

^4He observations in *Cold Fusion* experiments

Frederick J. Mayer

Mayer Applied Research, Inc., USA

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***Corresponding author:**

Frederick J. Mayer

Mayer Applied Research, Inc.

1417 Dicken Drive

Ann Arbor, MI 48103

USA

E-mail: fred@frederickjmayer.net

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Abstract

Observations of ^4He released in $\text{Pd}/\text{D}_2\text{O}$ electrochemical experiments are examined in light of a new perspective on such experiments. The observations had previously been thought to have been conclusive of nuclear reactions but I show that they had been incorrectly identified and were of a quite different origin.

Keywords:

Background

The present paper was written in response to certain questions that arose after my recent Letter [1] was published. A well-known researcher in *cold fusion* contacted me stating that "he agreed there were no neutrons observed (presumably from the most likely reaction $\text{d}+\text{d} \rightarrow ^3\text{He}+\text{n}$ ") but both he and a second well-known researcher [2,3] had observed ^4He in the exiting gases evolved in their $\text{Pd}/\text{D}_2\text{O}$ electrochemical experiments (*cold fusion*). Both experiments were well-documented and had consistent results. Together they appeared to provide experimental evidence that *some form of fusion* was taking place in their electrochemical cells. But, this is a questionable interpretation as I show below.

The Putative Nuclear Reaction

Both researchers pointed to the reaction $\text{d} + \text{d} \rightarrow \gamma + ^4\text{He}$ as being responsible for the ^4He production. Still, the problem is that although this is a well-established nuclear reaction it produces γ rays that carry 23.8 MeV, and at this energy they would be easily detected, as well as being a radiation health risk. This inconsistency was recognized by both [2,3] commenting on the reaction as: $\text{d} + \text{d} \rightarrow ^4\text{He} + 23.82 \text{ MeV (lattice)}$, that is to say by delivering the assumed reaction energy from the γ 's into lattice kinetic energy without saying how this could occur.

The New Perspective in Electrochemical Experiments

For certain obvious reasons, I have chosen to continue with the *Different Perspective* that I presented in [1].

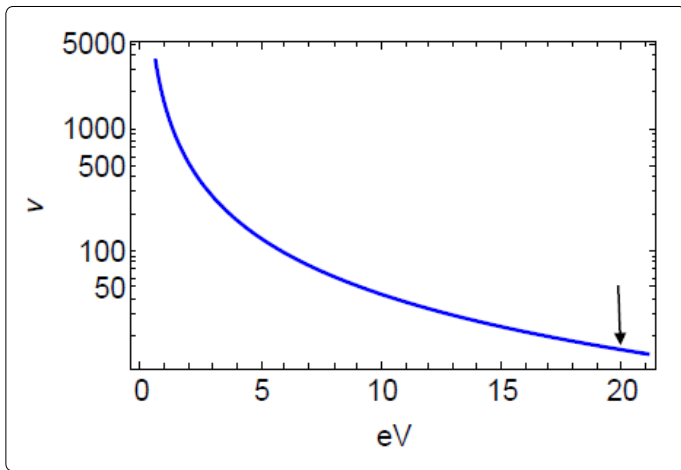


Figure 1. The log-linear plot of the energy transfer rate (ν) for electron-deuteron (blue) collisional build-up taking $f = 10^{-10}$ and other parameters as given in [1]. The $\epsilon = 20$ eV point (the vertical arrow) is the least energy value required to generate tandem electrons that therefore provide for *tresino* generation. Note that $\nu = 16/s$ at the $\epsilon = 20$ point so the *tresino* energy released is about 59200 eV/s. This result means that there is a substantial build-up of d^* deuteron-*tresinos* in the cell lattice along with substantial numbers of deuterons.

The Alternative of ^4He Production

It was clear from our Early Universe cosmology paper [4] that roughly equal numbers of *protons* and *tresinos* would be created. They would then combine into what we at then-called *proton-tresino molecules* or PTMs. Later, I re-examined this configuration as *dark rotors* [6] because they would be attracted to each other, collide, and then “spin-down” to a minimum size. Moreover, they would be charge-neutral and in the mostly hydrogen Early Universe would appear as $p-p^*$ (the $*$ indicates a *proton-tresino*). In fact, later on the *dark rotors* came to represent our *dark matter* particles that pervade most of the late Universe. Note that in Figure 2 below, the dynamics is a straightforward extension of the physics of [6].

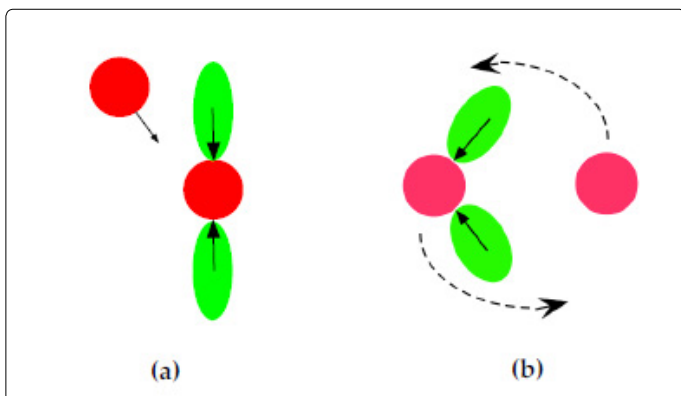


Figure 2. Because of electrostatic attraction, the left-hand panel (a) shows a d^* with the deuteron in (red) and its two electrons in (green) being “impacted” by another deuteron. The right-hand panel (b) shows the resulting d^*-d rotor with the same color scheme. One might expect that with protons in the cell, one proton might be substituted for the second deuteron in (a) so that a d^*-p rotor would be formed and registered as ^3He in a mass-spectrometer, as well.

Notice that this $d^* - d$ rotor “spins-down” to a very small size ≈ 14 Comptons, is charge-neutral having atomic mass of 4. This rotor will be detected in mass-spectrometers as indistinguishable from a ^4He . So, as already mentioned, the observations of ^4He were not the result of *nuclear reactions* rather they resulted from the generation of $d^* - d$ rotors (or $d^* - p$ rotors) in the Pd lattices by *deuteron tresinos*.

Conclusions

The *New Perspective* presented in [1] has made it clear that the observed ^4He was not the result of *nuclear reactions* but was the result of *tresinos* generating *dark rotors* that appeared to be ^4He (or ^3He) in mass-spectrometer observations. *Cold Fusion* has been an incorrect physics picture for many years, this clear analysis bears that out.

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