The Orbital Electron Capture Decay of $^{185}$Os.

A. Bisi, E. Germagnoli (*) and L. Zappa

Istituto di Fisica Sperimentale del Politecnico - Milano

(*) Laboratori CISE - Milano

(ricevuto il 7 Maggio 1957)

Summary. — Radiations emitted in the orbital electron capture decay of $^{185}$Os have been investigated by means of a scintillation spectrometer and with the help of coincidence methods. The total decay energy was found to be 984 keV; the orbital electron capture decay is complex and one of the transitions involved shows an anomalous $L/K$-capture ratio. It is suggested that this transition can be classified as second forbidden ($\Delta I = 2$; yes).

1. — Introduction.

$^{185}$Os is known to decay with a half life of 97 days to $^{185}$Re. No positron emission was observed; conversely intense $\gamma$-rays having the energies 645 keV and 879 keV were found by several authors (1-4) together with some $\gamma$-rays of much lower intensities. These facts show that the total decay energy in the electron capture decay of $^{185}$Os must be greater than 879 keV and less than 1.02 MeV. The $L/K$-capture ratio was measured by Miller and Wilkinson (2) by comparing the intensities of $K\times$ and $L\times$ radiations from $^{186}$Re and found to be $0.35 \pm 0.15$; owing to the complexity of the considered electron capture transition, the uncertainty of evaluating counting efficiencies for soft radiations as $L\times$ radiations and to the lack of exact knowledge of

L series fluorescence yields, this value cannot be considered very accurate. Therefore a further examination of the radiation emitted from $^{185}\text{Os}$ and a new measurement of the $L/K^-$ capture ratio by means of coincidence techniques (5) were thought to be useful.

2. - Experimental results.

Active Os was obtained by slow neutron irradiation and supplied by A.E.R.E. (Harwell). One year after irradiation the only important activity is due to $^{185}\text{Os}$.

1) A spectrum of high energy $\gamma$-rays, as obtained with a source located at 2.5 cm from a single crystal $\gamma$ spectrometer, is shown in Fig. 1. The well-known lines of 650 keV and 875 keV are clearly visible; their intensity ratio resulted to be 7.6 when efficiencies were taken into account according to the data given by Bell (6). No other $\gamma$ lines were apparent in the spectrum.

The only important peaks in the low energy region were attributable to characteristic $K\!\times\!$- and $L\!\times\!$-rays of Re (60 keV and 9.5 keV respectively). $L\!\times\!$-rays were observed by means of a $\Delta+\text{CH}_4$ filled proportional counter. The line due to $K\!\times\!$-rays is shown in Fig. 2: it is clearly asymmetrical at the right side and this fact was interpreted as due to the presence of a $\gamma$ line at about 70 keV.

<table>
<thead>
<tr>
<th>$\gamma$ or $X$ line</th>
<th>Relative intensity</th>
</tr>
</thead>
<tbody>
<tr>
<td>875 keV</td>
<td>0.188</td>
</tr>
<tr>
<td>650 keV</td>
<td>1.435</td>
</tr>
<tr>
<td>$K!\times!$-rays</td>
<td>1.00</td>
</tr>
<tr>
<td>$L!\times!$-rays</td>
<td>1.6</td>
</tr>
</tbody>
</table>

(5) A. BISI, E. GERMAIGNOLI and L. ZAPPA: Nuclear Physics, 1, 593 (1956).