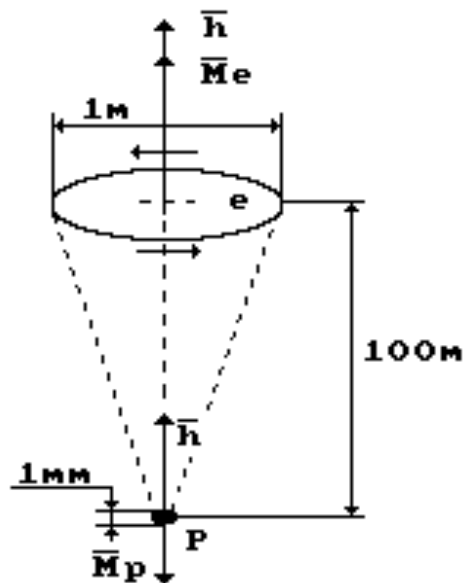


ELECTROLYSIS OF WATER Kanarev Ph.M. E-mail: kanphil@mail.ru <http://kubagro.ru/science/prof.php?kanarev>

The announcement. Atomic hydrogen exists in a plasma condition at temperature 2700-5000 C. If the formation of molecules of hydrogen at electrolysis of water goes by branch of its atoms from molecules of water, in a phase of an atomic condition of hydrogen in electrolytic solution the specified temperature should be formed, but it is not present. Why? It is known, that the most perfect electrolyzers spend 4 kWh the electric power for reception of one cubic metre of hydrogen from water. At burning this hydrogen it can be allocated about 3.5 kWh a net energy [1]. This implies, that hydrogen can become the competitive energy carrier if an expense of energy for its reception from water to lower even up to 1 kWh/. It also is the main task of an initial stage of development of hydrogen power. But before to analyze reserves of decrease in expenses of energy on reception of hydrogen from water, we shall present graphically process of generation of molecules of hydrogen. As atomic hydrogen exists only at temperature about 5000 C, and in usual electrolyzers such temperature is not present, it means, that molecules of hydrogen are allocated from clusters of water in the synthesized condition [2], [3]. Certainly, to understand it it is possible only at presence of structures of atoms and molecules. Absence of orbital movement of electrons in atoms and their linear interaction with protons of nucleus opens structures of any atoms, including atoms of hydrogen (fig. 1) and oxygen (fig. 2) which are



part of a molecule of water [1].

Fig. 1. The

circuit of model of atom of hydrogen: - an electron, - a proton. Two electrons 1 and 2 atoms of oxygen are located on an axis of atom, and other six - on a circle, perpendicular axes (fig. 2). It is possible to assume, that a total electrostatic field of six electrons located on a circle (we shall name their ring electrons), deletes the first and second axial electrons on the greater distance from a nucleus of atom, than that distance from a nucleus of atom, on which located ring electrons. Therefore axial electrons of atom of oxygen are its main valent electrons. Electrons of atoms of hydrogen also join these electrons, and the molecule of water (fig. 3) is formed [2], [3].

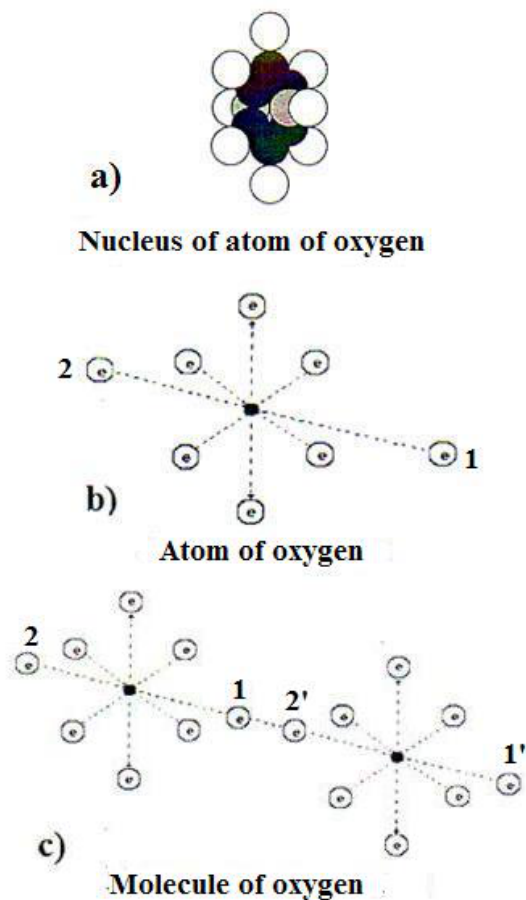


Fig. 2. Circuits of a nucleus, atom and

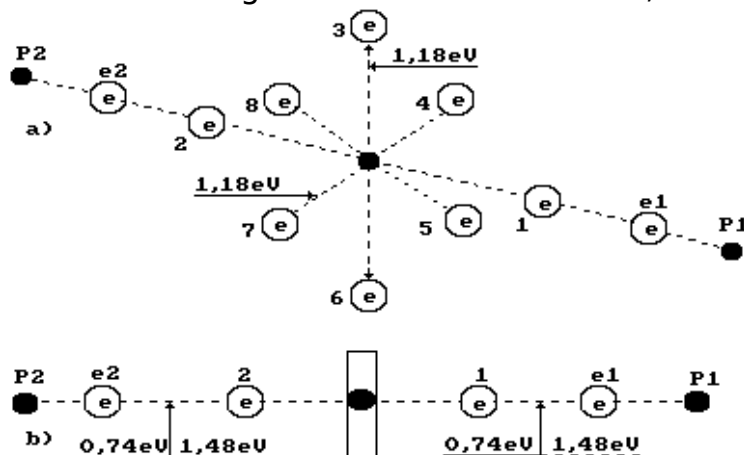
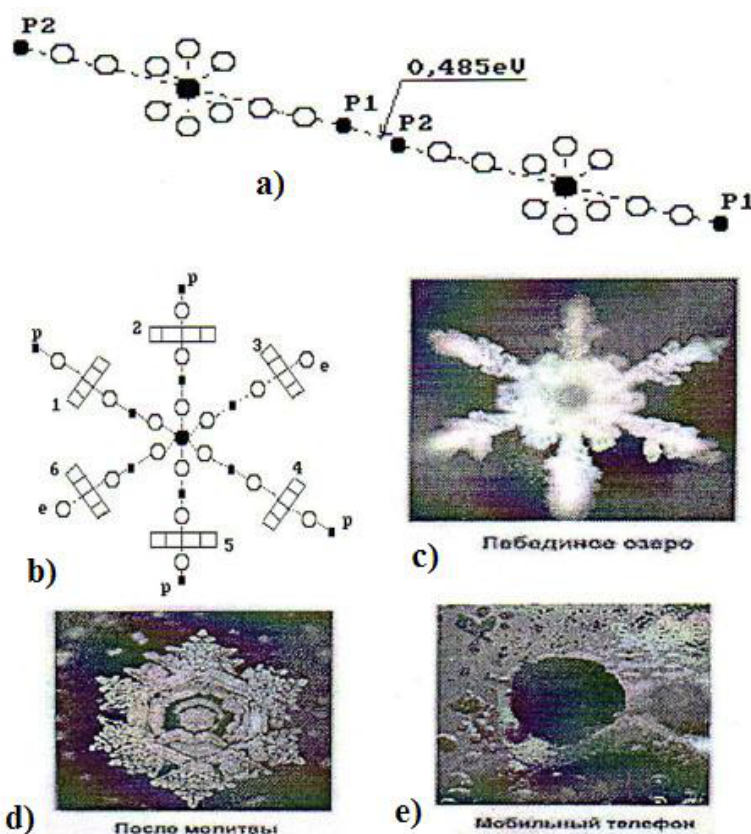


Fig. 3.

molecule of oxygen

The circuit of a molecule of water: 1,2,3,4,5,6,7,8 - numbers of electrons of atom of oxygen; - nucleus of atoms of hydrogen (protons); and - numbers of electrons of atoms of hydrogen. Symbols also designate electrons of atoms of hydrogen, and by symbols and - protons of atoms of hydrogen. The structure of atom of hydrogen shows fig. 1, that if this atom will incorporate to the first axial electron of atom of oxygen the unique electron the proton appears on a surface of a molecule and forms a zone to a positive charge which will be generated by a proton of atom of hydrogen. The similar zone will be generated also with a proton of the second atom of hydrogen which incorporates to the second axial electron of atom of oxygen (fig. 3). Negatively charged zone will be generated with electrons of atom of the

oxygen, located on a ring around of an axis of atom of oxygen [2]. As at cooling electrons radiate photons and come nearer to a nucleus of atom, six ring electrons of atom of oxygen in a molecule of water (fig. 3), coming nearer to a nucleus of atom, the static field delete axial electrons from a nucleus. In this case distance between the atoms of hydrogen located on an axis of a molecule of water, increase. It is the main reason of increase in the sizes of molecules of water at their freezing. It is known, that molecules of water can incorporate with each other, forming the whole associations which refer to clusters. The clusters is a set of the same molecules and the ions connected among themselves as was considered earlier, hydrogen connections. And it is valid so. Molecules of water can connect in clusters protons of atoms of hydrogen (fig. 4) [2], [3]. We shall pay attention that clusters of water are formed, first of all, a proton - proton connections when its two molecules incorporate coaxially. If to take into account, that the size of a proton on three order is less than size of an electron a proton - proton connection collapses at mechanical influence on such cluster (fig. 4, a) more easy. The second variant of formation of clusters - connection of an axial proton of one molecule of water with a ring electron of other molecule of water. It - a proton - electronic connection (fig. 4, b). Its durability too is less than durability an electron - electronic connection. These facts also clear up



fluidity of water. d) **После молитвы** e) **Мобильный телефон** Fig. 4. The clusters of molecules of water: a) and b) - linear and six beam theoretical clusters; c) six beam cluster, generated by classical music; d) to six beam cluster, generated by a prayer voice of the believer; e) to six beam cluster, destroyed by mobile phone. Molecules of water form clusters various forms (fig. 4). Under certain conditions and the certain temperature (in winter clouds) six molecules of water join the protons of atoms of hydrogen ring

electrons of other molecule of water or atom of oxygen (fig. 4, b). In result six beam structure which with increase in the size and complication forms openwork six beam structure – a snowflake (fig. 4, c, d) is formed. This natural process is realized at strictly certain energies of connections of valent electrons which depend from energies of absorbed and radiated photons. The experimental facts when the water irradiated with a melody of quiet classical music are known, forms symmetric six beam structures (fig. 4, c, d). The same structures are formed at an irradiation of water by a quiet prayer voice. In this case the body praying radiates such photons which are necessary for formation of connections of symmetric structures. Not casually therefore, that such water as it is already proved, possesses medical properties. It is experimentally established, that at an irradiation of water jazz music in it forms ugly structures (fig. 4, e). It is caused by that such music initiates surrounding subjects to radiate photons with chaotically varying energies. Valent electrons, absorbing such photons, destroy to six beam clusters of water or form without simmetrical clusters. Certainly, this weighty proof of harmful influence of jazz music on health of the person, in fact the most part of weight of his body – water. There is also an opportunity to calculate the energy spent on heating of one molecule of water on one degree. It is known, that at heating one litre of water from 20C up to 100C it is spent 335.2 kJ of energy. Counting upon one molecule it will make.

(1) It - size of energy of connection of molecules of water in clusters will change if to heat up it from 20C up to 100C. Having divided 0.063 eV on 80, we shall receive size on which energy of connection between molecules of water in clusters changes at its heating on one degree. It appears equal 0.00078 eV. This energy corresponds to photons of a relic range (tab. 1). The minimal size on which this energy of connection can change, is equal to energy 0.000022 eV an absorbed photon with the maximal length of a wave 0.056m. This implies, that the minimal gradient of change of temperature of water is close to $0.000022/0.00078=0.03$ C a hailstones. Table 1. Ranges of change of length of a wave and energy of electromagnetic radiations

Length of a wave, m	Energy, eV	1. Low-frequency	2. Radio	3. Micro wave	4. Relic (макс)	5. Infra-red	6. Light	7. Ultra-violet	8. X-ray	9. Scale a range

Stated above, clears up the reason of explosion at connection of hydrogen with oxygen and formations of a molecule of water (fig. 3). Simultaneous transition of six ring electrons of each atom of oxygen in born molecules of water on lower power levels is accompanied by simultaneous radiation of photons which generate the phenomenon of explosion as their sizes on 5-7 orders there are more than sizes of the electrons radiating photons. If to imagine cluster from two molecules of water having the forms of spheres with diameters about 100 meters the protons located on a surface of these spheres and connecting them in cluster, have the millimetric sizes. The slightest, even mechanical, influence will destroy this system, creating conditions for fluidity of molecules of water. If clusters were formed an electron - by electronic connections they would have already meter sizes on a surface of hundred-meter molecules. The calmed brain and a body of the praying person also radiate photons with ordered energies, and it too results in formation of six beam clusters (fig. 4, d). The cellular telephone radiates powerful photons with various energies which at once destroy

connections between molecules of clusters and it collapses (fig. 4, e). The similar result turns out at execution of jazz music. Its chaotic, rapidly changed sounds, are transferred molecules of air and those radiate photons with a different range energies. At absorption by their electrons of water's clusters the energy of connection between molecules of clusters can decrease up to zero. In result cluster collapses (fig. 4, e). In one cubic metre contains $1000 \times 0.09 = 90$ gr. Hydrogen. The energy contents of one gramme of molecular hydrogen equally 142 kJ. The energy contents of one cubic metre of hydrogen it appears such $142 \times 90 = 12780$ kJ. Received energy 12780 kJ is equivalent ($12780/3600 = 3.55$ kWh. If it will be possible to achieve smaller expenses of energy for reception of one cubic metre of hydrogen, than 3.55 kWh it becomes the competitive energy carrier. The analysis of model of an electron (fig. 5) which formation of structure 23 constants operate, shows an opportunity of formation clusters of electrons [2]. Heteronymic magnetic a strip of electrons pull together them, and the same electric fields limit this rapprochement. Reliability of this consequence

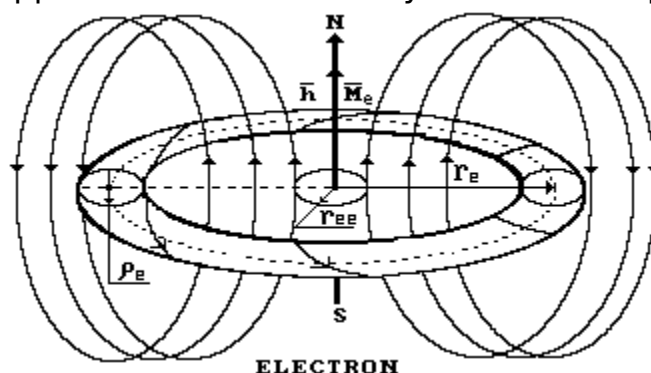
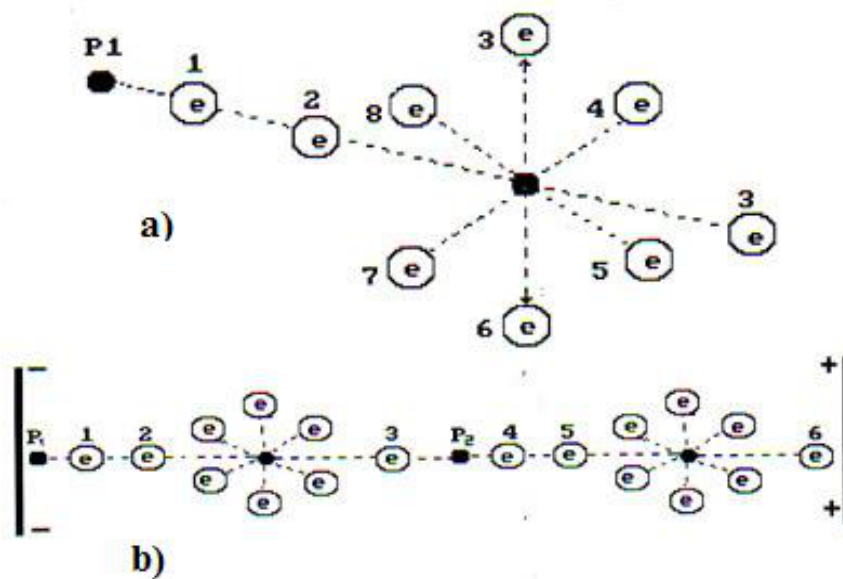


Fig.

is confirmed with experiments.

5. Scheme of theoretical model of an electron (the part of magnetic force lines is shown only) In view of stated, we have strong reasons to believe, that the electric spark is formed by photons which are radiated by electrons at formation electron-ionic clusters. The similar phenomenon proceeds and in storm lightnings. A primary factor providing realization of this phenomenon, concurrence of vectors of the magnetic moments and spins at electrons and ions is. Due to this at formation of clusters of electrons pull together not only their heteronymic magnetic poles, but also the unidirectional processes of their rotation (fig. 6). The big electric resistance of water is caused by that on the axial ends of molecules positively charged protons of atoms of hydrogen settle down. In result linear clusters of molecules of water have on both ends the same charges that excludes an opportunity of formation of an electric circuit in pure water. To reduce electric resistance of water and to increase its electro conductivity, it is necessary to enter into a solution ions which would have an electron on one end of the main axis, and on the friend a proton. In this case such ions are easily united in linear clusters with different signs on electric charges on their ends, as results in formation of electric circuits in a solution which increase its electro conductivity. As an example it is possible to consider presence at water of an ion (fig. 6). It is known, that water can possess alkaline or acid properties. Alkaline properties are formed due to the increased maintenance in water of



[1.]

Fig. 6. Circuits:

a) ion ; b) cluster of ions of . On fig. 6, and the circuit of is submitted. On one end of an axis of the electron of atom of oxygen is located, and another comes to the end with a proton of atom of hydrogen. Thus, – an ideal part of an electric circuit. Under action of the enclosed voltage these ions form linear clusters with positive and negative signs on electric charges on the ends (fig. 6, b). In result the pulse of a voltage is transferred along it cluster from a minus to plus. Certainly, the current does not flow lengthways of cluster. It is formed due to that an ion , located on the end of cluster at the anode (fig. 6, b) gives it the electron, and a proton of atom of hydrogen at an ion located at the cathode, receives an electron from it. If to this to add that fact, that hydrogen is allocated at the cathode (-), and oxygen at the anode the fact of movement of electrons from the anode (+) to the cathode (-) in the external circuit connecting the anode and the cathode, becomes conclusive. On what basis electrical engineers consider, that electrons move to circuits of a direct current from a minus (-) to a pole (+) remains a secret. Therefore we shall adhere to the described conclusive experimental fact about movement of electrons in a circuit of a direct current from plus (+) to a minus (-). On fig. 7 molecules of hydrogen are submitted [2].

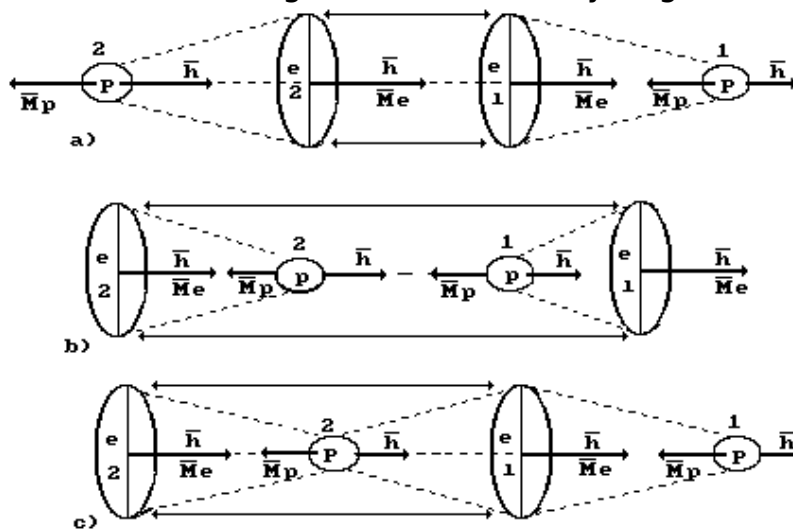
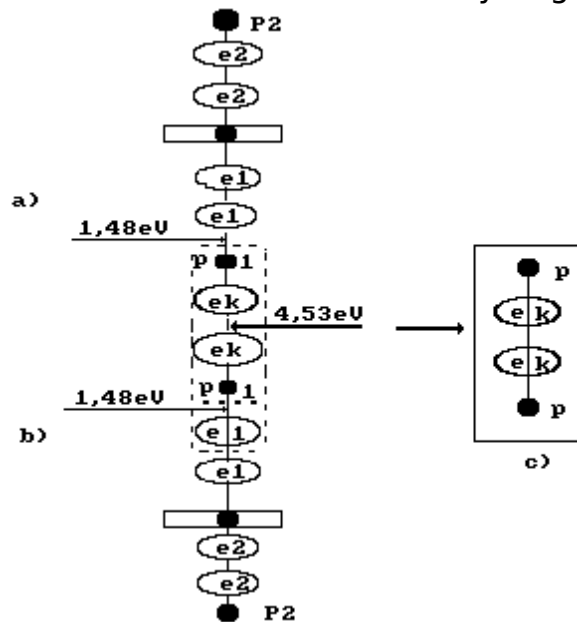


Fig. 7. The circuit of a

molecule of hydrogen : a), b) - orthohydrogen; c) - parahydrogen So, process of electrolysis begins with an output of an electron from the cathode in a solution. Axial protons of two molecules of water (fig. 8, a and b), having received from the cathode on an electron, incorporate in cluster in which structure there is a molecule orthohydrogen in the synthesized condition (fig.



7, a).

Fig. 8. The circuit of formation of a

molecule orthohydrogen in structure of cluster from two molecules of water. Now it is necessary to organize such pulse influence on this cluster that the formed molecule orthohydrogen was allocated into a free condition (fig. 8, c). We shall pay attention that in this process is spent for formation of a molecule of hydrogen two electrons which have come from **the cathode**. According to Faradei's law, on formation of one mole hydrogen in this case it is spent two Faradey Coulomb an electricity or ¹. If electrolysis goes at a voltage 1.70V for reception of one mole hydrogen it will be spent, and on reception -. Apparently, calculations with use of Faradey's law give the result conterminous to experiment. How to reduce expenses of energy but reception of hydrogen? The analysis of structure of a molecule of water shows, that the second variant when two molecules of water (fig. 9), incorporating protons of atoms of hydrogen, form cluster in structure of which there is also a molecule orthohydrogen in the synthesized condition is possible also, but it has other structure (fig. 9, and 7, b). In this case process of allocation of a molecule of hydrogen possible without the electrons received from the cathode. This process of electrolysis goes at photosynthesis. How it to check up experimentally? [2], [3].

¹ Let's remind, that the size equal to product of number Avagadro on a charge of an electron refers to as number of Faradey. This size in Coulomb (C) on one mole of substances C/mol is measured.

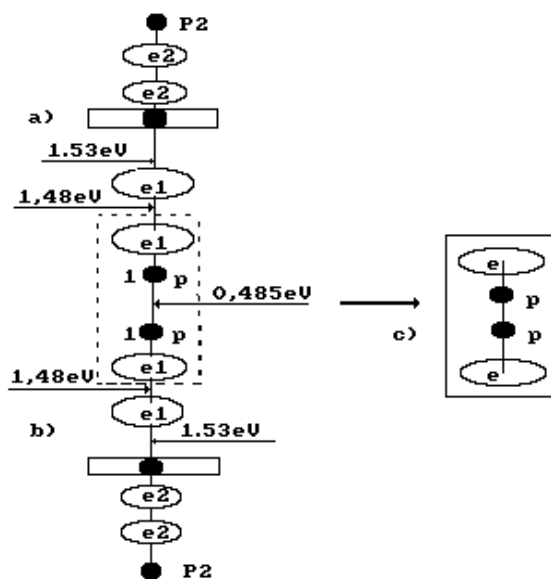


Fig. 9. The circuit of formation of the

second structure of a molecule of orthohydrogen from two molecules of water. It is known, that at photosynthesis carbonic gas is absorbed. It is considered, that carbon of a molecule goes on construction of cells of plants, and oxygen is allocated [1]. Now we have bases to doubt of it and to assume, that the molecule is entirely used on construction of cells of plants. Oxygen is allocated with molecules of water and it leaves in an atmosphere, and atoms of hydrogen of molecules of water are used as connecting parts of molecules of which cells of plants are under construction [2] [3]. There is a question: and whether it is impossible to simulate electrolytic process of decomposition of water on hydrogen and oxygen which goes at photosynthesis? The analysis of structure of a molecule of water (fig. 3), revealed by us, shows an opportunity electrolysis of water at the minimal current. On fig. 3 the circuit of a molecule of water with energies is submitted to connection between atoms of hydrogen and oxygen in conditions when the molecule of water is in the neutral environment, without ions of alkali or an acid, and also without electric potential which would act on such ions [2], [3]. Protons of atoms of hydrogen in molecules of water can incorporate among themselves and form clusters. In result in a circuit of cluster the molecule of orthohydrogen (fig. 7, b and 9, and, b, c) is formed [2], [3]. Search of conditions of modelling of process of decomposition of water on hydrogen and oxygen which goes at photosynthesis, has led us to a simple design of a cell, in which imitate annual rings of trunks of trees as backlashes between conic electrodes (fig. 10). Appeared, that process of electrolysis can proceed at a voltage 1.5-2.0 V between the anode and the cathode and to force of a current 0.02 A. That is why this process is named lowcurrent. First of all, we shall note, that a material of the anode and the cathode one - steel that excludes an opportunity of formation of a galvanic cell. Nevertheless, on electrodes of a cell there is a potential difference about 0.1 V at full absence electrolytic solution in it. When put the solution the potential difference increases. Thus the positive sign on a charge always appears on the top electrode, and negative - on bottom. If the source of a direct current generates pulses the output of gases increases [3]. Process lowcurrent electrolysis can consist of

two cycles, in one cycle electrolyser is included in an electric network, and in the friend - is switched off (tab. 2).

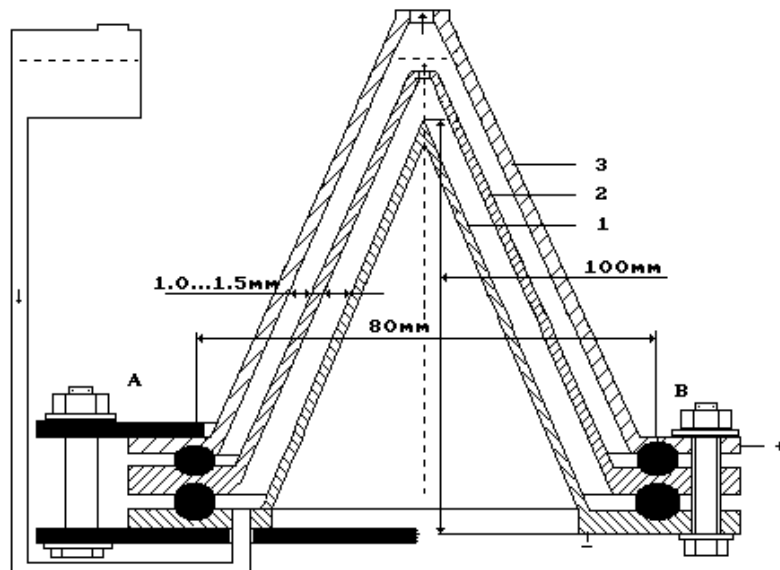


Fig. 10. Lowcurrent

electrolyser (the patent. № 2227817)

Process of generating of gases is easily observed on an output formed bobbles. They continue to be allocated and after switching-off electrolyser from a network. Certainly, after switching-off electrolyser from a network intensity of an output of gases decreases, but does not stop within many hours. It convincingly proves that fact, that electrolysis the account of a potential difference on electrodes follows [3]. In tab. 2 results of experiment are submitted at a periodic feed electrolyser by pulses of the straightened voltage and a current. Table 2.

Parameters of electrolysis of water

ParametersThe sum1 - operation time electrolyser, included in a network, in six cycles $6 \times 10 = 60,02$ - indications of the voltmeter V; 11.42' - indications of an oscillograph V'; 0.403 - indications of the ammeter I, A; 0.0203' - indications of an oscillograph, I', A; 0.019784 - power consumption ($P = V \times I \times \tau / 60$), Wh; 0.2284' - power consumption ($P' = V' \times I' \times \tau / 60$) Wh; 0.00815 - operation time electrolyser, switched - off from a network, for six cycles, $6 \times 50 = 300.06$ - change of mass of a solution m, gr 0.607 - mass exhalation waters m', gr 0.068 - weight of water, passing in gases, $m'' = m - m'$, gr. 0.549 - power consumption on gramme of water, passing in gases, under indications of the voltmeter and the ammeter $E = P / m''$, Wh/gr of water; 0.4209' - power consumption on gramme of water, passing in gases, under indications of an oscillograph $E' = P' / m''$, Wh/gr; 0.01510 - existing power consumption on gramme of the water passing in gases E'' , Wh/gr. of water 5.2511 - **reduction of a power consumption by reception of hydrogen from water under indications of the voltmeter and the ammeter** $K = E'' / P$, times; 23.0311' - **reduction of a power consumption by reception of hydrogen from water under indications of an oscillograph** $K' = E'' / P'$, times; 648.1512 - quantity of allocated hydrogen $\Delta M = 0.54 \times 1.23 \times 0.09 = 0.06$, gr 0.0613 - energy content of received hydrogen ($W = 0.06 \times 142 / 3.6$) = 2.36, Wh 2.3614 - **power efficiency of process electrolysis of water under indications of the voltmeter and the ammeter** ($W \times 100 / P$), %; 1035.114' - **power efficiency of**

process electrolysis of water under indications of an oscillograph (Wx100/P'), %; 29135.80

There are bases to believe, that lowcurrent electrolyser possesses properties of the condenser and a source of an electricity simultaneously. Having charged in the beginning, it is gradually unloaded under action the electrolytic processes proceeding in it. The quantity of electric energy generated by it appears insufficient to support process of electrolysis, and it is gradually unloaded. If it to recharge periodically the pulses of a voltage compensating a power consumption, a charge electrolyser as condenser, there will be to constants, and a process electrolysis – stable [2], [3]. **THE CONCLUSION** We have presented results of experiment in which conic electrodes have been made from idle time of steel. It is quite natural, that there are other materials with the big properties of the catalyst of process of decomposition of water on hydrogen and oxygen without expenses of electric energy. **The literature** 1. L. Poling. General chemistry. M.: Mir, 1974. 2. Kanarev Ph.M. The Foundation Physchemistry of Microworld. 10-edition. <http://Kanarev.innoplaza.net> or <http://kubagro.ru/science/prof.php?kanarev> + English. In English. 3. Kanarev Ph. M. The Foundation Physchemistry of Microworld. 12-edition. <http://kubagro.ru/science/prof.php?kanarev> In Russian