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RELATIVE INTENSITY AND INTERPRETATION OF SOME ELECTRON LINES IN Cm$^{243}$

James F. Schooley

June 24, 1955
Relative Intensity and Interpretation of Some Electron Lines in Cm$^{243}$

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I. K-LINES OF TRANSITIONS FROM THE 277-KEV LEVEL

Using the $\sqrt{2}\pi$ double-focusing beta ray spectrometer with an approximately 0.2 cm slit on the usual Geiger tube, the writer investigated the K lines of the transitions from the 277-kev level. The sample used was obtained from Dr. Frank Asaro. The activity was vaporized on a thick platinum backing. Approximately 12 percent of the alpha activity was due to Cm$^{243}$, the remainder being Cm$^{242}$ and Cm$^{244}$.

Experimental Procedure

The normal procedure of demagnetization and running from low to high current was followed.

Treatment of Data

The data were plotted as counts divided by magnet current vs magnet current. The intensities, obtained by graphical integration of the peaks, were compared on a relative basis. Energies were obtained from an experimental curve of $H_\rho$ vs current, using the intersection of the steep forward side of the peak with the background.
Results

K lines corresponding to the known transitions of 211 ± 2, 228 ± 2, and 278 ± 2 kev were seen. Their relative intensities are 1/2, 77/1.48, respectively. The L conversion lines were not clearly distinguishable from the background, but lower limits have been set on the K/L conversion ratios for the three transitions. These are K/L > 1.6 for the 211-kev transition, K/L > 6.4 (228), and K/L > 6.6 (278). The relative K line intensities and K/L ratios may be compared with those from work by Fulbright, who found relative K line intensities, 209:4:227:9:277:2:1:2:26:1:96, and K/L ratios of 5.6, 4.3, and 5.3, respectively.

Interpretation

Using the curves of Goldhaber and Sunyar, the K/L ratio limits indicate a most likely interpretation as M1 transitions with some E2 admixture not excluded, particularly in γ211.

II. L LINES OF THE TRANSITION FROM THE 321-KEV LEVEL TO THE 277-KEV LEVEL

Using the same source and experimental procedure as in I, data were obtained on the conversion lines of a 46.2 ± 1 kev transition. The data were handled in the same manner as in I.

Results

The intensities of the L1 plus LII to the LIII lines were found to be in a ratio of 2.8 to 1.
Interpretation

From the conversion coefficients of Gellman, et al., the transition would seem to be predominantly of M1 character. M1-E2 mixtures occur commonly for such rotational transitions.

III. ACKNOWLEDGMENTS

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1 H. W. Fulbright, private communication from M. S. Freedman to F. Asaro. (See also Fulbright paper in Seaborg, Katz, and Manning, The Transuranium Elements, National Nuclear Energy Series, Vol. 14B, 1011.
