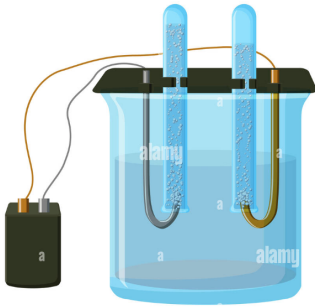


Title: Hydrogen Fuel Development in Utah

Name _____

Phenomenon: Follow these directions to complete the phenomenon.

1. Set up the apparatus as pictured. Add the solution of water and baking soda to the large beaker.



<https://www.alamy.com/water-electrolysis-illustration-image328920514.html>

2. Attach the electrodes to the battery and allow the tubes to collect gas. When one tube is half empty of water remove the electrodes without allowing the gasses to escape.
3. Place a stopper on the bottom of the beaker and wiggle the test tube over it.. Remove the test tube without losing the gas. Do the same for the other tube.
4. Light the wooden splint and remove the stopper from the tube with the most gas (hydrogen). Quickly place the flame over the mouth of the test tube.
5. Do the same for the less-gas tube (oxygen), only blow out the splint and put the glowing end into the gas. Record your results.

Data:

Reaction of the hydrogen to flame:

Reaction of oxygen to glowing splint:

Redesign: Draw and label your new device.

Results of redesign:

Questions:

1. What is produced with the hydrogen burns?
2. Could a solar panel be used instead of a battery?

3. Why would burning hydrogen make a good fuel?
4. What would be difficult about using hydrogen?

Analysis:

1. Read the article below and be prepared to develop an argument concerning the *cost, safety, reliability, possible social, cultural, and environmental impacts of using hydrogen as a fuel and storing it in underground mines.*
2. The following links will help you find additional information:
<https://www.eia.gov/energyexplained/hydrogen/use-of-hydrogen.php>
<https://www.energy.gov/eere/fuelcells/hydrogen-fuel-basics>
https://afdc.energy.gov/fuels/hydrogen_basics.html
<https://www.nrel.gov/research/eds-hydrogen.html>

Can Delta, Utah’s green hydrogen project save both a coal town and the climate?

KUER 90.1 | By [Associated Press](#) Published July 20, 2022 at 9:58 AM MDT

The coal plant is closing. In this tiny Utah town surrounded by cattle, alfalfa fields and scrub-lined desert highways, hundreds of workers over the next few years will be laid off — casualties of environmental regulations and competition from cheaper energy sources. Yet across the street from the coal piles and furnace, beneath dusty fields, another transformation is underway that could play a pivotal role in providing clean energy and replacing some of those jobs.

Here in the rural Utah desert, developers plan to create caverns in ancient salt dome formations underground where they hope to store hydrogen fuel at an unprecedented scale. The undertaking is one of several projects that could help determine how big a role hydrogen will play globally in providing reliable, around-the-clock, carbon-free energy in the future. A smokestack stands at a coal plant on Wednesday, June 22, 2022, in Delta, Utah. Developers in rural Utah who want to create big underground caverns to store hydrogen fuel won a \$504 million loan guarantee this spring. They plan to convert the site of the 40-year-old coal power plant to cleanly-made hydrogen by 2045.

What sets the project apart from other renewable energy ventures is it’s about seasonal storage more than it’s about producing energy. The salt caves will function like gigantic underground batteries, where energy in the form of hydrogen gas can be stored for when it's needed.

“The world is watching this project,” said Rob Webster, a co-founder of Magnum Development, one of the companies spearheading the effort. “These technologies haven’t been scaled up to the degree that they will be for this.”

In June, the U.S. Department of Energy [announced a \\$504 million loan guarantee](#) to help finance the “Advanced Clean Energy Storage” project — one of its first loans since President Joe

Biden [revived](#) the Obama-era program known for making [loans to Tesla](#) and [Solyndra](#). The support is intended to help convert the site of a 40-year-old coal plant to a facility that burns cleanly-made hydrogen by 2045.

Amid polarizing energy policy debates, the proposal is unique for winning support from a broad coalition that includes [the Biden administration](#), Sen. Mitt Romney and the five other Republicans who make up Utah’s congressional delegation, rural county commissioners and power providers.

Renewable energy advocates see it as a potential way to ensure reliability as more of the electrical grid becomes powered by intermittent renewable energy in the years ahead.



Rick Bowmer

Piles of coal wait to be burned outside the Intermountain Power Plant on Wednesday, June 22, 2022, in Delta, Utah. Developers in rural Utah who want to create big underground caverns to store hydrogen fuel won a \$504 million loan guarantee this spring. They plan to convert the site of the 40-year-old coal power plant to cleanly-made hydrogen by 2045. In 2025, the initial fuel for the plant will be a mix of hydrogen and natural gas.

Use this table to help organize your data:

Source of information	Cost	Safety/Reliability	Social/cultural impact	Environmental impact

Write a 4 sentence argument to support or deny the use of underground storage for hydrogen in Delta Utah. Support your decision with data.