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## The Alpha Lines in the "K" Series Tungsten Spectrum

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## THE ALPHA LINES IN THE "K" SERIES TUNGSTEN SPECTRUM

CHARLES CROFUTT

(Abstract)

According to Bohr's theory of the atom, radiation takes place only when an electron goes from one orbit to an orbit closer the nucleus. If  $W$  represents the energy associated with an orbit, that is, the energy required to remove an electron from the orbit to infinity, the energy radiated when an electron goes from orbit (1) to orbit (2) will be  $W_2 - W_1 = h\nu$ , where orbit (2) is closer the nucleus. Assuming that an absorption frequency corresponds to the energy associated with a ring of the Bohr atom, the difference between two absorption frequencies should give an emission frequency.

Duane has measured one absorption frequency in the  $K$  region and three absorption frequencies in the  $L$  region. The difference between the  $K$  absorption frequency and the  $L_1$  and  $L_2$  absorption frequencies respectively gives the  $K\alpha_1$  and the  $K\alpha_2$  lines. The difference between the  $K$  absorption frequency and the  $L_3$  absorption frequency gives a result very close to the frequency of the  $\alpha_2$  line. Duane did not succeed in resolving this  $K\alpha_2$  "doublet." However, he did obtain evidence that it was a doublet. The peak obtained by him, using the ionisation method, was broader on one side than on the other.

The present work was begun with the object of obtaining this  $\alpha_3$  line by means of the photographic method. The resolving power of the X ray spectrometer was increased by using thin crystals, narrow slits, a greater distance between the crystal and the photographic plate, and by working on the second and third orders. This made it necessary to considerably prolong the time of exposure, in one case 11 days continuous operation. The front slit was .005 cm. in width and the thickness of the crystal was .015 cm. The distance between the crystal and the plate holder was 60 cm. Since the  $\alpha_3$  line was not obtained on any of the plates the results seem to indicate that the intensity of the  $\alpha_3$  line

than .05 per cent. It is entirely possible that it could be obtained under more favorable circumstances.

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