

Answer on question #77564, Chemistry / General Chemistry |

What is the main product when U undergoes beta decay?

Th

Np

Pa

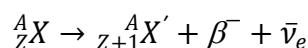
none of the above

Th

Solution

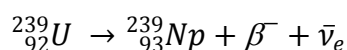
Beta decay (β -decay) is a type of radioactive decay in which a beta ray (fast energetic electron or positron) and a neutrino are emitted from an atomic nucleus.

In β^- decay, the weak interaction converts an atomic nucleus into a nucleus with atomic number increased by one, while emitting an electron (e^-) and an electron antineutrino ($\bar{\nu}_e$). β^- decay generally occurs in neutron-rich nuclei. The generic equation is:



where A and Z are the mass number and atomic number of the decaying nucleus, and X and X' are the initial and final elements, respectively.

There are many isotopes of uranium, but in beta-decay atomic number increases by one whereas mass number remains the same. Therefore for any isotope of uranium the result of beta-decay will lead to formation of neptunium. For example



Where β^- is an electron (β particle)

$\bar{\nu}_e$ is an antineutrino

As a neutron from the nucleus of U-239 emits an electron (negatively charged particle), the atomic number is increased by 1, but the atomic mass is left unchanged.

Answer: Np