Energy Levels in ^{129}I from (n,γ) and (n,2n) Reactions

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The low energy levels of ^{129}I were investigated using γ-sources obtained from ^{128}Te(n,γ)^{129}Te and ^{130}Te(n,2n)^{129}Te nuclear reactions. The singles spectra were taken using a Ge(Li) detector of 45 cm^3 (FWHM=1.89 keV) and a 671 ORTEC amplifier. Two different methods were employed for the production of ^{129}Te sources. The first one involved the irradiation of the enriched telurium (96% for ^{129}Te) with thermal neutrons flux of 10^{13} n.cm^2.s^{-1} at the IEA-R1 reactor. Using this procedure it was possible to study the β^- decay of ^{129}Te ($T_{1/2}$=70 minutes). The second method was the irradiation of natural telurium (with 33,8% of ^{130}Te isotope) with 14MeV neutrons at van de Graaff accelerator at IPEN. In this experiment, a series of γ-rays from the both reactions, in the range from 20 keV to 2.5 MeV, were recorded during 60 hours of live counting. In order to identify the origin of γ-rays, spectra were accumulated through four sucessive half-lives. The energy and relative intensity of the γ-rays have been determined and the results from β^- decay and the (n,2n) nuclear reaction were compared. Among the total number of γ-transitions observed, several of them were observed for the first time. In addition, a number of γ-transitions previously attributed were confirmed.