

Femto-Helium and PdD Transmutation

A. Meulenberg

National Advanced IPv6 Centre
Universiti Sains Malaysia, 11800 Penang, Malaysia
+601-259-2369, Fx: +604-653-3001, mules333@gmail.com

Present Lochon and Extended-Lochon Models for the low-energy nuclear reaction, LENR, fusion process predict the fusion of monatomic deuterium into a sub-fragmentation level excited condition of ${}^4\text{He}^{*\wedge}$. The \wedge and * indicate the presence of deep-Dirac level (DDL) electrons and of an excited nuclear state respectively.ⁱ The higher angular-momentum deuterium combinations result in the formation of femto-deuterium molecules or molecular ions, D_2^\wedge or $\text{D}_2^{+\wedge}$. Both the ${}^4\text{He}^{*\wedge}$ and femto-deuterium molecules are expected to be short lived (<1fs). However, the short life may be determined more by their fusion with other nuclei than with their decay time to ${}^4\text{He}$.

The ${}^4\text{He}^{*\wedge}$ and femto molecules and ions would be highly mobile in the lattice because of their multi-femtometer size. However, because of the Coulomb barrier, the positively charged ion, $\text{D}_2^{+\wedge}$ or ${}^4\text{He}^{*\wedge}$, would not penetrate a nucleus as would the neutral ${}^4\text{He}^{*\wedge}$ and femto molecule. The positively charged ion would penetrate an atom's electron cloud, but would interact with atoms as would a proton and form a short-lived 'ordinary' molecule, not a femto molecule.

The LENR fusion process for a ${}^4\text{He}^{*\wedge}$ or D_2^\wedge femto-atom or -molecule, with an atomic nucleus of mass A and charge Z could yield transmutation products ranging from (A, Z-2), by weak-nuclear interaction from (A, Z) absorbing one or two electrons to change protons to neutrons, to (A+4, Z-2), absorbing the whole ${}^4\text{He}^{*\wedge}$ femto-atom. It can also form femto-deuterides, with D_2^\wedge , or a femto-molecule, with ${}^4\text{He}^{*\wedge}$. As in the case for ${}^1\text{H}^\wedge$ or ${}^1\text{H}_2^\wedge$ femto-atoms or -molecules generated in NiH cold fusion,ⁱⁱ the large number of combinations possible is reduced by the stability 'needs' of the particular atomic nucleus with which the femto-atom/molecule fuses. There is sufficient energy in the process for the conversion of the DDL electron(s) and femto-atom or target-nucleus protons to form neutrons. There are sufficient 'building blocks' with which to 'construct' a stable nucleus from the fusion of almost any nucleus with ${}^4\text{He}^{*\wedge}$ or D_2^\wedge . Because of the multi-body interaction, strong near-field radiation from tightly bound electrons, and low input energies, energetic particle emission from fusion with these femto-particles is much less common than for normal fusion or neutron-activation processes. The attraction of femto-atoms or -molecules to radioisotopesⁱⁱⁱ will reduce any radioactivity generated by transmutation of lattice nuclei and fusion with any natural, induced, or added, impurities.

ⁱ A. Meulenberg and K. P. Sinha, "Deep-orbit-electron orbits in cold fusion," 17th Int. Conference On Condensed Matter Nuclear Science, Daejeon, Korea, 12-17 August, 2012

ⁱⁱ A. Meulenberg, "Femto-molecules and transmutation," 17th International Conference on Condensed Matter Nuclear Science, Daejeon, Korea, 12-17 August, 2012

ⁱⁱⁱ A. Meulenberg and K. P. Sinha, "Deep-orbit-electron radiation emission in the decay from 4H^\wedge to ${}^4\text{He}$," 17th Int. Conference On Condensed Matter Nuclear Science, Daejeon, Korea, 12-17 August, 2012