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Abnormal excess heat measured during Mizuno-type experiments : Artifacts elimination

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« Anyone who has never made a mistake has never tried anything new » Albert Einstein

Abstract:

During a new Mizuno-type experiments series, we examine more deeply the possible artifacts. In particular, the electric power measurement was carefully studied. We found that the bandwidth of our usual Unigor wattmeter was not large enough to give a correct measurement of the inlet electric energy when the current is very disturbed. The results that we gave in ref. 2 (Sotchi -ICCF13) are therefore inaccurate. However, we present here complementary experiments that allowed us to find again abnormal excess heat.

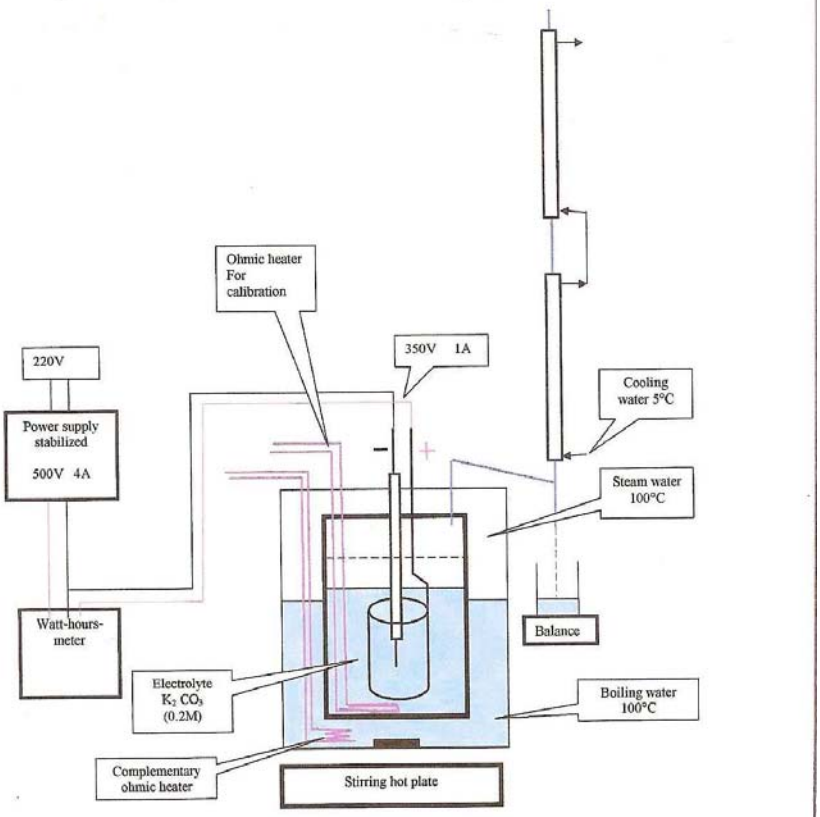
1-Introduction :

The search for a new CNAM team to pursue our cold fusion works lead us to make demonstration of our electrolysis experiments based on our boiling water calorimeter (ref 2).

As noticed in ref. 2 and illustrated by Fig1, which gives the scheme of the boiling water calorimeter, the said calorimeter allowed us to solve two artifacts:

- storage and destorage (the internal reactor temperature remains always at 100°C and then do not allow any stored heat)
- the possible electrolyte droplets losses (the condensed steam gives an easy chemical way to check up if electrolyte droplets are carried on)

Fig. 1 Boiling water calorimeter



The last artifact to be verified in depth is the inlet electric power measurement. Our experiments are done at constant voltage, but the current is extremely disturbed (many peaks, higher than 10 Amps). In our past experiments, we have verified that the heat released in a thermal resistance put in succession with the electrolysis enduring the same current was conforting the calorimetric measurements with an error margin inferior to 2%. This experiment was repeated and confirmed at Boulder in the same conditions with R. Slaughter and L. Kowalski. But nevertheless we have to recognize that in that case the voltage does not remain constant. It is shared between the resistance and the electrolysis. Power peaks are flattened favorizing then a better measurement by our wattmeter. Moreover, the electrolysis being made at constant voltage, recordings of the mean current's measurement seemed to show us a relatively good correlation with our Unigor wattmeter.

2-New measurements of the inlet electric power:

For this new analysis, we had in hands:

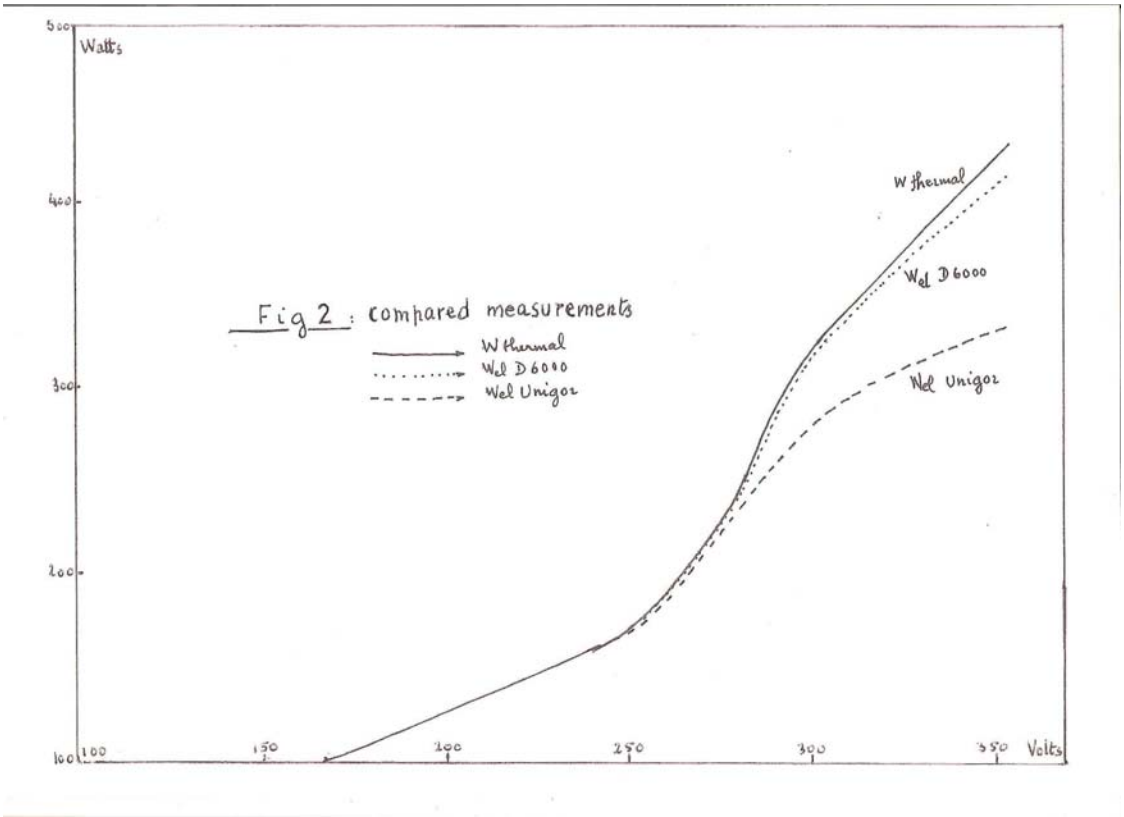
- our Unigor wattmeter (390 LEM) used in our past experiments (band width up to 100 kHz)
- a D6000 Norma Goerz wattmeter (with a quite larger band width : DC, 0.02 Hz to 2.0 MHz) lent by EDF (Etudes et Recherches)
- an oscilloscope allowing us to have mean current values to combine with the supposed constant voltage.

As seen in Fig. 2 (curves normalized at 200 volts), the measurements made with the D6000 wattmeter were very close to the thermal values. On the contrary, the Unigor values did not

agree with the D6000 values, especially after 280-300 volts and this explained the erroneous abnormal excess heat measurements announced.

The measurements obtained with the oscilloscope confirmed globally those obtained with the D6000 wattmeter.

So, abnormal heat seems to have disappeared!



3- Return to our Yokohama type experiments (ref. 1):

Therefore, we tried to understand why the abnormal excess heat seemed to have disappeared. We have then thought that the reactor in our boiling water calorimeter, was not large enough (only 1 litter) for the electrolysis to be made in and that violent moves of the electrolyte consequently disrupted the plasma around the cathode. Thus, we suspect that this phenomenon is responsible for the disappearance of the abnormal excess heat.

We decided to return to the experimental set-up presented in ref.1 (Yokohama -ICCF12), in which the volume of the beaker was 5 times larger for the electrolysis, but we replaced this 5 liters beaker by a Dewar flask of the same volume. See fig 3.

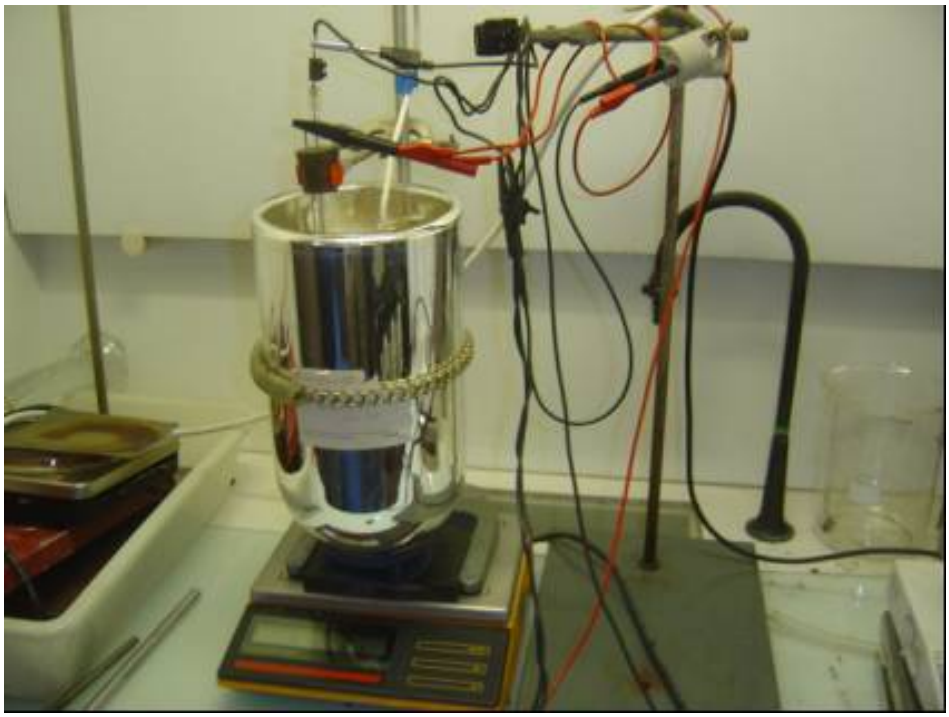


Fig 3 Experimental Yokohama (ICCF12) set up.

We have taken the same experimental conditions than in ref. 1 and ref. 2, that is to say:

- a Sartorius balance, measuring up to 6 kg at an accuracy of 0.1 g
- a continuous current electricity supply (500 volts, 4 amperes)
- a tungsten cathode of 2.4 mm
- a wire in platinized titanium for anode
- an electrolyte made with K^2CO3 at 0.2 M

Calibration tests made with a thermal resistance (~150 ohm) show us that in the range of 250 w to 700 w the thermal losses were very small and constant.

Our first electrolysis experiments were perturbed by the storage and destorage problem. We found out that the problem was due to non uniform temperature distribution (normally 100°C everywhere) inside the Dewar flask due to electrolyte stratification. We solved this problem by leaving inside the Dewar flask a thermal resistance giving a continuous power at about 300 watts. Convection of hot electrolyte inside the Dewar flask gives then the good temperature (100°C) everywhere. Of course, we have to take into account the continuous loss of water due to this 300 watt extra power.

Thanks to our quite deep Dewar and also to a well arranged perforated teflon screen just above the electrodes, we did not notice any electrolyte droplets losses. Moreover, the storage and destorage problem was solved and verified by measurements made with an auxiliary thermal resistance.

4 - Results obtained:

First, we will give an example of our experimental procedure, as done in our run of July 17th 2008.

Voltage applied was 300 Volts.
Duration of the run: 25 minutes.
T minutes (mn)
M: water mass (g).
Wh : Electric energy furnished (Wh).
(Water loss due to the auxiliary thermal heater for 2.5 minutes: 22g)

T	M	Wh
0	-150	545
2.5	-183	560.6
5.0	-240	575.1
7.5	-276	589.6
10.0	-328	602.8
12.5	-375	615.9
15	-416	628.9
17.5	-447	641.8
20	-493	654.7
22.5	-530	667.3
25	-585	679.7

The mean **COP** during this run may be obtained as following:

Mean thermal energy produced by electrolysis for **2.5 minutes** between 2.5 and 25 minutes (9 intervals of 2.5 minutes):
(585-183)/9 – 22 = 22.7 g, that is to say: 22.7x2260= 51302 joules.

Electric energy furnished for **2.5 minutes** between 2.5 and 25 minutes:
(679.7-560.6)/9 = 13.2 Wh, that is to say: 13.2 x 3600 = 47520 joules

Mean COP value: 51302/47520 = 1.08

The preliminary results obtained from July 2008 to July 2009 are the following:

Voltage applied	**COP values**
200v	1.00
250v	1.09 1.00 1.10 0.97
300 v	1.06 1.08 1.04 1.01

The accuracy of our measurements is fairly good (2 to 3 % max. error margin), as we have a measurement made every 2.5 minute during about 20 to 30 minutes duration for a given test. On the other hand, in this type of experiment, it is difficult to imagine to have negative thermal losses (destorage problem has been solved) and usually, the COP values are under 1.00. One can however notice that the positive COP values larger than one are not very large and that they are not as reproducible as formerly announced in ref.2.

5 – Conclusion:

After a severe doubt due to the use of a wattmeter without a sufficiently large bandwidth, we were able to find again values for the ratio of outlet thermal energy to inlet electric energy (COP) larger than 1.00 . We think that these values are meaningful. For the time being, these values are not very large and do not occur as often as we wrote in ref. 2. We may add that we get an hypothesis for the disappearance of the excess heat: the size of the reactor in our boiling water calorimeter was too small and the violent moves of the electrolyte inside disrupted the plasma around the cathode and the abnormal excess heat disappeared.

However, although we think that these results are quite encouraging, they need to be confirmed and we need a bigger involvement of new sponsors in the future studies because the hope of a clean, cheap and abundant energy deserves it, even if some uncertainties cannot be completely avoided.

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Literature:

[1] « Abnormal excess heat observed during Mizuno-type experiments » by J.F. Fauvarque- P.P. Clauzon- G.J-M. Lallevé – Service d'électrochimie Industrielle du CNAM – Paper given at Yokohama – Nov.2005 – ICCF12 meeting.

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