Transmutations by Heavy Electron Catalysis

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Our model uses heavy electrons to facilitate nuclear reactions, similar to muon catalysis. The heavy electrons have lifetimes ~ 10 fs, during which some of them may facilitate nuclear transmutations. The model is described in a separate paper. Here we compare predictions of the model with various experimental observations.

(1) Reactions of light hydrogen with Ni^{62} and Ni^{62}. These are claimed to have produced 11% iron, 10% copper and lesser amounts of zinc and cobalt. (Bazhutov-2014)

(2) Reactions between LiAlH4 and natural nickel. These depleted Li^{7} and all Ni isotopes except Ni^{62}. The reaction created many isotopes, in approximately decreasing amounts: Fe, C, O, Cl, Si, and smaller amounts of Cr and Mn, and apparently no copper, cobalt or zinc. (Levi-2014)

(3) Electrolysis of thin (65 nm) Ni films in light water with 1 molar lithium sulfate. These reactions produced silver (Ag^{107} and Ag^{109}) as well as Fe, Cu^{63} and isotopes similar to observations (1) and (2) above. (Miley 1996)

(4) Exploded Titanium foil produced Fe, isotopes. High voltage and current pulse vaporized titanium foil in either light or heavy water, producing Fe, Ni, Cu, Zn, and Co. (Urutskoev-2004)

(5) Deuterium diffusing through Cs, Sr, Ba, and W films on Pd (Iwamura)

(6) The reaction products were in the ground state (non-radioactive). Energetic emissions associated with dd fusion were not observed, except possibly as tiny traces

(7) Liquid neon that was dissolved in the liquid H_2/liquid D_2 mixture prevented muon catalyzed fusion reactions.

8) Weighable amounts of new isotopes have been reported, with substantial excess heat.

9) Darkening of photographic plates. X-rays and low energy gamma (~ 200 keV) have been observed, but energetic particles emitted are apparently not charged, except for trace amounts.

Heavy electron catalysis may be useful for neutralizing Cs^{137} and Sr^{90}.