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# Experimental Evidence Favoring Brightsen's Nucleon Cluster Model

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## Abstract

Brightsen's Nucleon Cluster Model (**NCM**) predicts that a relatively low-energy photon can stimulate a nuclear transmutation under certain specified conditions. Examination of an experiment by Lin & Bockris demonstrates that the transmutation of mercury-201 to gold-197 induced by a mere exothermic chemical reaction (burning gunpowder) is an actual concrete example of the novel process predicted by the NCM.

## Introduction

Ronald A. Brightsen has already presented considerable evidence [1, 2, 3, 4, 5, 6, 7], both theoretical and experimental, on behalf of the validity of his *Nucleon Cluster Model* (NCM) of the atomic nucleus. Briefly, by painstaking examination of the systematics and periodicities in both (Z,A) plots of the Atomic Number **Z** (*i.e.*, number of protons, P), versus the Atomic Mass **A** (*i.e.*, total number of nucleons, including both protons P and neutrons N, so that A = P + N) as well as (Z,N) plots, it is deduced that the nuclei of all beta-stable nuclides are comprised of just 3 basic building blocks: **deuterons**, **tritons**, and **helium-3 nuclei**, which for brevity are referred to as **NP**, **NPN**, and **PNP** clusters.

In this author's opinion, the most striking evidence is presented in Figs. 7, 10, and 12-14 of [4], wherein experimental data for thermal neutron fission of U-235, U-233, Pu-239 and Pu-241 is plotted as percentage fission-yield versus Mass A (which ranges from A = 80 to A = 160) in comparison to the 80 predictions from the NCM which are presented. These are complicated double-hill, triple-valley shaped curves, and the *virtually identical agreement* between the NCM predictions and the experimental data (which in most cases is uncertain by up to ten to twenty percent) is truly stunning. In this author's opinion, Nobel Prizes have been awarded for comparable achievements which are not even as conclusively overwhelming, regarding

agreement between theory and measurement, as in this case: noting that the experimental data are not perfect, the cited Figures are consistent with the assumption that the NCM *is* perfect and that the measured data *agree perfectly* (within experimental error). Reference [4] is one of the relatively few cases wherein world-class scientific information has been published in the patent literature prior to its appearance in one of the archive journals.

The NCM, in contrast to the more-often considered nuclear shell models based upon Quantum Mechanics (QM) and sub-nucleon models based upon Quantum Chromo-Dynamics (QCD), postulates that aggregates of any or all of the 3 fundamental clusters are present in the nucleus with their own separate quantized properties, such as energy levels, spin, magnetic moment, etc. Accordingly each *isotope* has many separate modes of existence, e.g. at different energy levels for each of the 3 basic clusters, which it is proposed herein to call the isotope's *isodynes*. In Brightsen's opinion, the observed statistical distributions of the properties of nuclides can be better explained by postulating actually physically distinct existence of each possible isodyne in a multi-isodyne population, as the result of which statistical predictions would be the results of ontologically real *population distributions* rather than being considered, as at present, as merely fictitious probabilistic QM calculations, acausally descriptive but not plausibly explanatory, such as are involved in the well-known Gamow theory of alpha-emission decay (which in the NCM would consist of decay by emission of a nucleus of a helium-4 consisting of two NP clusters [each of which could have its own distinct energy level, spin, magnetic moment, etc.]). The present author suggests that this idea is sufficiently meritorious to warrant further investigation.

Among the novel technical processes disclosed in the cited NCM-based patent application [4] is a procedure for artificially inducing fission of dangerous radioactive nuclei in order to produce stable, less hazardous elements. If externally-produced electromagnetic radiation happens to resonate with the magnetic moment of a particular sub-nuclear nucleon cluster, then such a cluster can be excited (independently of other clusters in the target nucleus) to the point where it will jump out of the nucleus, leading to the subsequent transmutation of the nucleus via fission and/or further decay into one or more daughter products of smaller atomic mass and greater natural stability against radioactive decay. The purpose of this note is to call attention to published experimental data which favors the reality of this patent-pending process invented by Brightsen *et al.* [4].

## ANALYSIS

In 1992, Lin & Bockris [8] experimented with heating inorganic mixtures to produce anomalous radioactivity and anomalous apparent transmutations, such as mercury into gold, using alleged medieval alchemical methodology, such as boiling mercurous chloride ($Hg_2Cl_2$) in

gunpowder (C, $KnO_3$, S). During two such "burns" of gunpowder, anomalous beta radioactivity having half-lives of 17.7 hours and about 20 hours, respectively [average 18.9 hours], was measured.

A careful examination of the various half-lives $t_{1/2}$ of possible reaction products leads to a limited number of possibilities, all of which proceed from stable isotopes of Hg, involving triton $t = {}_1H^3$, alpha = ${}_2He^4$, or deuteron $d = {}_1H^2$ emission and either electron ($\beta^-$) or positron ($\beta^+$) emission, or electron capture *(E.C.)*, or isomeric transition *(I.T.)* in which the superscript $^m$ refers to a meta-stable nuclide:

1 ${}_{80}Hg^{196}(\gamma,t){}_{79}Au^{193} \longrightarrow$ [E.C., $t_{1/2}$ = 17.5 hrs $\longrightarrow {}_{78}Pt^{193}$ ( [E.C. / $\beta^+$] $\longrightarrow {}_{77}Ir^{193}$ (stable)

2. ${}_{80}Hg^{201}(\gamma,\alpha){}_{78}Pt^{197} \longrightarrow$ [$\beta^-$, $t_{1/2}$ = 18.3 hrs ] $\longrightarrow {}_{79}Au^{197}$ (stable)

3. ${}_{80}Hg^{202}(\gamma,\delta){}_{79}Au^{200m} \longrightarrow$ [ 84% $\beta^-$, $t_{1/2}$ = 18.9 hrs ] $\longrightarrow {}_{80}Hg^{200}$ (stable)

All other possible radioactive products are either too short-lived or too long-lived to be consistent with the measured half-lives.

However, both ${}_{80}Hg^{196}$ and ${}_{80}Hg^{202}$ would have *zero* spin and *zero* magnetic moment. Since it is specified in the patent-pending process [4] that there must be a resonance between the incident photons ($\gamma$) and a sub-nuclear magnetic moment, it is clear that ${}_{79}Au^{193}$ and ${}_{79}Au^{200m}$ can be ruled out. Thus the measured data support the removal of a pair of NP clusters (${}_2He^4$) from Hg, *i.e.* artificially stimulated alpha-decay via ordinary thermo-chemical heat containing in its spectrum radiation of the precisely required type.

It is interesting to note that the (NP + NPN) + (PNP) formula shown in the *Atomic and Nuclear Periodic Table of Elements and Isotopes* [7] also balances in this context:

$$ {}_{80}Hg^{201} \; {}_{78}Pt^{197} + {}_2He^4 $$

$$ (60 + 10)\ (58 + 10) + (2 + 0), $$

$$ [(9 + 51) + 10]\ [(7 + 51) + 10] + [(2 + 0) + 0] $$

## CONCLUSION

No other logically consistent possibilities remaining, no possible conclusion seems consistent with well-established microphysical interpretation rules other than to deduce that the cited Lin-Bockris experiment empirically demonstrates a particular, but hitherto unsuspected, example of the patent-pending Brightsen process for artificial low-energy stimulation of specific nuclear transmutations.

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