

IS IT TRUE THAT ^{210}Po IS FISSIONED BY ANTI-NEUTRINOS?

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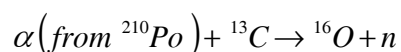
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When I was working with measurements of β -delayed neutrons which are produced from some of fission products (e.g. ^{87}Br), 10^5 neutrons were observed and counted. The irradiated uranium concentrations were too small to give this huge number of neutrons from ^{235}U fission. An ISFP process suggested that ^{210}Po might be fissioned by anti-neutrinos that were produced in the reactor core.

Neutrino has no charge and almost of zero rest mass, <30 eV. The particle was postulated in 1930 to solve both the problems of energy conservation and spin, and detected in 1953 through inverse β -processes. The interaction cross-section of neutrinos with matter is very small ($\sim 10^{-48}$ b). Operating reactors generate huge numbers of antineutrinos, $\sim 10^{20}/\text{d}$ from typical power reactor.

Very small concentrations (ppb) of uranium were irradiated for 2 minutes in the thermal channel of the 100kW TRIGA reactor, Germany – Mainz, at a flux of 1.7×10^{12} n/cm². sec. In the case of Pulse mode, this reactor has a flux of 10^{25} n/cm².sec. The delayed neutrons were then counted for 1 minute by a well calibrated ^3He neutron counter.

The number of delayed neutrons due to irradiation of the samples was found to be 10^5 neutrons. The samples were also containing the even-even ^{210}Po . For the same reactor and in the same irradiation conditions, 10^5 neutrons were obtained from about $8 \mu\text{g/g}$ of ^{235}U [1]. The following two simultaneous stages mechanism (abbreviated as ISFP) is suggested to be the process taken place in the samples inside the reactor core environment:



So, the presence of the observed neutrons might be due to simultaneously both delayed neutrons from ^{235}U fission and fission of ^{210}Po by anti-neutrinos ($\bar{\nu}$, f) through the nuclear reaction; $^{13}\text{C}(\alpha, n)^{16}\text{O}$.

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REFERENCE

- [1] Hube, G., Lenz, S., and Kratz, K.L., "Determination of the Uranium and Thorium Contents in Aqueous Samples with Neutron Activation Analysis", 3rd International Conference on Nuclear and Radiochemistry, Vienna, 7-11 Sept., 1992.

هل صحيح أن البولونيوم – ٢١٠ ينشط بواسطة ضديد النيترينو؟

سيد أ. المونجي

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تم في هذا الخطاب إقتراح تفاعل نووي لنواة البولونيوم - ٢١٠ مع ضديد النيوترينو لتفسير تواجد فيض من النيوترونات المتأخرة في قلب المفاعل النووي بكثافة أعلى من تلك الناتجة عن انشطار نواة اليورانيوم - ٢٣٥.