

decay are not cyclic processes.

8

3) Some radioactive elements emit α -particles, or helium nuclei, as part of their decay cycle. When a nucleus undergoes α -decay, the α -particle has to surmount a potential barrier due to the strong nuclear force. Very accurate modelling of α -decay can only be done by computer but we can be surprisingly accurate with a model drawn by hand and eye.

This model of α -decay is a superb example of extrapolation across many powers of 10. α -particles are emitted from elements with z values that vary by 24 or more powers of 10, though the kinetic energies of emitted particles vary by factors of only two or three. (I've read 10 somewhere) never the less, they are correlated, and the task of the model is to explain the correlation.

not relevant

again not about the question

The basic theory is that α -particles exist inside the nucleus in a potential well due to the strong nuclear force between protons and neutrons (more precisely, between the quarks of which they're made). The strong nuclear forces and electromagnetic forces act on different scales: the strong nuclear force acts on distances of the order of 10^{-15} m (the scale of the nucleus); the electromagnetic force acts on all scales. Inside the nucleus the strong force is much stronger than the electromagnetic force so we ignore the electromagnetic force inside the nucleus. Outside the nucleus, the strong force decays rapidly, and quickly becomes much weaker than the electromagnetic force so we ignore the strong force outside the nucleus. These thoughts lead us to hypothesize the potential shown: