LETTERS TO THE EDITOR

NEW ISOTOPE ^{146}Dy

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The new isotope ^{146}Dy $T_{1/2} = 32 \pm 5$s has been identified on the IRIS on-line mass-separator facility coupled to the 1 GeV proton beam from the synchrocyclotron. The identification is based on the analysis of the X-ray and γ-ray spectra.

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The search for the next new isobar $A = 146$ far from the beta stability line on the proton rich side, has been undertaken using the mass-separator IRIS on line with 1 GeV proton beam from the synchrocyclotron [1, 2].

The experimental technique involved has been reported earlier [2, 3]. 1 GeV proton beam induces spallation reactions in the system of combined tungsten target and surface ionisation ion source heated up to about 3200 K. In the present experiment a special arrangement with two exchangeable ionisers [4] is used.

After a mass-separation, products of the spallation reaction are collected on the moving polyester tape and transported to the set of Ge(Li) detectors. The transport of the samples, the collection and counting times, and the storage of 8 consecutive spectra for each sample are controlled by the minicomputer.

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The identification of a new nuclide is based on the unambiguous mass number determination and on the analysis of characteristic Roentgen lines in the X-ray spectra. Fig. 1 shows the low energy part of the γ-spectrum for the mass number $A = 146$ with well pronounced Roentgen lines $K_{\alpha 1}$ Gd; $K_{\beta 1,2}$ Gd and $K_{\alpha 1}$ Tb; $K_{\beta 1,2}$ Tb. The first set of the lines

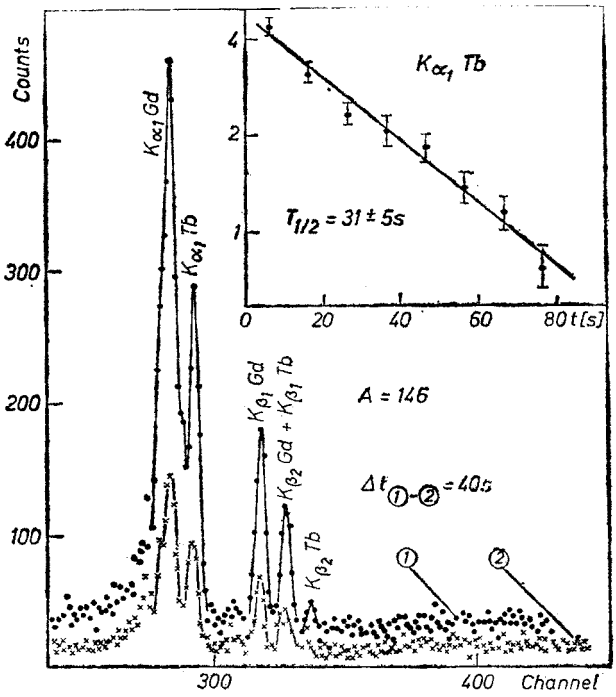

Fig. 1. A part of the low energy γ-ray spectrum, and the decay characteristics for the $K_{\alpha 1}$ X-line in Tb. Two spectra shown in the figure are the sums of first four and last four from eight spectra measured in the experiment

belongs to the decay ^{146}Tb $\rightarrow$ ^{146}Gd studied in paper [5]. The second set we ascribe to the decay ^{146}Dy $\rightarrow$ ^{146}Tb. The analysis of the decay data for $K_{\alpha 1}$ Tb line (see insert in Fig. 1), gives $T_{1/2} = 31 \pm 5$s, which is in good agreement with the value predicted by Tokahashi et al. (see reference [6]) for the half-life of ^{146}Dy.

TABLE I

Energies and intensities of γ-lines assigned to the decay of ^{146}Dy

$E\gamma \pm \Delta E\gamma$ keV	$I \pm \Delta I$
240.6 ± 0.4	73 ± 10
280.0 ± 0.4	100
337.7 ± 0.3	95 ± 20
384.3 ± 0.4	72 ± 10

In the gamma spectra, beside the gamma lines corresponding to the decay of the known isotopes that belong to the isobaric chain $A = 146$ [5], a number of new γ-lines can be seen (Table I). The decay curves shown in Fig. 2 give an average value for the half-life of those lines $T_{1/2} = 33 \pm 5$s.

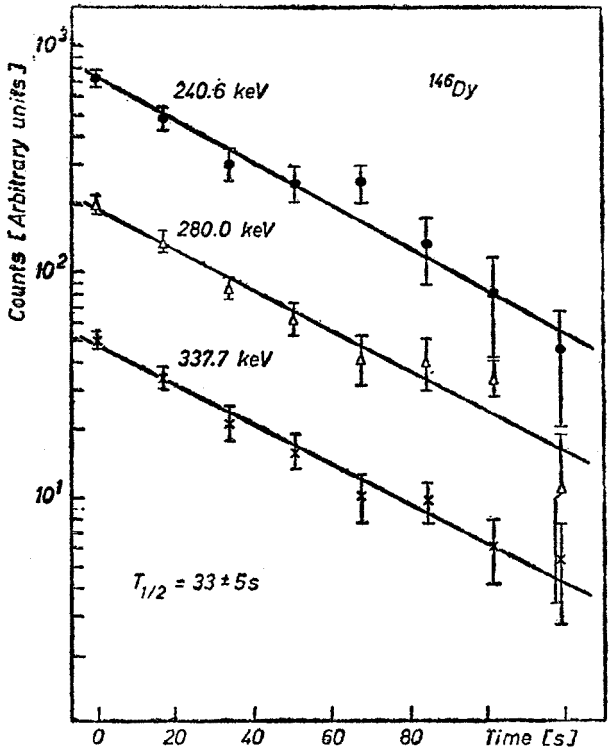

Fig. 2. Decay curves for some γ-lines assigned to the decay of ^{146}Dy

In our spectra the half-life of ^{146}Tb, isotope known from the study of reactions with heavy ions [5], gives $T_{1/2} = 22 \pm 1$s. In addition in Ref. [5] there was no evidence of the existance of any isomeric states decaying with the half-life of about 30s.

Taking this into account we assume that we are dealing with the decay of a new isotope. ^{146}Dy, with the half-life $T_{1/2} = 32 \pm 5$s (average value from Roentgen and γ-line results),

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