Two Surprising ICCF7 Reports

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Abstract

Two remarkable reports were presented at ICCF7 in Vancouver (BC) which showed the critical role of background neutrons in creating the cold fusion phenomenon. These, using the TNCF model, will be discussed, as will be the physical basis of the data analysis.

1. Introduction

The *Proceedings of ICCF7* arrived in August. There are many reports which further demonstrate the reality of the cold fusion phenomenon, from the excess heat generation to nuclear transmutation (explained by a decay or a fission), by those experimentalists who have developed good reliable data over the last several years, and this despite the carping chorus of the skeptics.

We have provided a consistent analyses of their data which has been compiled into a book that was published in September, and as papers.[2-4] Beyond that, we will examine just two of the many interesting reports since they provide results which have not been noticed before.

But before we get into a discussion of these interesting experimental results, I should point out something about the theoretical situation in cold fusion research. It may be common sense to trained physicists to conclude the inability of phonons and electrons in solids at room temperature to participate in a possible nuclear reaction occurring because of following facts: 1) the average energy of these particles (or more exactly quasi-particles) are about 0.03 eV and lattice constants are about 3 Å; 2) nuclear energy is ~ 5 MeV per nucleon and the action range of the nuclear force between nucleons is ~ 10–5 Å; and 3) the energy necessary to confine an electron in a small region with a linear dimension 10–5 Å to screen the Coulomb repulsion between charged particles is ~ 1 GeV. There have been several failed attempts to break through this common belief with artifice armored with math-

ematical sophistication. Any theory proposed for events in the cold fusion phenomenon should give some results which can be explained by ordinary physics.

There is, however, a pitfall in the above common sense of confining the action to solids and hydrogen isotopes. The background neutrons should be considered as playing a role in the cold fusion phenomenon as demonstrated in our TNCF model. The remarkable reports at ICCF7 which are introduced in this paper are related with the background neutrons.

2. Experimental Data

As mentioned in the introduction, there are many reliable results in the ICCF7 Proceedings which substantiate the cold fusion phenomenon. In this report, I'll confine my discussion to papers which I (and my group) have not discussed before. The first is by L. Forsely et al.[5] reporting a null result without background neutrons and the second is by R.A. Monti[6] reporting a 'seasonal effect' of nuclear transmutation.

2.1 Data by L. Forsely et al.[5] — A Null Result without Background Neutrons

Using a careful experimental arrangement, L. Forsely et al. from several US institutions tried to check the electro-catalytic reduction of radioactivity in U and Th in a low background cave, but produced null results.

In the abstract of their paper they write as follows (with a few changes by H.K.):

"A proprietary electrolytic system of JWK International Co. for the reduction of radioactivity in U and Th was evaluated from June through December 1996. An exhaustive analysis of reaction materials taken before, during and after the experiments was carried out. These tests involved trace metals analysis via NAA (neutron activation analysis), EDAX (energy dispersive atomic X-ray) and ICP/MS (inductively coupled plasma mass spectroscopy). Additional tests involved HRMS (high resolution mass spectroscopy) of evolved gases and reaction products, allowing isotopic differentiation and HRGS (high resolution gamma spectroscopy). Neutrons were searched for via ^{235}U fission fragments and n–γ reactions.

The results of over 10 series of runs were ambiguous. *However, the definitive test, operating a system in a low background cave with high resolution gamma spectroscopy, failed to show any radioactive reduction of the system as a whole.* (italicization by H.K.)

Regardless of these results, the testing protocols developed define the standard and rigor by which any proposed catalytically reduced radioactive system must be subjected. It is crucially significant that results be obtained, including the statistical uniformity of the matrix composition, as otherwise comparisons will be impossible and the conclusions drawn will be erroneous."

This precise check of the reported reduction of radioactivity in the process of electrolytic treatment with a null result again shows the decisive effect of the background neutrons on the cold fusion phenomenon. The reduction of radioactivity in this case, is shown by many, including S.E. Jones et al.[7], for nuclear products. From our point of view, the exclusion of the background neutrons to improve *S/N* ratio becomes

Date	Element	Initial(g)	Final(g)	Difference (g)	Difference (%)
May 1997	Pb	314.36	264.74	− 50	− 16
	Ag	89.61	180.20	+ 91	+ 102
	Th	2.26	0.27	~ − 2	− 88
June 1997	Pb	314.83	203.95	− 111	− 35.3
	Ag	89.84	174.88	+ 85	+ 94
	U	4.20	2.96	− 1.2	− 30
January 1998	Pb	291.86	227.06	− 64.8	− 22.2
	Ag	160.81	169.97	+ 9.16	+ 5.7
	U	5.34	5.08	− 0.26	− 5
March 1998	Pb	292.92	269.65	− 23	− 7.9
	Ag	163.02	163.23	...	...
	U	4.72	3.95	− 0.77	− 16
April 1998	Pb	290.32	261.12	− 29	− 10
	Ag	158.01	158.39	...	...
	U	4.72	3.26	− 1.46	− 30

Table 1: Change of Pb, Ag and Th or U in experiments

a decisive fault in the experiment, eliminating one of the necessary components to produce the cold fusion phenomenon.

There is another work by F. Celani et al.[8] which tried to confirm the reduction of radioactivity of Th in an electrolytic system of the CINCY group. Their results were still not conclusive, although they found less Th after the process and new elements were produced.

2.2 Data by R.A. Monti[6] — The 'Seasonal Effect' of Nuclear Transmutation

One surprising ICCF7 report, from my point of view, was related to the existence of background neutrons. In the paper,[6] due to limited space, the author presented only the results of his experiments done from 1992 to 1998 showing nuclear transmutation of stable and also unstable isotopes by means of ordinary chemical reactions. The lack of description about the details of his experiments unfortunately made it impossible to analyze the data using the TNCF model, as done in our previous papers for other excellent experimental data as compiled in our works.[1-4]

His abstract of the paper read as follows:

"The possibility of causing nuclear transmutation of stable isotopes by means of ordinary chemical reactions suggested the possibility of causing the nuclear transmutation of unstable isotopes.

"A first series of experimental tests was made from 1993 to 1995 with positive results.

"In 1996 an industrial reactor was built in Canada and sent to Italy for a new series of independent tests at ENEA (Italian National Laboratories).

"In these tests the production of Ag from Pb was used as a driver of the nuclear transmutation (NT) of Th and U.

"A new series of tests has been performed at the ENEA Laboratories, starting October 1997."

He also explains about his papers which were presented from ICCF3 in 1992 to ICCF5 in 1995, but not printed, where he had shown the result of the variation of the half lives of radioactive

elements in cold fusion experiments (which has been noticed also by us in relation with NT[1,4] and called 'decay time shortening':

- "Low Energy Transmutation" (ICCF3)
- "Experiments in Cold Fusion and Cold Fission" (ICCF4)
- "Variation of the Half Lives of Radioactive Elements and Associated Cold Fusion and Cold Fission Reactions" (ICCF5)

From this explanation of his experiments it is clear that R.A. Monti is one of pioneers who found 'induced fission reactions' of composite nucleus and 'decay time shortening' of radioactive elements in cold fusion materials which has attracted attention recently.[4,9,10]

His experiments have clearly shown a decrease of Pb and increase of Ag with a decrease of Th or U. The observed that the change of those elements depended on the time when the experiments were performed as shown in Table 1.

Monti has given an interpretation of this time-dependence as follows:

"The 'seasonal effect,' which I had already previously observed showed itself again. Even though I knew it, I had never written about it before. It was already difficult for the scientific community to get acquainted with the idea of Low Energy Transmutations. Imagine how easily a 'seasonal effect' in nuclear reactions could be accepted."

His results on the variation of radioactivity (decay time shortening) and cold fission (induced nuclear fission) was too unusual to be printed in Proceedings of ICCF4 and 5. In addition to this his reference to constellations in regards to the 'seasonal effect' seemed too outrageous to be a scientifically logical. From our point of view, however, the density of the background neutrons can surely be dependent on the season, and thus would influence the cold fusion phenomenon and therefore NT. It should be better to tell about constellations as an object of scientific investigation than as an origin of seasonal effect of NT because we know too little about Nature, including human beings, to interpret the whole phenomenon in Universe using the present knowledge of science.

3. Discussion

The two remarkable papers presented at ICCF7 which showed the decisive role of the background neutrons in the cold fusion phenomenon by L. Forsely et al.[5] and by R.A. Monti,[6] seem to be contradicting each other at first sight. It is, however, not contradicting when we notice the difference between these experiments, which is the absence and existence of background neutrons.

The precision measurements of the possible nuclear products by L. Forsely et al.[5] with a null result have again shown the need for background neutrons before the cold fusion phenomenon can occur. To improve the *S/N* ratio in neutron measurements researchers have tried to reduce the background neutron density, thus preventing the cold fusion reaction from occurring. This is in clear contrast with large amount of transmuted nuclei observed in many experiments, including those by R.A. Monti,[6] G. Miley et al.,[11] G.S. Qiao et al.,[12] T. Mizuno et al.,[13] T. Ohmori et al.,[14] D.S. Silver et al.[15]

On the other hand, the data by R.A. Monti6 have shown an important feature of NT, the 'seasonal effect,' the change of the cold fusion phenomenon

with time, in addition to a large amount of transmuted nuclei, as demonstrated by others as noted above. It is well known that the density of background neutrons is time-dependent, varying with the intensity of cosmic rays, which change daily and by the season. The 'seasonal effect' discovered by Monti would seem to prove the importance of background neutrons in triggering the cold fusion phenomenon; NT in this case.

Regarding a theoretical explanation of the cold fusion phenomenon, it is necessary to be very clear where a theory or model departs from the ordinary concepts of physics. Some principles physics are sometimes quietly ignored such as the well known discrimination between classical and quantum physics. Thus, two principles should be pointed out.

One is the uncertainty principle. Before discovery of neutrons in 1932, a nucleus was supposed to be composed of protons and electrons. The electron, however, is a light particle and it is necessary to use energy on the order of ~ 1 GeV to confine it in a nucleus with a diameter ~ 10^{-13} cm. This energy is inversely proportional to the square of diameter of the region where the electron is confined. This fact had presented a difficulty in nuclear physics which was resolved by the discovery of the neutron as a component of the nucleus. Unfortunately, this common sense has been ignored in some discussions of cold fusion science.

Another is the particle-wave duality of microscopic objects. There are arbitrary uses of this concept 1 in discussions of the cold fusion phenomenon. The particle view or the wave view appears according to the situation where an object (electron, proton, neutron and others) is and not according to the observer's will. An assumption made to explain a phenomenon should be recognized and be verified using existing physical principles.

In this context, it should be emphasized that the single particle nature of electrons in metals is a result of an approximation based on and verified by the Bohm-Pines theory of many-body problems with the Coulomb force and is not freely applied to a proton occluded in transition metals, which is known to behave like a classical particle in diffusion.

From my viewpoint, the cold fusion phenomenon includes various events as have been revealed during its ten year history, and the events are probes of physics in complex and inhomogeneous solid systems composed of transition metals, hydrogen isotopes, alkali metals and neutrons. We are now in a position to synthesize various data to establish a science of the cold fusion phenomenon and to apply it for the welfare of mankind.

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