**132Cs GAMMA RADIATION**

J. FRÁNA, J. ŘEZANKA, A. ŠPALEK, A. MÁSTALKA

*Nuclear Research Institute, Řež*

The decay of $^{132}$Cs was studied by means of Ge(Li) detectors and a magnetic beta-ray spectrometer. The energies and intensities of the transitions in $^{132}$Xe and $^{132}$Ba were determined. Of the decay schemes proposed hitherto, that of Johnson et al. [Phys. Rev. **138** (1965), B 520] was confirmed.

1. INTRODUCTION

A number of papers has been devoted to the decay of $^{132}$Cs ($T = 6.5$ d) [1—9]. Apart from this, excited states in $^{132}$Xe have been studied from the decay of $^{132}$I [10, 11]. The work done so far on the decay of $^{132}$Cs has been performed by the scintillation and coincidence methods; in the last paper [9] a lithium drifted germanium detector was used.

2. PREPARATION OF SOURCE AND INSTRUMENTAL EQUIPMENT

The $^{132}$Cs for this work was obtained by the chemical isolation of cesium fraction from products of the spallation of cerium by protons with energy of 680 MeV [12]. Irradiation, usually for three hours, was performed on the synchrocyclotron of the Joint Institute of Nuclear Research in Dubna. On an average, chemical isolation was begun 12 hours after the end of irradiation. Because the shorter-period activities $^{127}$Cs ($T = 6.1$ hours) and $^{129}$Cs ($T = 32$ hours) were present in cesium fraction, the decay of $^{132}$Cs could only be studied after their decay. When measuring the spectrum of $^{132}$Cs we also observed the spectra of $^{136}$Cs ($T = 12.9$ days) and $^{134}$Cs ($T = 2.05$ years). The transitions of $^{134}$Cs [13] could be used for energy calibration.

The gamma spectrum was measured by means of a Ge (Li) detector. The plane-type detector was cylindrically shaped, the thickness of the sensitive layer being 6 mm and the diameter 15 mm. The resolution for short-period measurement was 2.8 keV at 84 keV and 5 keV at 662 keV. A double focusing magnetic spectrometer [14], working with a resolution of $0.2\%$, was used for measuring the conversion electrons.

3. MEASURED SPECTRA

Figure 1 shows part of the gamma spectrum of cesium fraction in a range of 600 to 2000 keV, measured 10 days after irradiation. The strongest lines in the spectrum have their origin in $^{132}$Cs but lines from the decay of $^{129}$Cs, $^{136}$Cs and $^{134}$Cs can be seen, too. In addition, the spectrum also contains a line with energy of 735 keV, of unknown origin, which did not appear in the spectra of the samples of other irradiations. Table I gives the energies and intensities of gamma transitions which could be ascribed to $^{132}$Cs according to their decrease with time.

The energy of the strongest transition from the gamma spectrum was determined using the neighbouring energies of $^{134}$Cs, $(604.64 \pm 0.12)$ keV and $(795.80 \pm 0.16)$ keV [13] as $(668.0 \pm 1.0)$ keV. The conversion lines of this transition were the only lines of $^{132}$Cs, observed in the conversion spectrum of cesium fraction. The measurements of the conversion electrons yielded the transition energy as $(667.5 \pm 0.3)$ keV. The ratio of the conversion coefficients $K/L$ of this transition is 7.2, which is in good agreement with its E2 character.
Fig. 1. Gamma spectrum of cesium fraction in range of 600 to 2000 keV. Energies are given in keV. Apart from lines of $^{132}$Cs the lines 605, 796, 1168 and 1365 keV (of $^{134}$Cs), 906 and 946 keV (of $^{129}$Cs), 818, 1048 and 1236 keV ($^{136}$Cs) can be seen. The origin of the 735 keV line is not clear. Measurement was performed 10 days after irradiation.

4. DECAY SCHEME

The values of the energy of the strongest transition, determined in both ways, agree within the limits of experimental errors with the value of $(667.8 \pm 0.3)$ keV given in paper [11] for the decay of $^{133}I$ and according to our data it is just this transition that de-excites the first excited state $2^+$ in $^{132}$Xe.

The energies and intensities given in Tab. I agree within the limits of experimental errors with the data in paper [9] apart from the transition energy $(1136 \pm 1)$ keV. Nevertheless, the position