SPECULATIVE INTERPRETATION OF OVERUNITY EXPERIMENTS INVOLVING WATER ELECTROLYSIS

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The background to this paper is a number of papers reporting low temperature nuclear reactions outside the system Pd-D. These experiments (up to June, 1996) have been summarized in the review by Bockris, Lin and Bush.[1]

A brief description of certain phenomena by Steri and Zorzi[2] is the earliest origin of suggestions made here. They sparked gasoline-air mixtures of unusual ratios, and recorded more heat being produced from such actions than could be justified in terms of thermochemistry. It was suggested that the origin of the heat arises from the natural deuterium within the gasoline and H present. Among possible reactions may be $D+D \rightarrow He^4$ or $D+H \rightarrow He^3$.

2. Experiments with Brown's gas.

For some years, Y. Brown has been describing the special properties of "Brown's gas." At first, this gas was regarded merely as the result of the electrolysis of water. The only difference from this venerable process was that Brown mixed the hydrogen and oxygen together (i.e., in stoichiometric ratio) in plastic tubes and maintained them without contact with a metal so that when he introduced the mixture into the cylinder of an internal combustion engine, they burned hotter than the normal hydrogen-oxygen flame in air because of the volumetric ratio for optimal combination, and the absence of dilution with nitrogen.

However, as Brown's experiments have progressed (particularly those done at the Batou Institute in Peking), Brown has proposed the use of a number of novel solutions, some containing D_2O. In a communication of 1995 to the author,[3] Brown stated that the flame given by burning gases from the electrolysis of this mixture reached a temperature far above 2000°K, easily melted tungsten, etc. The normal temperature of the H_2 - O_2 flame is about 2000°K.

Brown stated[3] that tritium was found in the water collected from the combustion. This suggests a nuclear origin for the elevated temperature. No attempt to find He was made.

3. Meyer

Many patents have been received by Meyer.[4] He claims to be in possession of an above unity process. The Meyer process works by applying d.c. pulses to the electrode of a device aimed at decomposing water (no ions added.) The peaks of the voltage pulses reach 3,000 volts. The hydrogen produced in such processes is stated by Mallove[5] (observation of one demonstration) to be about six times that calculated by Faraday's laws.

It is, however, difficult to calculate this latter quantity because of the pulse-like nature of the electrolysis. Thus, during pulsing, much of the current will be used up capacitatively. This is calculated from $i_c = CdV/dt$, where C is the double layer capacitance, V is the voltage and t the time. On the other hand, such a current (neglected by Mallove) would subtract rather than add to the current to be counted in the Faraday calculation. The anomaly is thereby increased.

According to experiments described by Szklarczyk and Bockris[6] in 1987, when voltages of more than around 1000 are applied to an electrode in pure water, the electrode surface begins to glow and emits a white radiation. Dielectric breakdown of the water occurs and "streamers" pass between the cathode and the anode (such streamers have been shown to travel at up to c/10 and consist of an electron stream).[7]

Let it now be supposed as a hypothesis that the very high† local temperatures on the electrode surface triggers a nuclear reaction between naturally occurring deuterium atoms arising from the thermally caused dissociation of water, the heat arising from such a (possible) formation of helium could lead to a thermal dissociation of water in the vicinity of the electrode surface and thus, an excess of that formed by Faradaic electrolysis. Some recombination would occur but it may be incomplete at the (chemically) high temperatures involved.

Then, when the resulting H_2 is combined with oxygen (air) later, the heat evolved is greater than that expected from the recombination of hydrogen and oxygen calculated on the assumption that the H_2 arose in an amount calculated by Faraday's laws.

4. Aquafuel

A process was recently patented by Richardson[8] which involves electrolysis between two carbon electrodes in distilled water. The applied potential is about 3,000 volts (cf Meyer's experiments). The carbon is used up forming largely CO but the hydrogen which is evolved is above that expected from Faraday's laws.

An interpretation similar to that for the Meyer experiments is suggested. The high applied voltage would bring about conditions similar to those observed by Szklarczyk and Bockris.[6] The speculation is that a nuclear reaction occurs between the naturally present deuterium to form helium and the heat of this reaction causes the dissociation of water which would give rise to the excess hydrogen.

5. Water Explosions Observed by Graneau and Graneau[9]

† High in the chemical sense, but only around 0·1% of the temperature range associated classically with fusion.

These workers have reported underwater explosions arising from apparatus in which two electrodes form an arc within water. (cf. Sundaresen and Bockris) They have photographed a large area of plasma with the emission of a strong white radiation (cf. Szklarczyk and Bockris).[6]

One may refer here to observations published by Matsumoto[10] of cavities formed on the surface of electrodes undergoing electrolysis. Matsumoto claims these holes to be the sites of micro nuclear explosions. A similar explanation has been given by George and Stringham[11] in interpreting the micro pits and damages they find in palladium electrodes after their sono illumination. George and Stringham report that the edge of these craters are populated by new elements, i.e., that transmutation of Pd has occurred.

Thus, the carbon electrode surfaces which originate the arc which the Graneaus use is evidentally the site of micro explosions and a sufficient number of these provide sufficient heat to cause what is seen as an explosion in the water adjacent to the electrodes. Alternatively, the streamers (electron streams) which pass between the cathode and the anode during dielectric breakdown phenomena in water may give rise to nuclear actions according to schemes developed by Shoulders and Fox.[12]

6. Correa's Over Unity Discharge Tubes

The Correas have patented processes in which discharge currents pass between electrodes in gas discharge tubes as a result of the application of a certain electrical pulse regime. An over unity emission of heat is observed. The electrodes are partly used up. These experiments resemble experiments carried out in electrochemical cells, i.e., they consist of the "electrolysis" of gases. In so far as nuclear reactions have been observed to occur at some electrodes sparked in the presence of O_2, it is reasonable to suggest they may occur here, too. However, insufficient information is available to allow a suggestion as to their identity. However, Karabutt, Kucherov and Sammatimova[14] observed nuclear heat as a result of sparking Pd electrodes in D_2 gas.

Possible Eventual Development to Energy Sources

The suggestions given here are particularly speculative. They rest upon poorly defined facts and use an extremely novel theory not yet accepted by the nuclear community. (See, however, Kim and Zubareev[15]) However, the number of positive reports on the existance of low temperature nuclear reactions in solids is now too great for there to be doubt as to their existence.[17]

One can make a speculative suggestion of an application of eventual engineered versions of these devices. One begins with a trigger energy W and by this energy electrolyzes water under the over unity circumstances corresponding to some of the above experiments. The W joules of energy entered into one of the electrolysis devices produces, say, 2W in respect to the energy equivalent of the hydrogen which they produce. (Calculated in terms of the normal chemical combination heat of the combustion of one mole of H_2 with 1/2 mole of O_2).

This hydrogen is then converted to electricity in a fuel cell and, after counting the losses (say 1/2 W), is used in an over unity electrolysis device to form, say, 3 W in hydrogen energy.

The process continues by electrolysis and fuel cell and one can begin to remove some of the excess electricity to be applied to outside circuitry, - eventually to act as an energy source.

These remarks may be applied to futuristic concepts of the organization of States in which the computer directed and automated factory has reached an assymtotic state of development. Thus, within a few generations, perhaps no more than one, most of our means of production will have little need for the employment of people. The needed energy and goods could be available if there is sufficient "free" energy, applied to automated systems. A high degree of recycling would be necessary.[†]

Thus, Bockris and Dandipani[16] have shown that average personal income in countries is related to the average energy per person available by an $\int$ shaped curve. 10kW levelized per person would bring an affluent (work-free) post-industrial society to the whole planet. (Though a population increase STOP would have to be organized.)

[†] Nevertheless, this can never be 100% efficient. However,in a few generations, extra terrestrial sources of materials will be available.

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