Fast and Reliable Hydrogen Generation Utilizing a Fixable Catalyst and Borohydride Solutions

Advantages
- Fast and reliable generation of hydrogen from borohydride solutions
- Can be utilized for on-board hydrogen production for vehicular operation
- Catalysts easily fixed to a variety of plastic substrates
- Wide variety of catalysts to choose from
- Stabilizing agents to control rate of hydrogen produced

Invention
The composition of a variety of organic pigment catalysts, method of fixing said catalysts to a substrate, methods for creating hydrogen rich borohydride solutions and the utilization of stabilizing agents for fine tuned control of a hydrogen gas production system suitable for large scale production and on-board vehicular fueling

Background
The demand and popularity of hydrogen gas (H2) as a fuel source has increased dramatically over the last few years. The rise in demand for hydrogen fuel can be attributed to the fact that it is clean burning, it reduces the need for fossil fuels and it can be used for a wide variety of energy needs. It is the fuel of choice for the space program and can easily be reacted with oxygen in devices such as fuel cells, combustion engines or gas turbines to produce energy and water. Safe and efficient storage of H2 is the main challenge for its widespread commercial use as a fuel. One possibility would be a solid, hydrogen-rich storage medium; metal hydride solutions are a good, safe example of such a medium. Borohydrides, a class of metal hydrides, are known to decompose in water to produce hydrogen gas and a boron atom bonded to oxygen. This reaction is both spontaneous and takes place in water, making it attractive as a means of producing hydrogen. Unfortunately, this reaction occurs very slowly. Only the presence of a proper catalyst would increase the rate of this valuable reaction so it could be used for real world applications. Current catalysts are limited to a narrow range of applications, and do not always increase the reaction rate sufficiently.

With these shortcomings in mind, UCF scientists have developed a broad range of more efficient catalytic materials utilizing a variety of organic pigments. These materials are capable of increasing the hydrogen gas evolution reaction at rates exceeding those of previous catalyst. Additionally utilizing the presented methods, these materials are easily fixed onto plastic substrates. They can then be used with a variety of borohydride solutions for large scale or on-board hydrogen generation, making this hydrogen production method perfect for fuel cell or vehicular operation. Finally hydrogen production can be fine tuned by introducing stabilizing agents into the borohydride solution to control the rate and amount of hydrogen generated.

Application
The invention is a fast and reliable hydrogen gas generating system. It can most readily be utilized by hydrogen gas producers, car manufactures and fuel cell designers. By utilizing this technology manufacturers will find themselves one large step closer to effectively introducing hydrogen fuel as a reliable and cost effective energy source.

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Selected References

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