

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 D₂ 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 polynutron 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 polynutron 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 $^{137}\text{Ba}^{12}\text{C}$. The signal at mass 150 is largely $^{138}\text{Ba}^{12}\text{C}$ 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 polynutron 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 ^4He .

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

2. Production of ^3H .

Explanation: Transfer of two neutrons from polynutron to ^1H .

3. Production of energetic protons.

Explanation: Transfer of one neutron from ^2H to polynutron.

4. Absence of neutrons.

Explanation: Correlation barrier (see text of theory).

5. 2 MeV energy of alpha particles in showers.

Explanation: Decay of polynutron bound to ^{16}O .

6. Ratio of energy to ^4He production in deuterated Pd.

Explanation: Sequential addition of four neutrons to a polynutron, 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: Polynutron-catalyzed fission.

Reference: J. C. Fisher, "Palladium fission triggered by polyneutrons", *J. Condensed Matter Nucl. Sci.* **1**, 6 (2007).

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