

## HYDROGEN ENERGY IN THE FIELD OF ENERGY

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### ABSTRACT

The article describes today's widespread use of hydrogen energy in the field of energy, the fields of hydrogen application, the development of hydrogen energy technologies, and the possibilities of continuous energy supply to our country's economy and population.

**Keywords:** Hydrogen, energy, energy, technology, hydrogen energy, technology, hydrogen engines, car.

In the rapid development of current modern equipment and technology, including the production of new modern equipment in the field of electric power based on state standards, the role and quality of electrical technical materials is very important [1].

It is aimed to increase the share of solar and wind energy to 13.8% in the total electricity generated in our country. As you know, getting energy from the sun and wind depends to a large extent on the weather. Therefore, when this energy capacity decreases, there is a need to create other cheap and environmentally friendly sources to replace it. Also, the current situation related to environmental problems and their elimination requires further development of hydrogen energy.

One of the main reasons why hydrogen energy has not been widely popular so far is the high cost of its production. With the help of existing technologies, 3-4 units of energy are used to obtain one unit of hydrogen energy. For example, a temperature of 1200 °C is needed to obtain hydrogen using natural gas, and 1600 °C to decompose water.

Initial steps have been taken to develop hydrogen energy in our country. For example, at the Institute of Materials Science of the Academy of Sciences, research is being conducted on the synthesis of hydrogen, the mixing of water with zinc, and the extraction of hydrogen by means of solar energy, and the creation of cars running on hydrogen fuel at the Polytechnic University of Turin.

Scientists of our country conduct research on obtaining hydrogen from water at a high temperature (1600 °C) using sunlight. One of the advantages of this is that no additional energy is used to obtain a high temperature, and it does not have a harmful effect on the environment. In the process of extracting energy from hydrogen, it reacts with oxygen, ultimately producing both a temperature of more than 1000 °C and water.

Therefore, the water used for hydrogen synthesis is almost completely returned to its place, and both electrical energy and thermal energy are obtained from the high temperature released from it.

In addition, it is planned to create special nano-sized catalysts to reduce the temperature required for hydrogen separation and increase the volume of hydrogen separation, to create elements for transport fuel from hydrogen, to develop technologies for safe storage, transmission and use of hydrogen. The use of hydrogen as a fuel element, in turn, reduces the amount of compounds harmful to the atmosphere, such as nitrogen, sulfur and carbon oxides. The most important thing is that the development of hydrogen energy technologies allows to continuously supply the economy and population of our country with energy.

Hydrogen ( $H_2$ ) is the first element in the table of chemical elements [10]. Its name means "water-forming" in Latin, because it combines with oxygen to form water. Its chemical symbol is (H). Hydrogen is rarely found in the free state in nature, but it exists in large quantities in compounds combined with other elements. It plays a major role in the sun and stars, water, oil and gas, organic and inorganic compounds, plants and animals. Its properties are as follows: It is the lightest and smallest atomic element. Its melting point is  $259.14^{\circ}C$ , boiling point is  $252.87^{\circ}C$  and heat capacity is  $14.3 \text{ kJ/mol}$ . It is the element with the highest diffusion rate and the highest fusion energy. Its diffusion rate is  $0.61 \text{ cm}^2/\text{s}$ , and its fusion energy is  $3.4 \text{ MeV/atom}$ . The fields of application of the hydrogen element are as follows:

Hydrogen is used as a catalyst in chemical synthesis, for example, in the production of ammonia, methanol, acids and other compounds. They are widely used in industry, food, chemistry and other fields.

Hydrogen is used as an energy source in energy, for example, hydrogen-oxygen fuel cells, hydrogen engines, hydrogen rockets, and other technologies. They are a clean, renewable and efficient source of energy.

Hydrogen is used in biotechnology, for example, gene, cell and enzyme engineering, technical bioenergetics, immunobiotechnology and other fields. They help control biological processes, produce biological substances and maintain the biological environment.

Hydrogen is used in physics such as atomic, molecular, nuclear, quantum, astro and other fields. They allow studying hydrogen atom, hydrogen spectrum, hydrogen bomb, hydrogen field, hydrogen star and other objects.

The application of the hydrogen element in electrical engineering is as follows:

Hydrogen fuel cells are devices that produce electricity through the chemical reaction of hydrogen and oxygen. They are used in cars, locomotives, airplanes,

spacecraft and other vehicles, as well as stationary and portable power sources. They are a clean, efficient and sustainable source of energy.

Hydrogen engines are devices that burn hydrogen and convert it into heat and mechanical energy. They are used together with or instead of fuel cells. They are used in cars, locomotives, airplanes, spacecraft and other vehicles. They are a clean, efficient and sustainable source of energy.

Hydrogen rockets are devices that burn hydrogen and convert it into heat and mechanical energy. They are used to launch spacecraft and satellites into orbit. They are a strong, efficient and sustainable source of energy.

New inventions made in the application of the hydrogen element in electrical engineering are as follows:

A hydrogen generator is a device that burns hydrogen and converts it into heat and electricity. They are used as a source of electricity in homes, offices, factories and other places. Unlike electric generators, they do not use fuel cells and store hydrogen in the form of metal hydrides. They are a clean, efficient and sustainable source of energy.

Several countries and companies in the world are actively involved in the production of cars running on hydrogen fuel. Hydrogen energy is developing at high speed in production and consumption processes. It plays a major role in solving many problems that require successful integration of production and consumption stages, energy directions and financial resources.

From these data, we can conclude that hydrogen is the most preferred fuel and there is a lot of work to be done on hydrogen today. This is because hydrogen-powered cars have a much longer range, but are more dangerous than other different fuels. Human safety should always come first. For this reason, a lot of work needs to be done to improve the safety of hydrogen-powered cars.

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