Matches Between Polyneutron Theory And Experiment

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A. Predictions of previously unknown and subsequently verified phenomena:

1. **Energetic charged particles in an active electrolyte.**
   Prediction: Private communication to R. A. Oriani.
   Confirmation: R. A. Oriani and J. C. Fisher, "Detection of energetic charged particles during electrolysis", *Proc. 10th Intl. Conf. Cold Fusion, Cambridge MA*, 577 (2003).
   Comment: Fully confirmed.

2. **Energetic particles in the vapor over an electrolyte.**
   Prediction: Private communication to R. A. Oriani.
   Confirmation: R. A. Oriani and J. C. Fisher, "Energetic particle shower in the vapor from electrolysis", *Proc. 11th Intl. Conf. Cold Fusion, Marseilles, France*, 281 (2004).
   Comment: Fully confirmed. A shower of 150,000 alpha particles with energies about 2 MeV.

3. **Energetic particles in the air outside an electrolysis cell.**
   Prediction: Private communication to R. A. Oriani.
   Confirmation: R. A. Oriani and J. C. Fisher, "Nuclear reactions produced in an operating electrolysis Cell", *Proc. 11th Intl. Conf. Cold Fusion, Marseilles, France*, 295 (2004).
   Comment: Fully confirmed.

4. **Transmutation of ^{138}Ba into ^{144}Nd.**
   Prediction: J. C. Fisher, "Outline of polyneutron theory", *8th International Workshop on Anomalies in Hydrogen/Deuterium Loaded Metals, Sicily, Italy*, (2007). See: http://www.iscmns.org/catania07/program.htm (PDF of the Sunday 10:30 paper).
   Confirmation: Y. Iwamura, T. Itoh, M. Sakano, N. Yamazaki, S. Kuribayashi, Y. Terada, T. Ishikawa and J. Kasagi, "Observation of nuclear transmutation reactions induced by D_2 gas permeation in Pd complexes", *Proc 11th Intl. Conf. Cold Fusion, Marseilles, France*, 339 (2004).
   Comment: Confirmation probable. See Figure 4(a) of the Iwamura reference. An expanded copy of this XPS spectrum was handed out at the conference. A small signal for Nd is evident. The authors did not mention this signal.

5. Transmutation of ^{137}Ba into ^{136}Xe.

Prediction: J. C. Fisher, "Outline of polyneutron theory", *8th International Workshop on Anomalies in Hydrogen/Deuterium Loaded Metals, Sicily, Italy*, (2007). See: http://www.iscmns.org/catania07/program.htm (PDF of the Sunday 10:30 paper).

Confirmation: Y. Iwamura, T. Itoh, M. Sakano, N. Yamazaki, S. Kuribayashi, Y. Terada, T. Ishikawa and J. Kasagi, "Observation of nuclear transmutation reactions induced by D_2 gas permeation in Pd complexes", *Proc 11th Intl. Conf. Cold Fusion, Marseilles, France*, 339 (2004).

Comment: Confirmation probable. See Figure 4(a) of the Iwamura reference. An expanded copy of this XPS spectrum was handed out at the conference. A small signal for Xe is evident. The authors did not mention this signal.

6. Transmutation of ^{137}Ba into ^{138}Ba.

Prediction: J. C. Fisher, "Outline of polyneutron theory", *8th International Workshop on Anomalies in Hydrogen/Deuterium Loaded Metals, Sicily, Italy*, (2007). See: http://www.iscmns.org/catania07/program.htm (PDF of the Sunday 10:30 paper).

Confirmation: Y. Iwamura, T. Itoh, M. Sakano, N. Yamazaki, S. Kuribayashi, Y. Terada, T. Ishikawa and J. Kasagi, "Observation of nuclear transmutation reactions induced by D_2 gas permeation in Pd complexes", *Proc 11th Intl. Conf. Cold Fusion, Marseilles, France*, 339 (2004).

Comment: Confirmation probable. See Figure 7 of the Iwamura reference. ^{137}Ba in natural Ba does not transmute to mass 149. Enriched ^{137}Ba does lead to a signal at mass 149. This is carbon impurity that forms $^{137}Ba^{12}C$. The signal at mass 150 is largely $^{138}Ba^{12}C$ confirming the predicted transmutation. The authors were not sure how to interpret this signal.

B. Theoretical explanations of previously known phenomena:

Except where noted all explanations can be found in:
J. C. Fisher, "Outline of polyneutron theory", *8th International Workshop on Anomalies in Hydrogen/Deuterium Loaded Metals, Sicily, Italy*, (2007). See: http://www.iscmns.org/catania07/program.htm
(PDF of the Sunday 10:30 paper).

1. Production of ^{4}He.

Explanation: Polyneutron decay product; two beta decays followed by alpha decay.

2. Production of ^{3}H.

Explanation: Transfer of two neutrons from polyneutron to ^{1}H.

3. **Production of energetic protons.**
   Explanation: Transfer of one neutron from ^{2}H to polyneutron.

4. **Absence of neutrons.**
   Explanation: Correlation barrier (see text of theory).

5. **2 MeV energy of alpha particles in showers.**
   Explanation: Decay of polyneutron bound to ^{16}O.

6. **Ratio of energy to ^{4}He production in deuterated Pd.**
   Explanation: Sequential addition of four neutrons to a polyneutron, followed by two beta decays and alpha decay.

7. **Transmutation of ^{133}Cs into ^{141}Pr.**
   Explanation: Transfer of neutron pairs followed by catalyzed beta decay.

8. **Transmutation of ^{138}Ba into ^{150}Sm.**
   Explanation: Transfer of neutron pairs followed by catalyzed beta decay.

9. **Transmutation of Pd into Ti.**
   Explanation: Polyneutron-catalyzed fission.
   Reference: J. C. Fisher, "Palladium fission triggered by polyneutrons", *J. Condensed Matter Nucl. Sci.* **1,** 6 (2007).
   (www.iscmns.org/CMNS/JCMNS-Vol1.pdf)