A Theory of Light Element Nuclear Reaction

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Many experiments have shown anomalous heat and/or helium from hydrogen (light or heavy isotopes). Electrolytic, thermal, plasma, acoustic and other methods have been used. These observations, conventionally known as Low Energy Nuclear Reactions, were extensively documented by Edmond Storms [1] (especially Table 2, pages 53 to 61 therein) and by several others. All of the reactants and nuclear products involved in these reactions are stable and no neutrons or other dangerous emanations are involved.

A frustrating characteristic of this phenomenon is its inconsistency: some researchers have never produced the effect, others observe heat or helium in most trials. Few (if any) can always predict the result. This paper discusses the nuclear reactions that may likely produce substantial amounts of helium and heat from hydrogen, using the methods reported to have done so. The inconsistency is explained and some requirements for the necessary reactions are theorized upon.

Experiments by this author [2], [3] using dry reactions of light hydrogen in copper matrices containing lithium or boron will be extended with respect to this theory. A more efficient method is being studied that has some potential to be scaled up to commercial power levels,

A list of potential nuclear reactions, including mass/energy balances, is given. That list makes comparisons to well-known energy releases by fission, explosive fusion and controlled hot fusion (e.g. ITER). LENR energies, per atomic mass unit, approximate the levels of those commercial/military/research reactions (in the order of about one MeV/AMU). They can be about one-third that of the D + D = He reaction. Thus, the term "cold" fusion is not appropriate.

[1] Edmund Storms, The Science of Low Energy Nuclear Reaction (A Comprehensive Compilation of Evidence and Explanations about Cold Fusion), 1-st edition, World Scientific Publishing Co., 27 Warren St, Suite 401, Hakensack NJ 07601, 2002.

[2] Wm. H. McCarthy, "Water-Free Replication of Pons-Fleischmann LENR", J. Condensed Matter Nucl. Sci., Vol. 15, pp. 256–267, (2015)

[3] Wm. H. McCarthy, "Light Hydrogen LENR in Copper Alloys", „J. Condensed Matter Nucl. Sci. , Vol 29, pp. 191–201, (2019)