

Specifics of Andrea Rossi's "Energy Catalyzer" Test, University of Bologna, 1/14/2011

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On January 14, 2011, Andrea Rossi submitted his "Energy Catalyzer" reactor, which burns hydrogen in a nickel catalyst, for examination by scientists at the University of Bologna and The INFN (Italian National Institute of Nuclear Physics). The test was organized by Dr. Giuseppe Levi of INFN and the University of Bologna and was assisted by other members of the physics and chemistry faculties. This result was achieved without the production of any measurable nuclear radiation. The magnitude of this result suggests that there is a viable energy technology that uses commonly available materials, that does not produce carbon dioxide, and that does not produce radioactive waste and will be economical to build.

The reactor used less than 1 gram of hydrogen, less than 1,000 W of electricity to convert 292 grams of water per minute at $\sim 20^{\circ}\text{C}$ into dry steam at $\sim 101^{\circ}\text{C}$. The unit was turned ON and began producing some steam in a few minutes, and once it reached steady state continued producing steam until it was turned OFF. The amount of power required to heat water 80°C and convert it to steam is approximately 12,000 watts. Dr. Levi and his team will be producing a technical report detailing the design and execution of their evaluation.

A representative of the investment group stated that they were looking to produce a 20 kW unit and that within two months they would make a public announcement. He declared that their completed studies revealed a "huge, favorable difference in numbers" between the cost to produce the Rossi Catalyzer and other green technologies. "We had a similar demonstration six months ago with the same success we've had today. We are almost ready with the industrialized product, which we think is going to be a revolution. It is a totally green energy." The representative offered that the company was called Defkalion Energy, named for the father of the Greco Roman empire, and was based in Athens.

Giuseppe Levi, PhD in nuclear physics at the University of Bologna and who works at INFN, offers exclusive comments on the test, which he deemed "an open experiment for physicists. The idea was like a conference: to tell everybody what was going on and eventually to start new research programs on that topic."

The first measurements Levi described were energy measurements to determine the input of energy inside the reactor and the output of energy of the reactor. "I don't have conclusive data on radiation but absolutely we have measured ~ 12 kW (at steady state) of energy produced with an input of about just 400 watts. I would say this is the main result. We have seen also this energy was not of chemical origin, by checking the consumption of hydrogen. There was no measurable hydrogen consumption, at least with our mass

measurement.” By measuring with a very sensitive scale, within a precision of a 10th of a gram, Levi measured the weight of the hydrogen bottle before and after the experiment “If the energy was of chemical origin you would have expected to consume about 100 to 600 more than the sensitivity of the scale. You measure the bottle before and after and then you see in your measurements there was almost no hydrogen consumed.”

The workings of the Rossi reactor was, Levi explained, unknown to them because of “industry secrets.” He said: “What we've done is to measure the water in the flux and we are heating and making steam for that water. We are measuring the water flux and carefully checking that all the water was converted into steam, then it is easy to calculate power that was generated. You are measuring the power that was going in the system by quite a sensitive power meter. Initially the system started up and we had 1 kW of input and then we reduce the input to just 400 W. The output energy was constant at about 12 kW.”

The flow rate, Levi continued, was measured with a high precision scale. “The flow rate was 146 g in 30 seconds. Using a simple measurement gives a simple result. There was a pump putting in a constant flux and what I have done is – with the reactor completely off take measurements – we spent two weeks of the water that flowing through the system to be certain of our calibration. After this calibration period I have checked that the pump was not touched and when we brought it here for the experiment it was giving the same quantity of water during all the experiment. The water was coming from an Edison well and the pump was putting it in the system. Then we were releasing the steam into the atmosphere; there was not a loop.”

To determine if the steam was coming out dry and at atmospheric pressure, Professor Gallatini, a specialist in Thermochemics and a former head of the Chemical Society of Italy, verified that all the water came out as steam. “There was no water in the steam,” Levi certified. “The outer temperature measured was 101° centigrade at atmospheric pressure.” The instrument he used was a Delta OHM # HD37AB1347 Indoor Air Quality Monitor. Gallatini inserted the probe inside the exit pipe with the steam.

Levi was asked: How did you compute the thermal energy production by the Energy Catalyzer (ECat)?

He responded, “The calculation is very, very simple. Because you know the number of grams of water per second delivered to the ECat you know you must raise the water to 100°C, this is the transient phase of operation. Once the water is at 100°C the energy is used to make the water into steam. It takes 2272 joules per gram to convert water at 100°C to steam. Because the ECat provided more energy the steam became hotter, 101°C. So our conservative estimate of the steady state thermal output of the ECat, neglecting thermal radiation and other losses, is just 2272 joules per gram multiplied by the 4.9 grams per second = 11, 057 joules per second or Watts. When you realize that you have to add the energy to raise the temperature of the water you get by about 80°C and the steam by another 1°C the total thermal power the ECat releasing is about 12,400 Watts. These are not our refined estimate but they indicate that the input electrical power of 400 W produces using an amount of hydrogen less than a gram in a couple hours of operation we are seeing a system with a power gain = 12,400/400 = 31.”