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Alternative Energy Sources Boron and Hydrogen Energy

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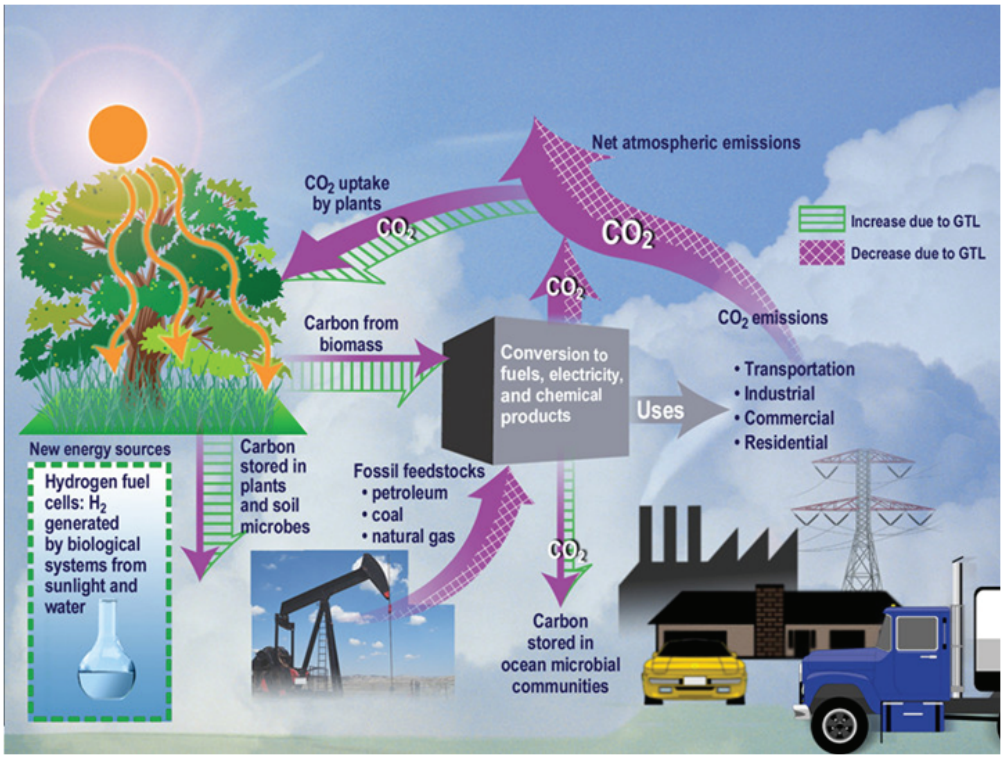
ABSTRACT

As you know classical energy sources are oil, natural gas and coal. As it is known, global warming is one of the most effective problems in recent years. Global warming, which threatens the world, is the classical energy sources we know. At the beginning of these are oil. As a consequence of the depletion of fossil fuel reserves, some scientists are exploring alternative energy sources for these energy sources, looking for alternatives to global warming and the depletion of fossil fuel reserves. Fuel price hikes also have an important effect on this research. Some energy sources, which are found in nature, are sources that act at a minimum level of clean, renewable and global warming.



HYDROGEN-H

- Atomic Number: 1
- Atomic Weight: 1.00794
- Electronic Configuration: 1

Hydrogen is a gaseous element that was first discovered by Henry Cavendish in 1766. It is the first element on the Periodic Table. Hydrogen is:

- Colorless
- Tasteless
- Odorless
- Slightly soluble in water
- Highly explosive

Hydrogen is the most abundant element in the universe, and serves as the fuel for the fusion reactions in stars. Normal hydrogen is diatomic (two hydrogen atoms chemically paired). Atmospheric hydrogen has three isotopes: protium (one proton in nucleus), deuterium (one proton and one neutron in nucleus), and tritium (one proton and two neutrons) [1-8].

The pursuit of hydrogen energy began way back in 1776 by the British scientist Henry Cavendish.

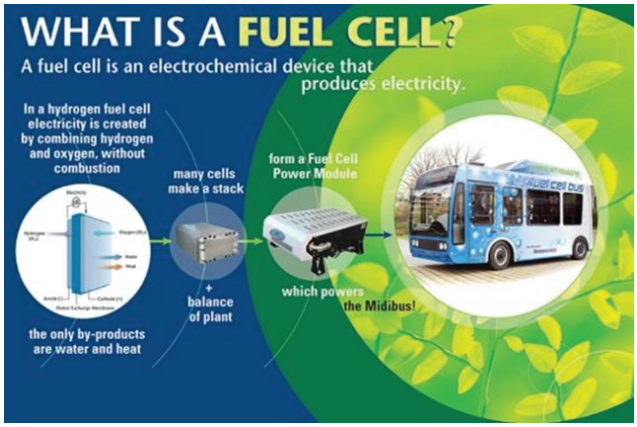
How is Hydrogen Energy Converted into Electricity?

Hydrogen gas is an expensive and complex fuel to make because it has to be separated from whatever element it is joined to. It often takes a lot of energy to make hydrogen gas, making it a costly power source. There are a number of ways to separate hydrogen from its companion elements.

Before we look at how hydrogen is converted into electricity, it would be beneficial to know how hydrogen is produced. Hydrogen is produced using two main methods; steam reforming and electrolysis (commonly referred to as water splitting).

Conversion of hydrogen into electricity

The most effective way to convert hydrogen into oxygen is using a fuel cell. A fuel cell converts chemical energy into electrical energy. A fuel cell enables hydrogen and oxygen to blend in an electrochemical reaction. The result is production of electricity, water, and heat. Fuel cells mimic batteries since they both convert the energy generated by the electrochemical reaction into useful electric power. Nonetheless, the fuel cell will generate electric power as long as fuel, mainly hydrogen, is available.



Fuel cells represent a potential technology for use a source of electricity and heat for buildings. It's also a promising source of power for electric and hybrid vehicles. Fuel cells function best on pure hydrogen. However, other fuels such as gasoline, methanol, or natural gas can be reformed to generate the needed hydrogen for fuel cells.

BORON -B

Boron is a chemical element with symbol B and atomic number 5. Produced entirely by cosmic ray spallation and supernovae and not by stellar nucleosynthesis, it is a low-abundance element in the Solar system and in the Earth's crust.

It is not be found in elemental form in natural, It was found as compound . This compound is called borate. The simplest boron compounds are boric acid (H_2BO_3), colemanite with calcium, ulexite with calcium, and borax, which is bound to sodium. Boric acid can also be combined with protein and carbohydrates.

COMMON USES

Cleansing Products

The most common natural form of this element is borax, and it has a wide variety of uses. It is used in laundry detergents and cleaning compounds, fertilizers, and fire retardants. Borax is also used as a water clarifier in swimming pools, aquariums, and in enamels that cover the steel of refrigerators, washing machines, and other like objects.

Medicines

If consumed in the prescribed quantity, boron prevents osteoporosis by helping the development and maintenance of healthy bones. It also helps patients with arthritis, reduces the loss of calcium and magnesium in urine, and increases levels of serum estrogen.

Glass and Ceramics

Boron is used for the production of glass and ceramics. Borosilicate, which is a type of glass with its main constituents being silica and boron oxide, shows good resistance to thermal shock because of its low coefficient of thermal expansion. Duran and Pyrex are two major types of borosilicate glasses.

Alloys

Amorphous boron is used in pyrotechnic flares because of its distinctive green flame. Boron is also an important ingredient for heat-resistant alloys, and when added to steel, boron provides extra hardness and strength at high temperatures.

Insecticides

Boric acid (H_3BO_3) is an important compound used in textile products and is used as an insecticide against ants, fleas, and cockroaches. It is also used as a mild antiseptic.

Lubricant

Borazon (boron nitride (BN)) is a hard material, used as a lubricant and abrasive. The compound is isoelectronic to carbon, and like carbon, it has both hexagonal (graphite-like) and cubic (diamond-like) forms.

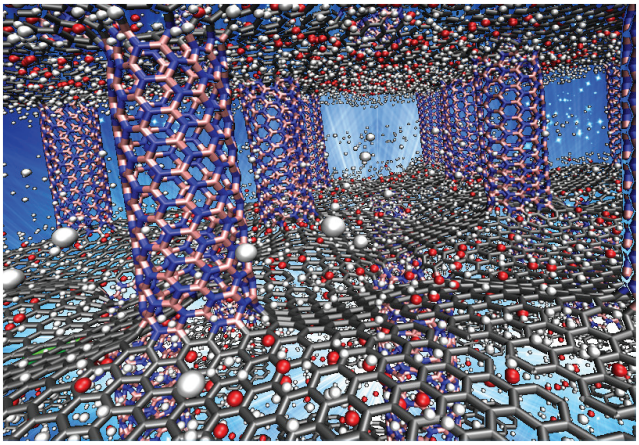
Flux and Nuclear Reactors

Boron is used as a flux for soldering silver and gold. It is also used with ammonium chloride for welding ferrous metals. It is often used for carrying out controlled fissions in nuclear reactors, due to its high

neutron cross-section and its property of high absorption of neutrons. It serves many uses in atomic energy generation and is often used in instruments designed to detect and count slow neutrons

Boron: The Best Choice in Alternative Fuel With the way the environment is looking these days it seems that it may be a good idea to raise the price of gasoline by one dollar. With growing concerns about pollution and other toxins in the atmosphere, the industry is forced to look into alternate forms of fuel. This extra tax on gasoline could aid in funding their research. Currently research is being performed on the element boron. It has been found to be more efficient and a generally safer fuel than gasoline. In the past scientists have been looking into solar and electrically powered vehicles to aid in the reduction of pollutants. Only recently has boron been introduced as another feasible alternative fuel. This alternative to gasoline is extremely combustible, and when burned there are no emissions or harmful pollutants. Also, it's easy to dispose of and has an extremely high energy density (Young 1). This little known element has become more recognized for its unique properties. Discovered in 1808 by J.L. Gay-Lussac and L.J. Thenard in Paris, France, and Sir Humphry Davy in London, England, boron is element number five on the Periodic Table of the Elements. The name "boron" comes from the Arabic "buraq" (pronounced borax).

The actual element boron is not commonly used, but compounds of boron are very common. These compounds can be found in such household items as detergent. Boron is also used in Pyrex glass, which makes the glass more heat resistant. Boron is also an essential mineral for plants and animals, although it can be toxic in large quantities (Chemsoc 1). Boron has many common uses, but there are also many advantages to using it as and alternative form of fuel. The biggest advantage to using a boron powered car is safety. Boron is extremely combustible but it is also extremely hard to light (Cowan 2). The reaction of boron in air depends upon the crystalline of the sample, temperature, particle size, and purity. Boron does not react with air at room temperature, in fact; it doesn't react at all (Winter 1). A pound of boron could not be ignited with a blowtorch, at least not in our atmosphere. It takes pure oxygen in order for boron to burn. A problem with petroleum powered vehicles is that when the vehicle crashes, there is a large chance that the gas tank will catch fire and explode. In the case of boron, this would never happen because of boron's inability to react with the earth's air. Another extremely beneficial advantage to using boron as an alternate form of fuel is that it is recyclable. Boron is produced in circular lumps that somewhat resemble discs. Boron cars would have one of these discs to start out with, but it wouldn't just be burned once and release harmful chemicals into the atmosphere. It would go back to a nuclear power plant to get regenerated. The decomposition of boron is a thermal process, so the heating of the discs would regenerate it and the boron could be reused (Cowan 1-2). At engine temperature which is approximately 212 degrees Fahrenheit, boron is somewhat viscous, not a solid, so it would transport fairly easily. Below two hundred degrees it then becomes a solid for easy disposal or regeneration. As it was stated above, the ideal atmosphere for boron is one of pure oxygen. When boron burns in pure oxygen, there are no other byproducts, only solid boron oxide. In addition to this wonderful advantage, boron oxide is also non-volatile, meaning that excess oxygen can also be used in the process of combustion. This adds to the efficiency and environmentally friendly part of the process, making boron look all the better. After reading the preceding points, it seems that boron is a safe, environmentally friendly, alternative form of fuel, but does it contain as much energy per gallon as gasoline? Boron has an extremely high energy density. With approximately 92.77 megajoules per liter, it has the highest energy of substance when compared to such substances as hydrogen, carbon, and silicon and phosphorous (Young 1). Proportionally speaking, boron contains a large amount of potential energy that can be harnessed. This information indicates that boron motors are extremely oxygen efficient. They will get more energy from a kilogram of oxygen than the petroleum used today. A fuel that is oxygen efficient is extremely important when considering the environment (Cowan 3). Car manufactures are not the only people looking at boron.



There have been several studies on boron done that have produced the same outcomes. For the past few years, researchers at the University of California Irvine and the University of Florida have been developing a fusion reactor using boron. The team's main claim is that the reactor is environmentally safe. By using boron as one of the key chemicals, less waste is produced. The reactor will be cheaper and produce more energy than a typical coal-burning power plant (Winter 1-2). The fact that boron is being used in such significant energy sources demonstrates what a powerful and useful element it is.

CONCLUSION

In conclusion, there are many advantages to using boron as an alternative form of fuel. The most important advantage is safety. Boron is more stable than gasoline and therefore is less likely to react dangerously in the event of an accident. Boron is also recyclable which is great for the environment because there are fewer waste products. Boron also produces no byproducts, and has a high energy density. Overall, boron-powered cars would be extremely beneficial to the environment and if the extra money from the increase in gasoline prices was invested in boron-powered cars, I'm sure they wouldn't disappoint.

Conflict of Interest: Author not mentioned any conflict of interest

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