2009 IGERT PBL Course
Problem 2: A Solar-Hydrogen Transportation Solution
Phase 1: Clean Car Breakthroughs – Hope or Hype?

Group 2. Hydrogen Storage

Hydrogen storage breakthrough

Gizmag
http://www.gizmag.com/hydrogen-storage-breakthrough/9517/
June 24, 2008

Hydrogen offers many benefits as a renewable and sustainable fuel of the future as its combustion emits only water. The main problem to now is that it must be stored as a gas, which is potentially dangerous for everyday use, and it can only be stored as a liquid under cryogenic conditions. Now there may be another alternative. Chemists in the US have developed a simple reaction to make ammonia borane (AB) – a powder more hydrogen-dense than even liquid hydrogen. AB is a stable white powder which releases hydrogen gas upon heating. Its use as a hydrogen storage material has been hampered by difficulties in making the powder in reasonable yield, but the new research further increases its promise.

Chemist Tom Autrey and colleagues from Pacific Northwest National Laboratory, US, discovered the "one-pot" method of making AB while studying its decomposition pathways. The group was pleasantly surprised that "under relatively simple reaction conditions the ammonia borane was formed in very high yields."

The group is researching new designer materials to store hydrogen safely, so that it can be released at will to power a fuel cell. The group is currently looking at scaling up the reaction to an industrial level.

Autrey says the next challenge is to "recycle the solvents to provide the most economical route to synthesise this promising hydrogen storage material."

Their one-pot synthesis of this promising hydrogen storage material is reported in the first issue of the new Royal Society of Chemistry journal Energy & Environmental Science.

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