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# Procedures for the Synthesis of Ethylenediamine Bisborane and Improved Synthesis of Ammonia Borane

**An improved, high-purity process efficiently produces amine-borane complexes for hydrogen storage, potentially meeting Department of Energy targets for fuel cell applications.**

Hydrogen is the environmentally desirable fuel of choice since it can be used in internal combustion engines or is electrochemically oxidized efficiently in Proton Exchange Membrane (PEM) and other types of fuel cells. Currently available hydrogen storage processes are either inadequate or impractical for widespread usage. Although many hydride complexes have been studied, amine-boranes, particularly, ammonia-borane (AB), has unique potential to store and deliver a large amount of molecular hydrogen through dehydrogenation reaction.

Researchers at Purdue University have developed an improved process for the preparation of ammonia borane in 85 to 92 percent yield and greater than 98 percent purity using sodium borohydride and ammonium salts in the presence of ammonia in tetrahydrofuran (THF) at zero degrees Celsius, without the need of an inert atmosphere. An efficient process has also been developed to prepare ethylenediamine bisborane complex (EDAB) from ammonia borane in THF. The prepared EDAB contains 11.4 percent by weight of hydrogen that can be liberated for fuel cell applications and has the potential to meet the Department of Energy (DOE) targets for hydrogen storage.

**Advantages**:

-Improved process

-Greater than 98 percent purity

-May meet DOE targets for hydrogen storage

Potential Applications:

**Technology ID**

65602

**Category**

Chemicals & Advanced Materials/Specialty & Performance Chemicals

Energy & Power Systems/Hydrogen & Fuel Cell Systems

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-Fuel cell applications

-Hydrogen storage

**TRL:** 4

**Intellectual Property:**

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