

1.5.2 DOE Report 1989 and the Book by J.R. Huizenga

Another example is a more scientific book by J.R. Huizenga, "*Cold Fusion—The Scientific Fiasco of the Century*." [Huizenga 1992]. Huizenga is a chair of a Panel appointed of the Energy Research Advisory Board in the Department of Energy to assess the new research area of cold fusion. The Panel published an Interim Report by July 31, 1989 and Final Report by November 15, 1989 [DOE Report 1989]. The report was inclusive but too hastily written to give right judgment on this complex science of CFP.

Huizenga wrote his book on his experience he had as a chairman of the above Panel. His point of view was confined in the traditional view of nuclear science and made the same mistake to assume Fleischmann's hypothesis as a cause of the effect observed by Fleischmann et al. and others. He discussed inconsistencies of experimental data obtained at that time only from this assumption.

1.5.2.1 DOE Report 1989

At first, we cite here the conclusion of the U.S. Department of Energy Reports, DOE/S-0071 [DOE Report 1989] and give critique to their logic below [Kozima 1998].

"B. Conclusions:

(1) Based on the examination of published reports, reprints, numerous communications to the Panel and several site visits, the Panel concludes that the experimental results of excess heat from calorimetric cells reported to date do not present convincing evidence that useful source of energy will result from the phenomena attributed to cold fusion.

(2) A major fraction of experimenters making calorimetric measurements, either with open or closed cells, using Pd cathodes and D₂O, report neither excess heat nor fusion products. Others, however, report excess heat production and either no fusion products or fusion products at a level well below that implied by reported heat and reproducibility remain serious concerns. In no case is the yield of fusion products commensurate with the claimed excess heat. In cases where tritium is reported, no secondary or primary nuclear particles are observed, ruling out the known D + D reaction as the source of tritium.

The Panel concludes that the experiments reported to date do not present convincing evidence to associate the reported anomalous heat with a nuclear process.

(3) The early claims of fusion products (neutrons) at very low levels near background from D₂O electrolysis and D₂ gas experiments have no apparent application to the production of useful energy. If experiments, some employing more sophisticated counter

arrangements limits on the fusion probability for these experiments, at levels well below the initial positive results. Based on these many negative results and the marginal statistical significance of reported positive results, the Panel concludes that the present evidence for the discovery of a new nuclear process termed cold fusion is not persuasive.

(4) Current understanding of the very extensive literature of experimental and theoretical results for hydrogen in solids gives no support for the occurrence of cold fusion in solids. Specifically, no theoretical or experimental evidence suggests the existence of D – D distances shorter than that in the molecule D₂ or the achievement of confinement pressure above relatively modest levels. The known behavior of deuterium in solids does not give any support for the supposition that the fusion probability is enhanced by the presence of the palladium, titanium, or other elements.

(5) Nuclear fusion at room temperature, of the type discussed in this report, would be contrary to all understanding gained of nuclear reactions in the last half century; it would require the invention of an entirely new nuclear process.

C. Recommendations

(1) The panel recommends against any special funding for the investigation of phenomena attributed to cold fusion. Hence, we recommend against the establishment of special programs or research centers to develop cold fusion.

(2) - (6) (Abbreviated.) The Panel is sympathetic toward modest support for carefully focused and cooperative experiments within the present funding system. (They pointed out specific problems and gave suggestions for research topics to be pursued: Note by the author).

Experiments reporting fusion products (e.g., neutrons) at a very low level, if confirmed, are of scientific interest but have no apparent current application to the production of useful energy. In view of the difficulty of these experiments, collaborative efforts are encouraged to maximize the detection efficiencies and to minimize the background.”

These conclusions and recommendations helped to eliminate the illusions such as a nuclear fusion reactor could be built immediately, and cooled down the heat of patent applications rush. (Cf. Appendix D, Topics 3, Radium and Patent). At the same time, they are also responsible for spreading the notion that the cold fusion research is not a science, and negatively affecting the public judgment on the research later.

1.5.2.2 Shortcomings of DOE Report

We can see how this conclusion is incomplete logically from normal scientific sense.

Let us point out mistakes in the DOE report [Kozima 1998].

Conclusion (1) is based on Conclusions (2) – (5), and it has no basis if Conclusions (2) – (5) are incorrect. The issue of excess heat and fusion products discussed in Conclusion (2) has significance only when D + D reaction is assumed as the main process. This assumption was adopted by the majority of the scientists at that time, including those who discovered cold fusion.

If there is some other mechanism governing the process, this argument is no longer valid. If you are searching for truth, whether one assumption made by a scientist is correct or not has no importance. You should search for the truth based on the fact that the phenomenon did occur. From this point of view, we will show, in the next Chapters, that it is possible to explain the results of cold fusion experiments without any inconsistency.

Conclusion (3) was based on the fact that the cold fusion phenomenon presented poor reproducibility. However, the reproducibility of a phenomenon is determined by the condition of the entire system, in which the process takes place. Simple analogy from other physical phenomena should not have been used to draw a conclusion. We will also show the reasons for the poor reproducibility and the way to improve it in the next Chapter.

Conclusion (4) only shows that the interpretations of the discoverers of cold fusion were not appropriate, and it has nothing to do with the truth. It is hard to believe that board members have made such an elementary mistake. It was found later that inside solid, such as Pd or Ti, with a combination of various factors, complex phenomena can occur. There is always such possibility in science. Today, it is quite obvious to everybody. The board members might have forgotten for some reason that natural science is built upon the fact.

Conclusion (5) is similar to Conclusion (4). If any new findings had been denied only because they were contradiction with the existing knowledge, there would have been no progress in science and there will not be any progress in the future.

1.5.2.3 The Book by J.R. Huizenga

In this subsection, we review the book “*Cold Fusion: The Scientific Fiasco of the Century*” [Huizenga 1992] by J.R. Huizenga, who was the Chair of the Panel appointed of the Energy Research Advisory Board in the Department of Energy to assess the new research area of cold fusion as explained in the begging of the Subsection 1.5.2. It is

natural that the content of the book by J.R. Huizenga has common defects to the DOE Report 1989. It is, however, valuable to see the defects appeared in the book reflecting the personal character of a scientist in the main stream nuclear physics at that time.

John R. Huizenga, *Cold Fusion: The Scientific Fiasco of the Century*, University of Rochester Press, 1992, ISBN 1-878822-07-1.

Note by H.K.

“This book shows that a narrow and short sighted view could not understand complexity of nature, at all. Mistakes and shortcomings of pioneers were inevitable without scarce knowledge of the object they were struggling with. Be no arrogant in front of truth.

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The episodes of pathological science cited by Huizenga, N rays, Allison effect, anomalous, Benveniste effect, and polywater, are interesting to us as illustrations of the so-called pathological science but are not related to the cold fusion phenomenon which he considered to be another example of the pathological science. And also, the general discussion on the nature of science he gives in his book is right without any doubt.

However, Huizenga’s discussion is based on his biased, narrow minded view on the cold fusion phenomenon and he does not open his eyes to the wide spread space outside the d-d fusion reactions supposed to be in CF materials by Fleischmann.

We can show why the cold fusion phenomenon is not a pathological science if we investigate the whole events in the cold fusion phenomenon in protium and deuterium systems not bound to the suppositions erroneously assumed by the pioneers.

Our treatment of the cold fusion phenomenon published as books and papers gives the proof that the cold fusion phenomenon is an object of a science as we have many times repeated our opinion to confirm it. We can give answers to each reasons Huizenga raise to conclude that the cold fusion phenomenon is a pathological science.

Our answer to the Huizenga does largely duplicate the reasons pointed out in the preceding section to show how the conclusions of DOE Report 1989 are mistaken. So, we give only one example of Huizenga’s mistake and cite concluding sentence of Huizenga which should be read as an instruction to him.

Examples; Huizenga is incorrect;

“The greater the implication of a result, the sooner it will be reexamined. Scientific results, if valid, must be reproducible. When errors are discovered, acknowledged and

corrected, the scientific process moves quickly back on track, usually without either notice or comment in the public press.” [Huizenga 1992 (p. 234)]

He says “The greater the implication of a result, the sooner it will be reexamined.” This is right in general but not always. One of the great discoveries, the determination of the elementary electric charge $|e|$ by R.A. Millikan was a very difficult experiment and he deduced his conclusion by his intuition discarding inappropriate data [Broad 1982]. In this case, the reasoning by reason was the decisive factor of recognition of the experimental result but not the reexamination.

He says also, “Scientific results, if valid, must be reproducible.” The problem here is what kind of reproducibility is it. We have discussed many times, there are two kinds of reproducibility, quantitative and qualitative. As has been shown, the reproducibility we can expect in the cold fusion phenomenon is qualitative one and not that Huizenga expect the quantitative. Furthermore, it is possible that we have non-reproducibility in the sense the chaos has no reproducibility.

Huizenga teaches himself,

“The purpose for exposing the cold fusion episode is to show that serious mistakes do occur in science. It is important that we learn from these mistakes. I hope examples discussed in this book will give others new insights into the way science should be done. The general scientific enterprise is vibrant and healthy and has weathered the cold fusion flurry with only minor bruises and scratches. The cold fusion fiasco illustrates once again, as N rays and polywater did earlier, that the scientific process works by exposing and correcting its own errors.” [Huizenga 1992 (p. 236)]

He says “The purpose for exposing the cold fusion episode is to show that serious mistakes do occur in science.” It is true that mistakes occur frequently not only in science but also in everyday life. So, we should not be arrogant to boast that our knowledge is complete. Pioneers of the cold fusion phenomenon certainly made many mistakes from our present knowledge piled up in these more than 25 years. Huizenga should be more modest in front of the fact not relying on his knowledge of nuclear physics.

[Broad 1982] W. Broad and N. Wade, *Betrayers of the Truth – Fraud and Deceit in the Halls of Science*, Simon and Schuster, New York, 1982, ISBN 0-671-44769-6.