

Amine-Boranes Bearing Borane-Intolerant Functionalities

A novel, open-air synthesis using water and baking soda enables the safe, inexpensive production of previously inaccessible, functionalized amine-boranes for use in medicine, energy storage, and materials development.

Amine-boranes have been known for over eight decades and have found several applications in industry and academia alike. Typically, amine-boranes are produced through reacting an amine with borane-based complexes. However, various common functional groups, such as hydroxyl, thiol, ester, etc., are reactive to these borane-based complexes. As a result, preparing amines-boranes bearing functional groups is a major challenge for chemists around the world. A method to synthesize these functional groups would expand borane's properties as an amine-protecting group and provide unique applications in both organic and materials chemistry.

Researchers at Purdue University have developed a novel synthesis of known, as well as inaccessible, functional group bearing amine-boranes, utilizing inexpensive and widely available reagents. This method is capable of producing amines bearing borane-reactive functionalities such as alkene, alkyne, hydroxyl, thiol, ester, amide, nitrile, and nitro. This technology will aid in the progress of materials chemistry and organic chemistry research.

Advantages:

- Production of amine-boranes is safer and less expensive
- Increased supply of amine-boranes
- Uses water and baking soda as reagents
- Works for previously inaccessible amine-boranes
- Utilizes nonflammable reagents
- Process performed in an open-air environment without the need for inert conditions

Technology ID

2017-RAMA-67642

Category

Chemicals & Advanced
Materials/Specialty &
Performance Chemicals
Energy & Power
Systems/Hydrogen & Fuel Cell
Systems
Materials Science &
Nanotechnology/Advanced
Functional Materials

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Potential Applications:

-Medicine

-Energy storage

-Batteries

-Hydrogen storage

-Hydrogen to power electric vehicles, electronic devices, and in rocket propellants

-Material chemistry R&D

-Organic chemistry R&D

TRL: 7

Intellectual Property:

Provisional-Patent, 2016-08-19, United States | Utility Patent, 2017-08-18, United States | DIV-Patent, 2018-04-27, United States

Keywords: Amine-boranes synthesis, functional group bearing amine-boranes, borane-reactive functionalities, organic chemistry, materials chemistry, amine-protecting group, hydrogen storage, energy storage, inexpensive reagents, nonflammable reagents