The Decay of $^{185}$W.

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Summary. — The decay of $^{185}$W has been studied with a magnetic $\beta$-ray spectrometer. The $\beta$ spectrum and the electron spectrum from a cadmium converter have been examined down to electron energies of 30 keV. The ground state $\beta$ spectrum has an allowed shape and an end-point of $(430 \pm 4)$ keV. Since no evidence is found for either internal conversion electrons or $\gamma$-rays associated with 55.6 or 125 keV transitions in $^{185}$Re, it is concluded that $\beta$ transitions to such levels do not exist with branching ratios greater than $1.5 \cdot 10^{-3}$ and $9 \cdot 10^{-4}$, respectively.

Although there have been many investigations of the decay of 74-day $^{185}$W (1-4), there still seems to be disagreement as to whether the decay process is simple or complex. In particular, Bisi et al. (3) have proposed a decay scheme involving a $(7/2)^+$ level at 55.6 keV in $^{185}$Re which is fed by 10% of the $\beta$ transitions of $^{185}$W and is de-excited by an M1 transition to the $d 5/2$ ground state of $^{185}$Re. Support for their proposal has been supplied by the coincidence experiments of Bhattacherjee and Raman (5) and of Mijotovic (6). From Coulomb excitation experiments (7) and from studies of

the decay of $^{185}$Os $^{(6,9)}$ there is good evidence for a $(7/2)^+$ level at 125 keV in $^{185}$Re which is also de-excited by an almost pure M1 transition $^{(7)}$. Since both of these $\gamma$-rays should be strongly converted, the authors have undertaken an examination of the low internal conversion spectrum of $^{185}$W in order to provide a sensitive test of the intensity of these transitions.

Tungsten metal was irradiated for a period of 47 days in the Chalk River reactor. The metal was dissolved in a solution of hydrofluoric and nitric acid and a $\beta$ source prepared by deposition on a thin film of VYNS. The $\beta$ spectrum was examined with a large double focusing $\beta$-ray spectrometer $^{(19)}$ set at a resolution of 0.87% on the 36.1 keV $B$ line of Thorium C (see insert $C$ of Fig. 1). The efficiency of the anthracene detector at this energy was very nearly 100%. A Fermi analysis of the $\beta$ spectrum gave a straight line from

![Graph](image)

Fig. 1. – The low energy electron spectrum of $^{185}$W and $^{181}$W. Curve A: the low energy $\beta$ spectrum; Curve B: the external conversion spectrum with a 0.3 mg/cm$^2$ cadmium radiator; Curve C: 36.1 keV calibration line of Thorium C.


$^{(9)}$ S. V. Nablo: Neutron induced activities in Ir and Os: Ph.D. thesis (McMaster University, Hamilton, Ontario, Canada, 1956).