Biologically mediated stimulated potassium 40 fission and DHA molecule - a hypothesis

(Totally speculative)

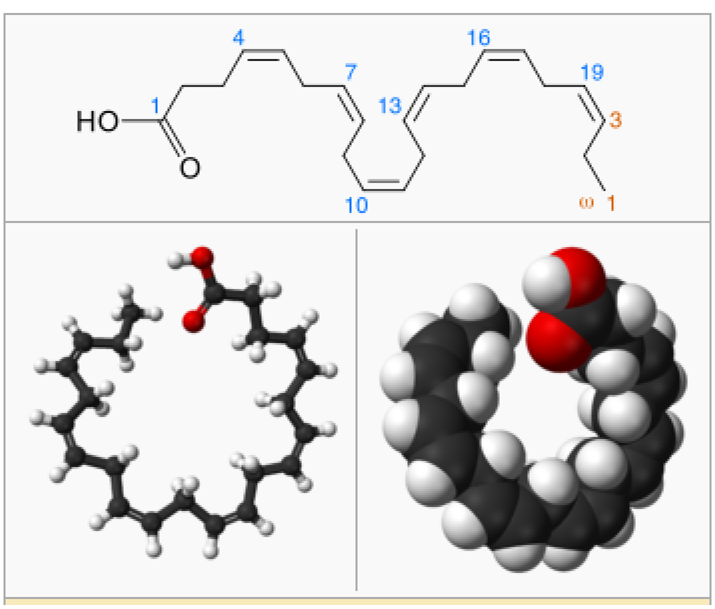
It has been speculated that a mystery of unusually low abundance of potassium-40 (K40) of 0.012% compared with the next more abundant isotope K41 of 6.7%, may be explained by a stimulated fission in biological systems. Natural half life of K40 is 1.25By, thus the natural decay theory would only explain a depletion factor of 1/16, over the life of the solar system. If the original abundance of K40 was the same as K41 then the expected present day abundance would be of the order of 6/16 = 0.4%. The actual figure is 30 times smaller.

The most likely scenario for the stimulated beta-decay is the K40 → Ca40 + e- + 1.3MeV

The most plausible mechanism of the process is a “laser” like transition of a coherent (monoenergetic) Bose-Einstein (BE) condensate of K40 atoms embedded in cellular membranes, into an already present coherent BE condensate of Ca40 atoms embedded in the same membrane.

The emitted beta radiation is biologically destructive thus the most effective way of absorbing the energy for the purpose of sustaining life, would probably be to isolate the reacting apparatus (membranes) in spread-out micro-organisms (millimeters apart) or spaced-out filament-like structures embedded in some neutral non-biological medium like water, soil or rock, capable of absorbing the bulk of the energy. Chemical energy can then be extracted by microbes from the radiative ionisation by products.

Docosahexaenoic acid



(wiki)

Could the vehicle that binds and holds the K40 and C40 atoms, allowing them to form a BE condensate, be the Docosahexaenoic acid forming a cellular membrane structure?

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Loose notes and comments

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The main isotopes of argon found on Earth are
40Ar (99.6%),
36Ar (0.34%), and
38Ar (0.06%). Naturally occurring
40K, with a half-life of 1.25×10^9 years, decays to stable
40Ar (11.2%) by electron capture or positron emission from 40K, and also to stable 40Ca (88.8%) via beta decay.

1amu = 931.494095 MeV/c^2

Isotope masses in amu
(https://www.ncsu.edu/chemistry/msf/pdf/IsotopicMass_NaturalAbundance.pdf)

e- 1/1822.888 = 0.0005486 amu
n 1.0086649
p 1.0072765
1H 1.007825
2H 2.014102
4He 4.002603

19 Potassium
39K 38.963707 93.2581
40K 39.963999 0.0117
41K 40.961826 6.7302

20 Calcium
40Ca 39.962591 96.941
42Ca 41.958618 0.647
43Ca 42.958767 0.135
44Ca 43.955481 2.086
46Ca 45.953693 0.004
48Ca 47.952534 0.187

18 Argon
36Ar 35.967546 0.3365
38Ar 37.962732 0.0632
40Ar 39.962383 99.6003

Other decay channels

40Ca   39.962591 -->
36Ar 35.967546 + 4He 4.002603 = 39.970149 (won't go)

40Ca   39.962591 → 40Ar 39.962383 + 0.000208 amu (194keV)
requires double electron-capture

39K   +   41K → 2x40Ca + e- + ~v + dE
38.963707 + 40.961826 = 2x39.962591 + 0.0005486
Won't go, deficit of dE=-0.695MeV

Earth crust abundance.

http://periodictable.com/Properties/A/CrustAbundance.html

… Argon is the most prevalent of the noble gases in Earth's crust, with the element composing 0.00015% of this crust.[6]

Earth crust abundance of potassium 1.5% (all isotopes)
Earth crust (present time) abundance of 40K = 0.0117*1.5/100 = 0.00018%

If 11.2% of 40K decays to 40Ar, then the original abundance of 40K to produce the observable abundance 0.00015% of 40Ar would have been 0.00015%/0.112 = 0.00134%. The original 40K isotope ratio would have been 0.00134/1.5 * 100% = 0.089%, assuming that all argon that has been produced stayed within the crust.

It is curious that he present day 40Ar abundance is comparable to the present day 40K abundance, which could indicate that the half-life time of Ar escape from the crust is shorter than the half-life decay time of 40K.