

Production of Hydrogen by Electrolysis of water and Plasmachemical Treatment of the Gascondensates-Waste of the Gas Industry

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Among problems that the whole world faces, it is climate change that poses a serious threat for all natural and economic complexes, including water and land resources. It is obvious that in processes of Global climate change the key factor is concentration of greenhouse gases in the atmosphere. An emission of polluting substances in Central Asia Region in 2005 has made of the total value of emissions from polluting substances from stationary sources were brought by gaseous and liquid substances (70.0 %). The main pollutants of the atmosphere are the weighed particles (35%) and SO₂ (31%), CO₂ (14 %) and nitrogen oxides (10 %) [3]. Problem of environmental protection and reduction of dynamics of global warming stimulates research for alternative and clean energy. In this plan, hydrogen power can be considered as a potential applicant for filling of the energy sector with cheaper and clean fuel. In the present work, there are problems in the use of water resources from upstream countries of the Central Asian Transboundary Rivers and the surplus of the electric power during the summer period for production of hydrogen by electrolysis and the possibility of storage and hydrogen transportation for long distances are considered.

The stainless steel and copper electrodes at electrolysis were used. The current-voltage characteristic of the cell by stainless steel and copper differed significantly. For electrolysis used river water and the water after the softening process. It should be noted that when using river water without treatment were found deposition on the electrodes conglomerates of complex composition and process of the electrolysis of water was not almost observed. Monitoring the formation of hydrogen qualitatively determined by the formation of bubbles on the electrode surface and quantified by measuring manometer connected to the cell. It is known that formation of bubbles on a surface of electrodes influence an electrostatic field; reduce intensity of a field between plates and current in a chain. For elimination of this effect are usually used the external oscillatory device which causes vibration of plates. For removal of bubbles from a surface of electrodes mechanical vibration was used. Shown that existence in composition of not conditioned river water of ions and cations of chemical elements becomes generation of processes of division at lower values of voltage. For the purpose of establishment of deposits of components of composition of water to shift of values of voltage at electrolysis the complex of physical and chemical analyses were carried. The composite chemical composition of river water explains observed process of accumulation of conglomerates on a surface of electrodes and specifies about need of their preliminary cleaning for electrolysis implementation.

The present work is devoted researches on research of possibility of the gascondensate treatment in low temperature plasma for production of no limiting hydrocarbons. The gas condensate meets in the nature as in the form of liquid fraction taken of natural gas (2-6 % weight at rate of 1.0 t gas production), and in independent deposits. The gas condensates in depending containing of easy and heavy fractions are characterized by boiling temperature 60-350 °C. In our investigation have been used natural gas condensate deposits of "Kanibadam" of Republic Tajikistan with molecular weight 140 (C₁₀H₂₀) and average value of temperature of boiling about 55°C.

At change of the plasma stream specific energy from 1.8 to 10.8 MJ/m³ and parities of plasma forming gas to raw materials ($\phi = N_2$ /raw materials) to equally 0.5 exit of cyanic hydrogen (7 % vol.) it is accompanied with no limiting hydrocarbons C₂H₂ (12 % vol.) and C₂H₄ (10 % vol.). Thus, its maximum value is reached at specific energy of plasma 7.2 MJ/m³. In products of pyrolysis, contain hydrogen (20-22 % vol.) and homological impurity in the sum (1.5-2.5 % vol.). The exit of the pyrolysis carbon has made 25-30 % of weights. At increase of ϕ to unit at the same values of specific energy the increase in values ϕ to unit leads to growth of exit HCN to 9 % vol. and to reduction of concentration of no limiting hydrocarbons C₂H₄ and C₂H₂ to 8 % vol. and 10 % vol accordingly.

Conclusion

The rich hydropower potential of the Republic of Tajikistan opens a wide perspective for the development of alternative and ecological source of energy - hydrogen energy.

Pyrolysis of gas condensate in nitric plasma has shown about basic possibility of production of no limiting hydrocarbons and cyanic hydrogen. Essential influence of cooling processes and training on the target products exit established. The dependence of a percentage parity of the no limiting hydrocarbons and cyanic hydrogen exits from the plasma stream specific power and time of stay of raw materials in a plasma stream specifies in possibilities of management of process of pyrolysis on maintenance of the maximum exit of separate components of products of reaction is shown.