

USE OF WATER AS THE FUEL

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In the whole world the problems with the fuel are accumulated continually. With the development of the society the fuel requirement increases all the time.

Stores of traditional types of fuel (coal, oil, gas) disappear. Main components that cause heat when burning (oxidation) are hydrogen and carbon.

When hydrocarbon fuel is burned the large quantity of different harmful substances, such as CO – carbon monoxide; NO and NO₂ – when joining water form acids; CO₂ – in large quantity creates a greenhouse effect – keeps the warm emission from Earth like glass in hothouses, are thrown into environment.

From year 1950 the average temperature on Earth increased on 2°C. As the result of this effect Northern Sea Route from Murmansk to Vladivostok was free for sailing whole year.

With the present consumption of hydrocarbon fuel by humanity, it is impossible to stop global warming. If the temperature will rise once more on 2°C, then all plain part of Europe will be flooded with water.

Therefore on Earth there are in its ways the active searches of new kinds of fuel.

The one of the attractive ways of harmless fuel reception is the water decomposition on hydrogen and oxygen.

Hydrogen is the most high-calorie fuel. Calorific efficiency of molecular H₂ in three times exceeds the one of benzene, and the calorific efficiency of atomic hydrogen exceeds in eight times one of the benzene. Besides, after burning of hydrogen the water is formed and the harmful influence on environment is eliminated.

There are many well known ways for production of hydrogen from water. The most profitable are electroplating technique, thermochemical decomposition and irradiation of hydrogenous combinations with neutrons, ultraviolet and other. The most perfect generators of hydrogen spend on receipt of 1m³ of hydrogen about 5 kilowatt-hour of electrical power.

In Prydniprovskaya State Academy of Civil Engineering and Architecture (PSACEA) there are conducted works on searching of cheaper methods of hydrogen reception from the water.

The water in the form of water steam can be directly burned in the thermal generating unit with the open flame. This alternative of fuel economy exists in those thermal generating units (automobile engines, steam generating units etc.), where it is

possible to utilize issued gases and to prepare the water steam for the further supply to fire chamber.

On laboratory-scale plant in Prydniprovskaya State Academy of Civil Engineering and Architecture after supply of steam to the burning area, the torch of burning can be distinctly seen by the unaided eye. The supply of 15% of water steam, as compared with the gas supply, made it possible to increase the temperature on 300°C.

The content of CO in the discharge gas with the torch working on natural gas makes – 1,2%. When the 15% of water steam was added the content of CO decreased to 0,2%.

If the dry water steam will be let through the electric field of high tension with the catalyst, then the steam will decompose on hydrogen and oxygen, and expenditure of electrical power will make in this case 400-500 watt-hours on 1m³ of hydrogen.

In PSACEA the works are conducted on:

- searching of cheap materials that carry the role of catalyst;
- water decomposition on hydrogen and oxygen with the normal conditions;
- creation of mobile generator unit of hydrogen that makes it possible to produce hydrogen in applied quantity, in the wanted place and to spend it immediately without the storage phase.

Conclusions

1. Addition of water steam to the burning area in thermal generating units makes it possible to save up to 50% of fuel.

2. Creation of mobile generating unit of hydrogen make it possible to avoid the expensive phase of hydrogen storage and be independent from the source of hydrogen filling.

References

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