Abnormal excess heat observed during Mizuno-type experiments.

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ABSTRACT :

A simple calorimetric device has been designed, working at constant temperature, that of boiling water. Heat losses can be estimated with accuracy using an ohmic heater. As expected, the losses are independent of the electric power injected in the heater and the amount of evaporated water is accurately linearly dependant of the power input. The device has been used for the determination of the heating power of a plasma water electrolysis (Mizuno - like experiment). We confirm that in this experiment, the heating power of the electrolysis is greater than the electrical power injected in the device. The excess energy increases as the electrolysis voltage is increased from 200 V up to 350 V (400 W input). The excess energy may be as high as 120 W.

1- INTRODUCTION :

Our experiment is an electrolysis experiment made in plasma mode with a Tungsten cathode, a platinized Titanium wire as an anode and as electrolyte a water solution of potassium carbonate (K2CO3 at 0.2 M). Besides excess heat in the same type of experiments, T. Mizuno reported hydrogen excess production.

The explanations found in the bibliography for this phenomenon are for example transmutations in the cathode material (2). The abnormal observations are concerned with the appearance of Osmium, Iridium Platinum and Gold, without quantitative measurements.(2)

It looks to us quite interesting to confirm these results with the help of a simplified experimental device.

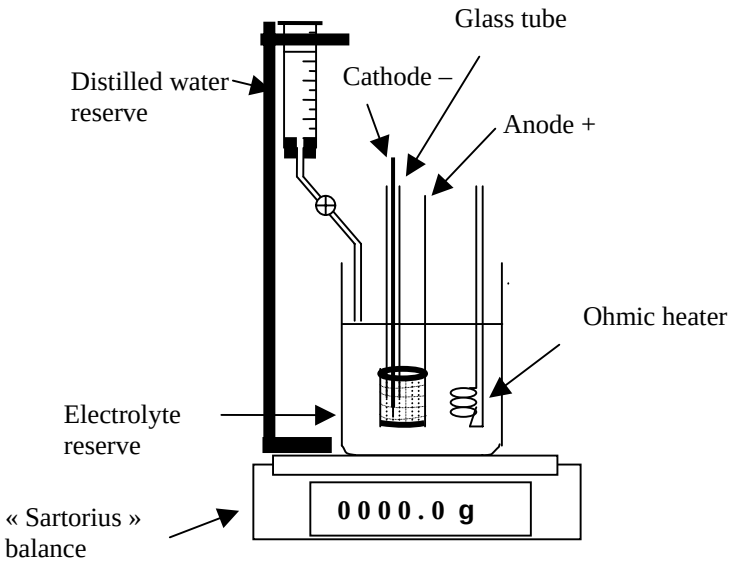
2- EXPERIMENTAL :

We have selected to do our experiments at constant temperature, the boiling point of water temperature, and to measure the heat emissions only by weighting the water mass of our experimental device. A storage water container inside the device itself allows us to maintain the electrolyte level constant and thus its K_2CO_3 concentration. This container, being graduated, gives also a way to confirm the mass of water boiled off.

A quite interesting repercussion of this operating mode concerns the thermal losses. Once the boiling temperature obtained and the overall thermal stability achieved, the thermal losses, which depend only on the temperature, remain constant, and this whatever the thermal emissions observed. This allowed us to hold the experiment in a simple beaker of the appropriate size and then to avoid to use a blind dewar. Of course, this allows to look visually at the cathode condition.

Finally, the use of a ohmic heating allowed us to bring the device at the suitable boiling temperature and to maintain this temperature at this level (much more quickly than by just the electrolysis). In an other way, it was possible to verify that, in the range of power used, the recondensation level inside the device and the droplets drive outside were very low. The excess heat that we were trying to highlight are quite large (30% to 100%). So, it is not necessary to obtain very precise measurements.

3- EXPERIMENTAL DEVICE DESCRIPTION :



Experimental scheme

(2l electrolyte reserve content)
we did not figure out the keeping tripod

The above figure gives the details of the experimental device :

- a SARTORIUS balance, heart of the device, measuring up to 6kg at an accuracy of 0.1g
- a beaker containing between 1 to 1.5 liter or electrolyte
- a tripod put also on the balance and bearing the electrodes and the container of pure water
- a continuous current electricity supply (500 volts, 4 amperes)
- a wattmeter to measure the input energy (Unigor 390 LEM)

The input energy was also quite often measured by use of the inlet voltage and the mean current intensity as given by a recorder. These results were compared between them.

- a tungsten cathode of 2.4 mm diameter made with 2% of Thorium (electrode often used on commercial scale for welding)

This cathode was inside a Pyrex tube with only about 15mm left outside underneath. Ceramic tubes were also used

- an anode made of a wire in platinized titanium in cone or cylinder form around the cathode in order to regulate the water currents, quite large due to the boiling and able to drive out droplets of electrolyte.
- An ohmic heater rated to about 400 watts (representing 34g of evaporated water in 300 seconds)
- A distillated water container equipped with a tap which allows to maintain a stable level inside the beaker during the experiments.
- Various measuring equipments for electrical components.

A typical run lasts about 10 to 20 minutes by 5 minutes periods. The evaporated water quantities may reach values of 50 to 100g, i. e. energy quantities of 113,000 to 226,000 joules. In some cases, we used a Geiger-Muller device to see possible nuclear radiation. The results of these nuclear observations were always negative.

4- RESULTS AND DISCUSSION:

4-1 CALIBRATION :

We have verified with our ohmic heater, which can remain inside the beaker permanently, the response of our device to heat emissions. It was necessary to verify that the thermal losses were constant beyond a certain inlet power level and then that every jump of power would give a loss of water corresponding exactly to the energy supplied in the device during the considered period.

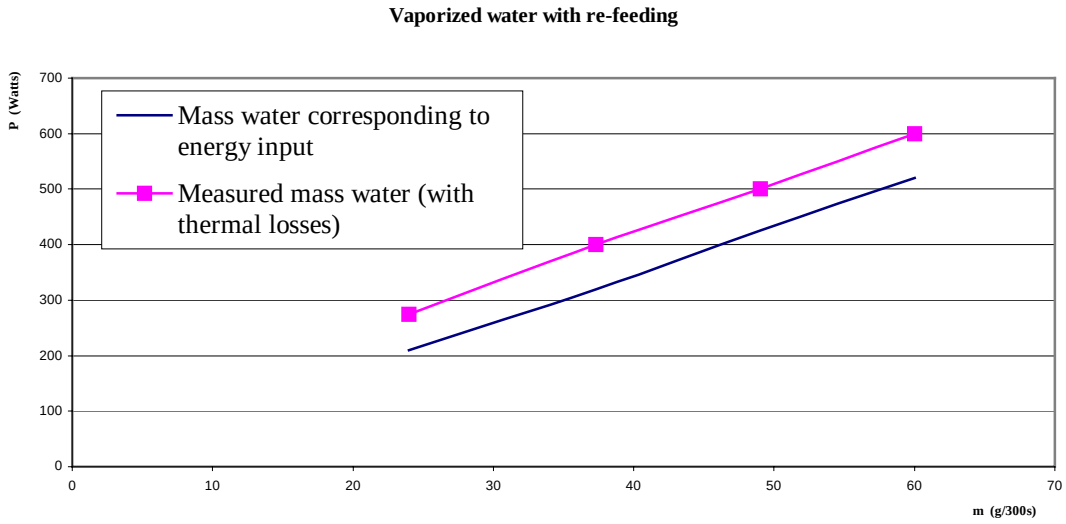
The electrolyte level is maintained constant, due to the supply of water (at 20°C) from the container. The energy used for the boiling of 1g of water is then :

2260j (latent heat at 100°C) + (100°C – 20°C) x 1x 4.18 (necessary heat to bring 1g of water from 20°C to 100°C) = 2594j.

Figure 2 underneath presents the results. One note that, from about 300 watts for the inlet power, the experimental curve and the theoretical straight line are rigorously parallel and that the thermal loss worth is 75 watts. Three important features can be deduced, when we maintain the power of the ohmic heater at about 400 watts:

- We were able to verify the validity of our measurement of the latent heat of water evaporation
- The power increase due to the experiment is directly measured by the water loss during a given time unit.
- The losses due to the recondensation inside the experimental device and those due at the contrary to droplets drive out seem negligible.

Figure 2 Device calibration by use of ohmic heating only.



4-1 RESULTS :

We made a parametrical study on the influence of the voltage applied to this electrolysis. The temperature was brought to the boiling point (100°C) with the auxiliary resistance. Then the electrolysis began with a voltage of 200 volts, necessary worth in order to have suitable plasma around the cathode. The plasma appearance is greatly favored by the electrolyte temperature. The Joule effect during electrolysis gives immediately an envelope of steam around the cathode and the appearance of the plasma, supposed to be hydrogen plasma according to T. Mizuno. The table underneath gives the value of the COP, which is the ratio between the energy represented by the vaporized water (of course, we have to take into account the water vaporized by the ohmic heater) divided by the electrical energy supplied to the device. It is very important to be sure that the device is stable from the thermal point of view. The selected definitive values for the inlet energies are the values of the wattmeter, considered as more reliable than those based on voltage and mean registered current.

Results: 5 minutes tests

Voltage (volts)	COP (Energy out / energy in)	Number of tests
200	1.0	3
250	1.05 to 1.12	8
300	1.12 to 1.15	8
350	1.31 to 1.41	4

Remarks:

1- The calculation of the COP is straightforward. Let us take the 200 volts case, for which the mass of missing water is 63g for 34g due to the auxiliary resistance. The mean worth of the current intensity was 1.25 Amp. , the duration of the test 300 s (5 minutes).
Energy out: (63 g – 34 g (auxiliary resistance) x 2594j = **75226 joules**
Energy in : 200v x 1.25 A x 300 s (5mn) = **75000 joules**
The COP is then: **1.0**

2- The COP values bands are not related to the inaccuracies of the measurements. The results presented here concern several hours of operation for the cathode, which undergoes very high temperatures and then is corroded. So we are obliged to restore its initial length (about 15 mm), that is the explanation for the variations bands.

3- However, we can notice that the reproducibility is in about 5% range.

4-2 DISCUSSION :

The very simple device used allowed us to highlight with reproducibility an abnormal excess heat, which is increasing with the voltage.

Then we think that we may confirm the appearance of abnormal excess energies for voltages larger than 200v in our present case. The cases presented for 350 volts correspond to inlet power exceeding 400 watts. The abnormal excess heat shown here exceeds 120 watts without taking into account the gas formation and also the luminous radiation. This power is therefore definitely meaningful. We did not found in our device any classical explanation for this thermal effect and we are examining the possibility of less classical explanations.

5 CONCLUSION :

The initial purpose of these experiments was to investigate the potential of a simple experimental device in order to confirm the results obtained by T. Mizuno. We think that this first step is obtained and that we can say that ratios between energies out and in (COP) of 1.3 and 1.4 have been reached with a satisfactory reproducibility.

In a second step, we will try to explain this phenomenon in order to increase the COP performances.

In any case, the device presented in this paper is a very simple device which can be used to verify very rapidly an hypothesis without calling for sophisticated means. For example: we have verified that this phenomenon does not seem related with the heavy water contained at one part for 7,000 in the natural water. We multiplied by 100 the content of heavy water in our electrolyte, i.e. one part for 70. We did not see any perceptible change in our results.

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