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5 FROZEN NEEDLES CF PROTOCOL

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ABSTRACT

The following protocol is designed to be intuitively convincing to a layman who, if told that needles 2, 3 and 4 have been pulsed with constant-voltage DC-electricity for *twice*, *thrice* and *quadruple* the amount of time as needle 1, and then measured to contain twice, thrice and quadruple the amount of He^4 as the first needle, will instantly reject any doubt that the electrical pulse was creating He^4 from some form of nuclear-chemistry process whose action was directly **proportional** to the amount of DC electrical energy used. At the same time, the protocol is sufficiently statistically sophisticated in its rigorous application of Experiment Design theory as to satisfy the most skeptical and informed critic.

DISCUSSION

Step 1. Prepare a strip-shaped cathode of CF-suitable Palladium (CF = cold fusion), sufficiently wide that after freezing it can be cut conveniently into 5 parallel "needles" each of which may be presumed to have been identically-loaded prior to freezing and cutting.

HINT 1. Note published caveats of Edmund Storms and Dennis Cravens regarding suitable versus unsuitable choices of materials.

Step 2. Gently load said cathode with deuterium in a Fleischmann-Pons electrolytic-cell manner, until *beta phase* is attained and cathode becomes $Pd.D_x$, loading-ratio x as close as possible to 1.0.

HINT 2.1. Recall Michael McKubre's resistivity test for assurance of at least 90% of full loading, as well as Fritz Will's volumetric-swelling test and Storms's pressure-changes and weight-changes tests; also note the many published warnings of Cravens and Storms regarding various potentially fatal mistakes to avoid.

HINT 2.2. Storms has kindly supplied the following additional comments regarding Step 2:

Here is some clarification about measuring composition.

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Swelling - The material does not swell in a uniform manner. The length expands in a different manner than the width. This swelling is not uniquely related to composition because it is influenced by formation of cracks.

Resistivity - This requires attaching leads to the sample. The resistivity ratio is also not unique to the composition because the shape of the sample and formation of cracks have an influence. The method is very useful because it can give a relative, real-time measurement of composition while the sample is in the cell.

Orphaned oxygen - The oxygen released when hydrogen goes into the sample can be measured using several methods. My method uses the weight of oil displaced from a reservoir by the change in pressure. This method is accurate to ±0.001 moles of D.

Weight - Weight can be easily measured to ±0.00005g (±0.00002 moles D) by weighing as a function of time after the current is stopped and extrapolating to zero time.

Step 3. Quick-freeze said cathode by sudden pouring of liquid nitrogen upon it (*in situ*, to inhibit de-loading), and thereafter maintain the *LOADED* Pd.D_x cathode frozen.

HINT 3.1. See paper by John Bockris *et al*, (*J.Electroanal.Chem.*, vol 338 (1992), pages 189-212), who pioneered this important freezing technique, and found "massive" amounts of He^4 in a cathode that had been producing excess heat!

HINT 3.2. Storms notes that if it is not required to keep the sample frozen for more than a couple of weeks, the same objective can be accomplished by freezing in dry ice.

Step 4. Cut or saw frozen Pd.D_x slab into 5 parallel "needles", keeping them frozen. Number the needles from 0 to 4. (Needle 0 will be the unprocessed blank control sample.)

Step 5. Attach electrodes to bottom & top of k_{th} needle ($k = 0, 1, 2, 3, 4$), and pulse electrically for times of duration $t_k = k.\tau$ (for a preselected duration-epoch τ seconds), with a preselected fixed current of I amperes, at a preselected potential difference $E_{100} = 17.7$ volts.

NOTE. According to the Turner-Bush-Bass *Resonant Transparency Spectrum* [*Abstracts*, ICCF5] this provides the energy-level $n = 100$, above ZPF ground-state, of *Coulomb Barrier transparency*. (It is assumed here that the engineering unit of "volts" in the MKS system is the same as in theoretical physics, as implied by a paper of Yeong Kim in *Proc.* ICCF1). The LOW-ENERGY quantum number $n = 100$ is chosen because the line-broadening created by lattice-ZPF is more than 50% of the distance to the next line and close to maximum over the computed Spectrum (Bass) for $n = 1$ to $n = 600$, during which the energy level in eV ranges from about 6.3 eV to 145.2 eV [with numerical accuracy increasing with n]; this is based upon a PERIODIC Coulomb-Madelung/Fermi-Thomas/Mott lattice potential whose validity has been *confirmed* in that it correctly *predicts* the strictly *empirical* Schwinger Ratio within 0.3% of its *measured* value. The optimal values of time τ and current I must be found by trial & error.

Step 6. Cut or saw each needle in halves (or thirds) and send all 10 (or 15) pieces, in a double-blind protocol, to *INDEPENDENT* test labs for physical, chemical assays of He^4 content by every known
measurement technique, the more accurate the better.

HINT. Upon request Brian Oliver of Pacific Northwest National Labs (who, while at Rockwell pioneered the commonly-accepted definitive test procedure in which Palladium cathodes were *fully* ionized before the application of Mass Spectroscopy measurement to the resultant plasma) will supply a 3-page statement entitled *Helium Analysis Procedures & Conditions*, which also contains pricing information for both governmental & non-government PNNL customers seeking such tests.

Step 7. Evaluate results by assigning He^4 amounts of A_k for k_{th} needle ($k = 0, 1, 2, 3, 4$).

Step 8. [See DERIVATION below.] Define *mean bias-error dA*, *mean increment-factor* δA, and estimated increment-factor *standard deviation* σ by

$$dA = (3A_0 + 2A_1 + A_2 - A_4)/5,$$

$$\delta A = (-2A_0 - A_1 + A_3 + 2A_4)/10,$$

$$\sigma^2 = (1/3)(A_k - dA - k.\delta A)^2.$$

Step 9. Judge experiment *successful* if

$$dA \ll \delta A,$$

and also

$$\sigma \ll \delta A/2,$$

in which case [see PROOF below] one *CONCLUDES* that with greater than 95% confidence

$$A_k/\delta A = k, \quad (k = 0, 1, 2, 3, 4),$$

which implies unambiguously that the amount of He^4 freshly created in the D-loaded Palladium cathode is *proportional* to the number of deuterons in the deuterium lattice raised to the energy level E_{100}.

DERIVATION: Define

$$\Sigma_0 = A_0 + A_1 + A_2 + A_3 + A_4,$$

$$\Sigma_1 = A_1 + 2A_2 + 3A_3 + 4A_4,$$

and differentiate σ^2 with respect to dA and δA and set both expressions to zero to obtain

$$\sum_{k=0}^{4}$$

$$dA + 2\delta A = \Sigma_0/5,$$

$$dA + 3\delta A = \Sigma_1/10,$$

which are trivial to solve in the form

$$\delta A = (\Sigma_1 - 2\Sigma_0)/10,$$

$$dA = (3\Sigma_0 - \Sigma_1)/5,$$

which may be readily identified with the form originally claimed.

PROOF. The reader can learn enough about Statistics by reading *The Cartoon Guide to Statistics* by Larry Gonick & Woolcott Smith, HarperCollins (1993), to verify that the preceding provides the result claimed at the 95% Confidence Level. I showed my one-page proof to an internationally reputable expert in Statistics and he agreed that it was correct and said that if the experiment turns out as I *predict* then he will give me a Certificate that the Confidence Level is that asserted and be willing to testify in Court as an Expert Witness that according to accepted principles of Statistics the preceding protocol is definitive as stated.