

Test of Energy Catalyzer

Bologna April 19, 2011

Measured voltage: 236 V (AC)

Weight hydrogen bottle (attached, opened, closed, and detached):

- before: 13653.1 grams

- after: 13652.6 grams

Total loaded: 0.5 grams

Pressure H₂

Bottle: 85 bar

Reduced: 12 bar

Temperature

T2 – temperature water inlet

T3 – temperature outlet

17.03 Water pump started.

17.07 Water comes out of outlet hose.

17.10 Water inlet from reservoir 2 – initial weight 10280.7 grams

17.12 Start control unit.
Measured AC current: 153 mA, which means 36 watts

17.15 Start heating
Measured AC current: 1.5 A, which means 354 watts
T2: 20.9°C T3: 21.3°C

17.21 Sound of heating water. T3: 67°C

17.25 T=99.9 °C. Outlet hose hot.

17.31 Change reservoir to 1
Reservoir 1: initial weight 10185.9 grams
Reservoir 2: 8826.6 grams (consumed 1454.1 grams in 21 minutes, which means 4.15 kg/h).
T2: 22.8°C T3: 100.0°C

18.25 Added water from reservoir 2 into 1
B before: 8826.4 grams T2: 22.6°C
B after: 6001.6 grams T2: 22.1°C
Tot added: 2824.8 grams

19.07 Added water from reservoir 2 into 1
B before: 6001.0 grams T2: 22.0°C
B after: 2195.2 grams T2: 21.6°C
Tot added: 3805.8 grams

19.41 Stop. Reservoir 1: 7891.7 grams T2: 21.6°C

Water flow

Reservoir 1

Weight at start 17.31	+10185.9 grams
Added 18.25	+ 2824.8 grams
Added 19.07	+ 3805.8 grams
Remaining 19.41	- 7891.7 grams
Tot consumed in 2:10 h	8924.8 grams, which means 4.12 kg/h

Energy calculation:

Conservative value of inlet water temperature, T_2 : 22.5°C

Boiling temperature: 99,5°C

$\Delta T = 77\text{K}$

Heat capacity of water is 4.18 kJ/(kg x K)

Energy required for heating water, $W_{\text{heat}} = 321.86 \text{ kJ/kg} = 89.41 \text{ Wh/kg}$

Enthalpy of vaporization is 2260 kJ/kg. Energy required for vaporization, $W_{\text{vap}} = 627.8 \text{ Wh/kg}$.

Total energy required, $W_{\text{tot}} = W_{\text{heat}} + W_{\text{vap}} = 717.2 \text{ Wh/kg}$

Total mass of water, $m_{\text{tot}} = 8924.8 \text{ grams}$

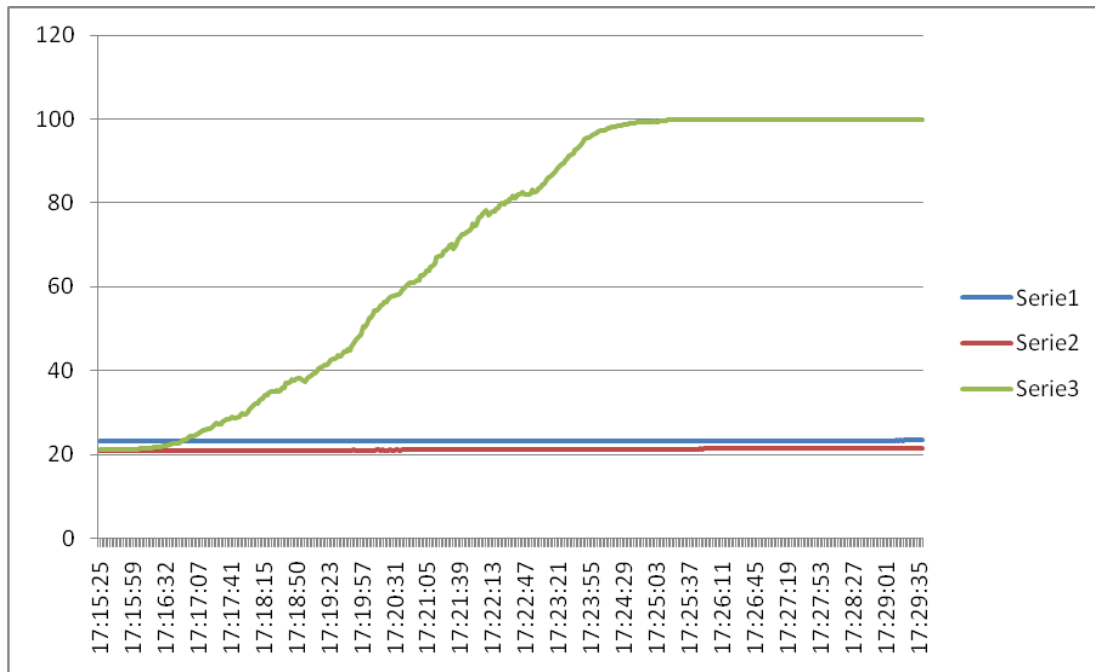
Total energy produced $W_{\text{tot}} \times m_{\text{tot}} = 717.2 \times 8.9248 = 6401 \text{ Wh}$

Max electric heating energy (including 36 watts power for control unit):
 $354 \times 2.167 = 767 \text{ Wh}$

Net energy: 5634 Wh $\approx 5.6 \text{ kWh}$ ($\approx 20 \text{ MJ}$)

Average net heating power in 2:10 (2.167) h: $5.634 / 2.167 = 2.6 \text{ kW}$

Temperature during start-up:



Instruments

* Peristaltic pump NSF

Model # CEP183-362N3

Serial # 060550065

Max output 12.0 liters/h

Max press 1.50 bar

* Temperature logger Testo

177-T3

0554 1765 Usb Interface

* Temperature probe Testo

Calibration certificate No 838/2010 PD 29/12 2010 (measured T3)

Calibration certificate No 839/2010 PD 29/12 2010 (measured T2)

* Radiation meter Automess

S/N 95171

* Scale

Model: TKW 15 S

S/N: 2917029003

Max 15000 g

d= 0.1 g

Certified according to ISO 9001:2000

* Amperemeter Digimaster DM201

1090647637

(Checked against a multimeter afterwards by Mats Lewan).

Report by Mats Lewan – mats.lewan@nyteknik.se, April 29, 2011.