



Comments on "Excess Heat Production by the Electrolysis of an Aqueous Potassium Carbonate Electrolyte and the Implications for Cold Fusion"

Setting aside the "theory" proposed in Ref. 1—a theory contrary to basic quantum mechanics (successful for over 70 years in describing atomic and nuclear phenomena)—I point out a quite serious omission in the authors' consideration of their experimental data. It is well known that potassium (a small fractional player in the Earth's radiogenic heat) has a long-lived ($t_{1/2} = 1.26 \times 10^9$ yr) beta-radioactive isotope ^{40}K , with beta endpoint energy of 1.3 MeV. The beta heating power from the ^{40}K , under most circumstances, may be expected to be small in an electrolysis cell, with $P_\beta \approx 3.6 \times 10^{30} N_{40} \text{ W}$ (N_{40} being the number of ^{40}K nuclei in the cell). However, the energetic beta particles in the electric field of the cell may strongly influence the conductivity of the electrolyte by producing more ionization than would be present without the beta particles. This, in turn, modifies the I - V characteristics and the electrical power deposited in the cell. This effect *was not* considered by the authors of the paper, but it must be accounted for before there is any chance of establishing a credible case that *any* excess heat was produced. They detect no such "excess heat" when Na_2CO_3 replaces the active electrolyte, K_2CO_3 ; note that sodium is not a beta emitter.

Furthermore, Mills and Kneizys claim that when replacing the K_2CO_3 with Rb_2CO_3 , "excess heat" is again observed. It is interesting that rubidium also has a long-lived ($t_{1/2} = 4.8 \times 10^{10}$ yr) beta-radioactive isotope, ^{87}Rb , with a 0.27-MeV beta endpoint energy. The isotopic fraction of ^{87}Rb is larger

at 0.28 than that of ^{40}K (0.0012) making up for the longer half-life of ^{87}Rb in producing energetic beta particles in the cell.

Another naturally occurring beta-radioactive isotope that would be expected to give similar results is ^{176}Lu , perhaps at a lower level because of its smaller isotopic fraction (0.026). Alpha emitters such as uranium and thorium may also require similar cell recalibration because of the enhanced ionization of the electrolyte. Furthermore, reactor-produced beta emitters such as ^{137}Cs or ^{90}Sr would have the same effect in the electrolyte solution and are easily obtained.

Finally, I mention that a similar recalibration of "excess heat" measurements is required in more conventional (palladium cathode and LiOD electrolyte) cold fusion electrolytic cells in those cases where tritium (an 18-keV beta emitter with a relatively short 13-yr half-life) is produced in large ($\geq 10^{12}$ triton/cm³) quantities.

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July 16, 1991

REFERENCE

1. R. L. MILLS and S. P. KNEIZYS, "Excess Heat Production by the Electrolysis of an Aqueous Potassium Carbonate Electrolyte and the Implications for Cold Fusion," *Fusion Technol.*, **20**, 65 (1991).