method for preparing amine-boranes. Amine-boranes are important reagents in organic chemistry and are becoming increasingly applicable in reduction, hydroboration, reductive amination, and transfer hydrogenation reactions. There are numerous procedures for amine-borane synthesis, including direct reaction, nucleophilic displacement, and salt metathesis. However, these methods all suffer from hazardous reagent preparation, poor atom economy, and unstable and toxic reagents. Despite robust research efforts, a safe, economical, and more environmentally friendly process for synthesizing amine-boranes is still direly needed.

The method developed by Purdue researchers for amine-borane synthesis helps reagent manufacturers and suppliers, as well as synthetic chemists significantly reduce amine-borane preparation costs. Where current synthesis procedures suffer from expensive preparation costs, the present method instead utilizes sodium borohydride as the borane source and water as the reagent, producing a greener and inexpensive solvent. This method is advantageous for large-scale reactions and improves the performance of amine-boranes as reagents in materials and organic chemistry applications.

Technology Validation:

A green chemistry metrics analysis was performed to quantify the improvements and superiority of the novel amine-borane compound. Results demonstrated that the synthesis method produced a carbon economy value of 100 while all other reactions had values of 60 or less.

Advantages:

Technology ID
2023-RAMA-70058

Category
Chemicals & Advanced Materials/Green & Bio-Based Chemistry
Energy & Power Systems/Hydrogen & Fuel Cell Systems
Pharmaceuticals/Drug Discovery & Development

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-Economical and environmentally friendly

-Advantageous for large scale reactions

-Reduces amine-borane production costs

Applications:

-Reagent manufacturers and suppliers

-Pharmaceutical companies

-Pharmaceutical manufacturing

-Synthetic chemists in academia or industry

TRL: 4

Intellectual Property:

Provisional-Patent, 2024-02-23, United States

Utility Patent, 2025-01-21, United States

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