Metingen van eigenbreedten en intensiteiten in het röntgenspectrum

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SUMMARY.

This thesis deals with the width of the X-ray spectral lines $L\beta_3$, $L\beta_4$, $L\beta_1$ and $L\beta_2$ and with the intensity of $L\beta_3$, $L\beta_4$ and $L\beta_2$ relative to that of $L\beta_1$. All the measurements have been performed by means of the photographic method.

1. The intensities of $L\beta_3$ and $L\beta_4$ relative to that of $L\beta_1$ have been measured for the elements Ru (44), Cd (48), J (53), La (57), Gd (64), Er (68), W (74) and Th (90). The results have been summarized in table 14 (p. 52) and fig. 14 (p. 64).

The variation of the intensities with increasing atomic number is in accordance with the theory of COSTER and KRONIG of the inner AUGER-process ($L_I \rightarrow L_{III}$) with the ejection of an outer electron ($M_{IV,V}$).

2. The widths of these lines have been measured for the elements Ru (44), Ag (47), Sn (50), Sb (51), J (53), La (57), Ce (58), Gd (64), Er (68), W (74) and Th (90).

The results have been summarized in the tables 11 and 13 (p. 49 and 50). See also fig. 10 (p. 56).

The widths of the lines show a variation with increasing atomic number differing from the variation of the intensities. It has been pointed out why no correspondence is to be expected: Indeed the intensity of a radiation transition depends principally upon the AUGER-processes starting from the initial level. The width of a spectral line, however, is equal to the sum of the widths of the initial and the final level, so that the width of a line also depends upon the transitions possible from the final level. In accordance with this explanation it has been shown that in the neighbourhood of $Z = 50$ the probability of the AUGER-processes $M_{II,\,III} \rightarrow M_{IV,\,V}$ with ejection of an $N_{IV,V}$-electron strongly varies with increasing atomic number.

The widths of the doublet-lines β_3 and β_4 are about equal (in volts) from $Z = 44$ to $Z = 70$, for higher atomic numbers β_4 is broader than β_3. This is in agreement with calculations of RAMBERG and RICHTMYER (Table 9, p. 39).

3. The relative intensity of β_2 has been measured for the

elements Ru (44), Sb (51), J (53), La (57), Gd (64), W (74) and Th (90). The results have been given in table 16 (p. 54) and fig. 15 (p. 67). The intensity increases to about $Z = 50$ (4 d-group unfilled and narrowing of the N-shell), is nearly constant in the region of the rare earths and thereupon increases again (further narrowing of the N-shell).

4. Finally the appearance of a satellite at the short wavelength side of β_1 in the region of the rare earths (see table 19, p. 71) can be elucidated by the AUGER-process $L_I \rightarrow L_{II}$ with ejection of an N_I-electron, this process being energetically possible below $Z = 70$ (see fig. 17, p. 70).