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EXCESS HEAT MEASUREMENT WITH PATTERSON TYPE CELLS

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Abstract:

We have measured excess heat in a Patterson type cell doing electrolysis of light water in Li_2SO_4 with a cathode made of 0.6 mm nickel palladium beads and a platinum anode. The cell employed is similar to the CETI cell, the main difference being its increased diameter, allowing the use of more beads and a larger current with a relatively low current density. The experiment lasted 90 days. We show that a total excess energy of 800 kJ is produced, and cannot be explained by a chemical reaction. No nuclear ashes have been searched for at this stage.

1 - Introduction

Following the discovery of "Cold Fusion" in 1989 by Fleischmann and Pons ([1]), numerous techniques have been proposed to duplicate this original work. In particular Patterson ([2]) developed an original method using 1 mm diameter polystyrene beads covered by a palladium layer sandwiched between two layers of nickel. Each one of these films being about one micron thick. The technique has been described in details in patents([2]). The purpose of our work is to verify Patterson's claims and to try to understand the possible reactions involved, including transmutation as proposed by Miley ([3]). In this study we will only deal with excess heat measurements, the transmutation work being still in progress.

Initially we started with two cells from CETI, 19 mm inner diameter. As the results were positive but small we decided to build a larger cell, 30 mm inner diameter. Also in the beginning we worked with CETI's beads destined for transmutation work, but seeing the difficulty of the work, we switched to heat measurement. CETI gave us beads having the three layer structure, nickel, palladium, nickel, but we were unable to get any large excess heat using these beads. We therefore made our own beads with similar composition by electrodeposition, which we used in this large cell with the following results.

2 - Experimental procedure

Figure 1 shows a schematic of the system. The cell consists of a cylinder of 30 mm ID, the cathode (a nickel mesh) is at the bottom, and the anode (a platinum mesh) at the top. The beads (0.6 mm diameter, 3.3g) are located above the cathode. The cathodic and the anodic compartments are separated by a nylon screen. The anodic volume being filled with ion exchange resins (3.2 g).

The cell is mounted inside an insulating enclosure to ensure minimum exchange between the cell and the room. Temperatures are measured at the inlet and outlet by calibrated thermistors. In order to avoid errors in measurements, the thermistors are placed inside a 3mm glass tube filled with oil, which penetrates 15 cm inside the Teflon tubing. The electrolyte circulates thanks to a rotating piston pump (FMI). A flowmeter is located after the pump for a gross estimate of the flow rate. A more accurate measurement is made daily by weight. At the output of the cell, the electrolyte and the gases are separated in the gas-liquid splitter, and volumes of gases are measured daily.

The beads are made by electrodeposition of thin films (about one micron each) of nickel, palladium and nickel on polystyrene beads (0.6mm in diameter), precovered by a thin film of copper.

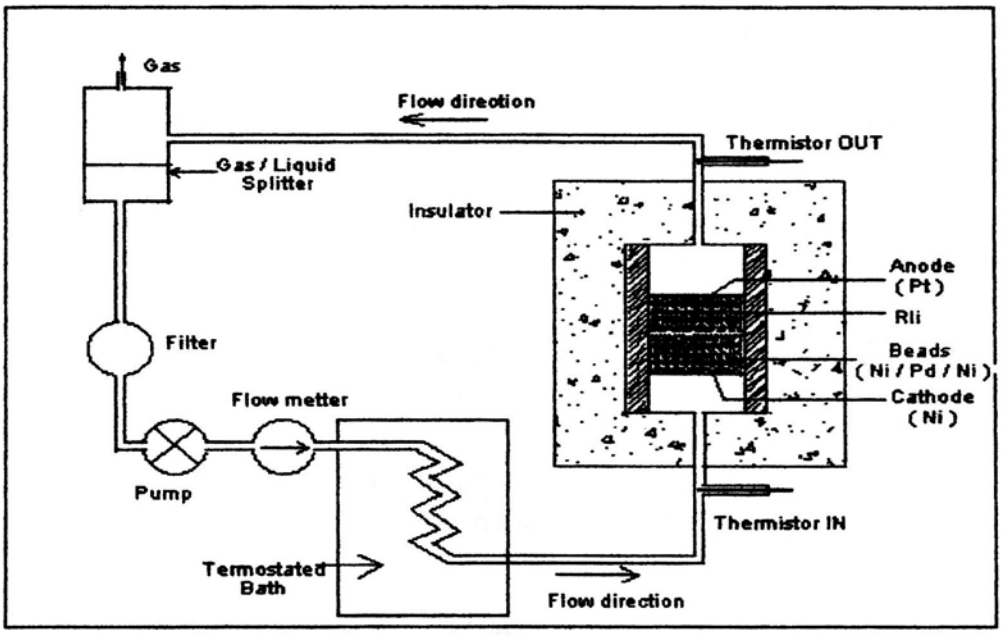

Figure 1: Experimental set up.

3 - Experimental results

3.1 - Calibration

A calibration experiment without beads has been performed that showed no excess heat, and no oxygen hydrogen recombination.

3.2 - Experimental procedure

Experiments have been performed at various currents and flow rates, ranging from 20 mA up to 800 mA and flow rates from 5 ml/min up to 40 ml/min. Temperatures are measured continuously, and stored in a computer. Flow rates as well as gas volumes are measured daily. The experiment lasted altogether 90 days, even though only the last 60 days results are shown. In fact at the beginning there were errors due to accidental heating of the cell by the environment, and therefore an insulator has been added around the cell to isolate it from the room.

Recombination varies depending on current intensity, flow rate and level of water in the gas/liquid splitter. At low current (20 mA), there is almost no gas produced, oxygen and hydrogen are recombined.

3.3 - Results

A total of 800 kJ has been produced in the course of the experiment. Figure 2 shows a plot of excess heat versus time measured daily at various currents and flow rates.

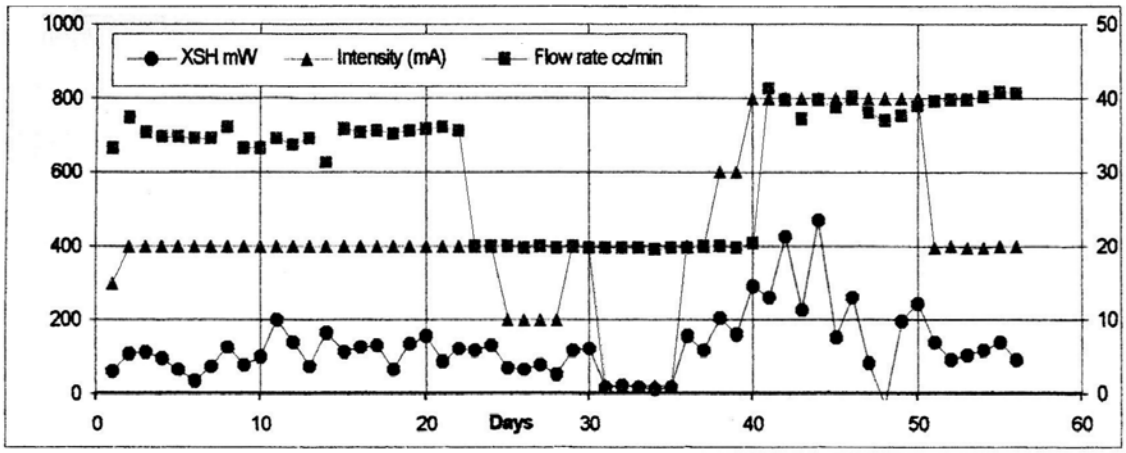

Figure 2: Excess heat versus time (in days) at various current intensities and flow rates. Left scale is excess heat in mW, and current in mA. Right scale is flow rate in ml/min.

Figure 3 shows the excess heat versus input power. There is scattering of the data which has several sources. At 4 Watts (800 mA), the temperature difference between output and input is noisier because of the bubbles formed when larger quantities of gases are mixed to the electrolyte. This explains in part the larger data scattering at higher power. Another source of scattering in the data comes from the measurement of the flow rate, and finally there is a heat loss from the cell to the environment that depends on the input and output temperatures. When the temperature difference between output and input is large, at low flow rate, or high power, this heat loss becomes larger.

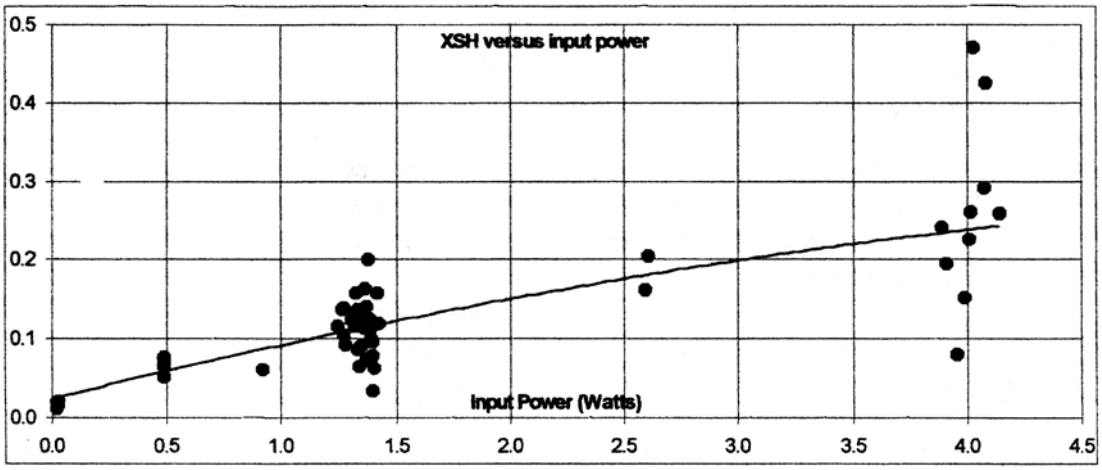

Figure 3: Excess heat (in Watt) versus input power (in Watts).

Figure 4 shows the percentage of excess heat versus input power. The relative excess heat is close to 100 % at low current, and levels off at about 8% at high power. However the uncertainty at low power is large due to the small temperature increase produced in the cell.

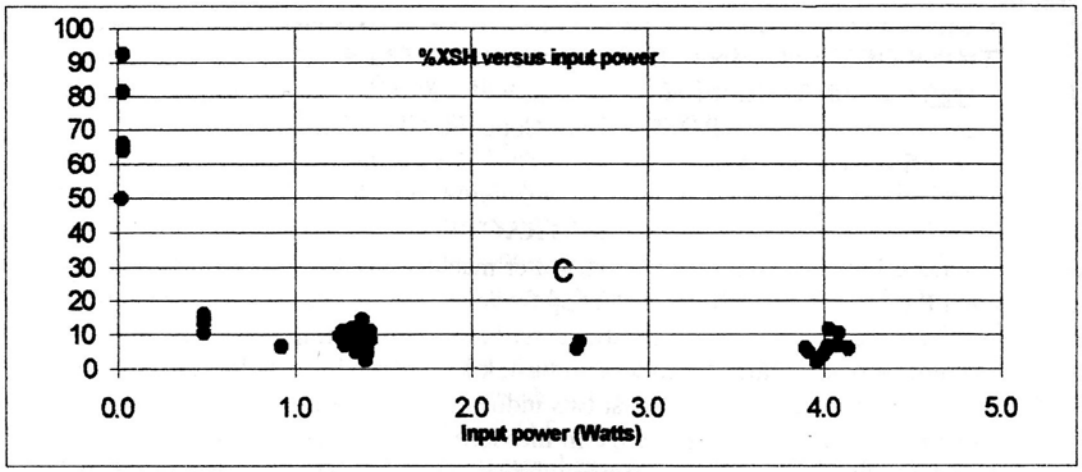

Figure 4: Excess heat in percent versus input power.

4 - Conclusion

We have shown in this 90 days experiment that excess heat is produced in a cell similar to the Patterson cell, using our own beads. Care has been taken to measure accurately the input and output temperatures, and volumes of gases have also been measured for taking into account recombination. We have measured excess heat up to 400 mW, but our numbers are smaller than those shown by Patterson. However the trends are similar, i.e. the yield is high at low input power, and low at high input power.

This particular experiment was not designed for careful transmutation analysis, but new experiments will be performed to look for possible new elements production.

References

1. M. Fleischmann and S. Pons, J. Electroanal. Chem. 261(1989) 301.
2. J. A. Patterson, “Systems for electrolysis”, US patent #5,494,559,27 Feb. 1996.
3. G. H. Miley, G. Name, M. J. Williams, J.A. Patterson, J. Nix, D. Cravens, and H. Hora Proc. ICCF6, Hokkaido, Japan, October 13-18,1996, p.629-644.