



Just Add Water Generating Hydrogen Gas from Aluminum Nanoparticles



Dayton, OH (Wright-Patterson Air Force Base) -- Scientists are generating hydrogen gas from water by using nanoparticles of aluminum. A coating on the aluminum nanoparticles prevents oxidation until water is added, at which time a chemical reaction releases energy. The hydrogen can be used in a fuel cell which can power a small electronic device.

"It is discovery, it is playing. IT'S FUN! You get to go in and be like an artist, be like a painter. You have your palette of paints—the chemicals—and what you can do and where you can go is only limited by your own imagination."

Christopher Bunker, research chemist

Framework

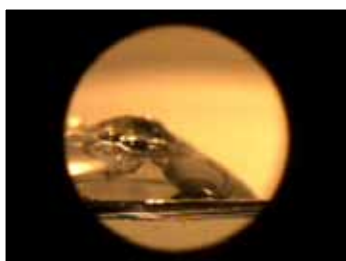
Middle School

Standards

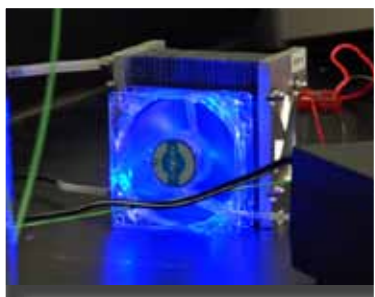
- NSES - B.i.1 ➤ A substance has characteristic properties.
- NSES - B.i.2 ➤ Substances react chemically in characteristic ways.
- NSES - B.iii.5 ➤ Energy is transferred in chemical reactions.
- STL - 2.P ➤ Technological systems can be connected.
- STL - 19.I ➤ Chemical technologies alter substances.

Content Illustrated

- Aluminum nanoparticles react with water.



Content



Physical Science

- Aluminum is very reactive with water, oxidizing and creating hydrogen gas. This is an exothermic reaction that gives off lots of heat.
- Aluminum is used for many products but must be coated to protect the element from reacting.
- Hydrogen gas is converted, using a pressure regulator, into electric energy in a fuel cell.

Engineering

- Energy can be harnessed from natural reactions using everyday materials.

Guiding Questions

To think about as you watch:

- What advantage do nanoparticles have over larger particles?

Suggested Activities

- Find other applications where aluminum is used in which the coating is critical.
- Watch this webisode as an additional resource for the *Engineering Now* unit on *Energy*.

Keywords

aluminum
angstrom
endothermic
exothermic
fuel cell
hydrogen
nanoparticle
oxidize
pressure regulator
reactive
transponder