Comparison of simulated and measured nickel isotope distributions in 'E-Cat ash'

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	Ni-58	Ni-59	Ni-60	Ni-61	Ni-62	Ni-63	Ni-64
Fuel[1]	65.9	0.0	27.6	1.3	4.2	0.0	1.0
Added neutrons	4		2	1	0		≥1
σ	1.1		1.0	0.9	0.0		0.3
New data[2]	14.2		6.3	0.3	78.5		0.7
Simulated	14.1		6.4	0.3	78.5		0.6
Lugano I[1]	0.8		0.5	0.0	98.7		**0.0**
Simulated	0.6		0.4	0.0	98.7		**0.3**
Lugano II[1]	0.3		0.3	0.0	99.3		0.1
Simulated	0.3		0.2	0.0	99.3		0.2
Added neutrons	2		2	1	0		≥1
σ	0.4		1.0	0.3	0.0		0.1
New data	**14.2**		**6.3**	0.3	78.5		0.7
Simulated	**12.5**		**8.1**	0.4	78.5		0.6
Added neutrons	1	1	1	1	0		1
σ	0.4	8	1.0	11	0.0		0.1
New data	**14.2**		**6.3**	**0.3**	78.5		0.7
Simulated	**11.7**	**0.6**	**7.9**	**0.7**	78.5		0.6

Table 1. Simulated transmutation data for nickel vs. laboratory data.

The isotopic distribution data in the table is presented as atomic percent of total nickel.

Added neutrons is the number of simulated neutrons added momentarily, or one by one at relatively short time intervals, to a nickel nucleus. The neutron source include hydrogen protons that undergo electron capture at the beginning of the LENR, in a DEAN-like structure[3] with a high electron density. Adding single protons, instead of neutrons, to other nickel isotopes than Ni-62 will give a similar isotopic distribution due to the decay of the relatively short-lived reaction products. Ni-62 is the end product (a theoretical issue, if correct) in the simulation models, when adding neutrons to the lighter nickel isotopes. Ni-64 is transmuted to other elements.

σ denotes the relative reaction cross sections used in the simulations.

Bold numbers indicate significant deviations between simulated and laboratory data.

New data is from [2].

Lugano I and **Lugano II** are laboratory data from analyses of nickel isotope distributions in particles, solid (ToF-SIMS) respectively dissolved (ICP-AES), from a used E-Cat reactor[1]. The simulated data for Lugano I and II is the same for all three neutron addition models.

The simulations were stopped when the specified amounts of Ni-62 in the laboratory samples were reached.

During 2015, a number of transmutation simulations were made by Heliorite AB, particularly for nickel-based systems. The reference data from the Lugano E-Cat study [1] came from nickel consisting of >98% Ni-62. Now, when new laboratory data from a sample with 79% Ni-62 has been published [2], new simulations have been made with three neutron addition models to find out if the data fits into any of them. As can be seen in the table above, it is striking how well the 4-2-1 neutron addition model matches the new laboratory data.

1. Levi,G. et al, Observation of abundant heat production from a reactor device and of isotopic changes in the fuel, http://www.elforsk.se/Global/Omvärld_system/filer/LuganoReportSubmit.pdf

2. http://www.e-catworld.com/2016/07/08/document-isotopic-composition-of-rossi-fuel-sample-unverified/

3. http://www.heliorite.com/LENR/DEAN.html

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