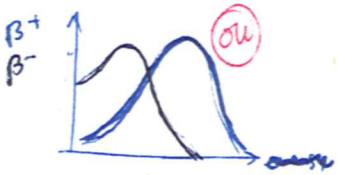
FNE-RP. Decay processes. Questionnaire

2014 10 06

Name: _____ Group: 3

Draw, schematically, the energy spectrum of e^- and e^+ in β^- and β^+ processes. Give a short explanation of the different in the shape of the energy spectrum of the β^- electrons and β^+ positrons

β^+: ${}^{A}_{Z}X \rightarrow {}^{A}_{Z-1}Y + e^+ + \nu$; β^-: ${}^{A}_{Z}X \rightarrow {}^{A}_{Z+1}Y + e^- + \bar{\nu}$



OK

* The β^+ positrons have more energy than the β^- electrons. This is because these particles, when emitted, are under the influence of the nucleus of the atom, which contains protons (+) and neutrons. The β particles will be under the Coloumb effect, so a positron will be repelled from the nucleus while an electon will be attracted. If repelled, the speed of the positron increases, so the energy of these particles will be higher than the electrons (β^-).

Why there are almost not β^+ emitters on a nuclear reactor?

β^+ : a proton becomes a neutron. HEAVY NUCLEI SPLITTIN IN TWO SIMILAR "PIECES" YIELD N EXCESS

- The main concern in a nuclear reactor is to control the number of neutrons, since per every fission process, 1 neutron is needed while 3 are emitted. The key is to reduce the number of "free neutrons" from 3 to 1, so it is not desirable to have β^+ emitters in the reactor, since they generate new neutrons. NO. n in β^+ stays in the nucleus.

What kind of nuclei present alpha decay? Give a short, intuitive, explanation to this fact

Heavy nuclei present alpha decay. This is because these nuclei have more energy than lighter nuclei, and a method to reach lower energetic states and become more stable is by releasing alpha particles, which are 2 protons and 2 neutrons.