

PROPERTIES OF SOME ZINC, CADMIUM,  
AND MERCURY BANDS

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ABSTRACT

Zinc bands at wave-lengths 2139, 2064, and 2002 are shown to resemble the corresponding bands of cadmium and mercury in emission as well as in absorption.

THE absorption spectra of zinc, cadmium, and mercury each show three corresponding continuous bands which may be called *A*, *B*, and *C*. The wave-lengths at the maxima are given in Table I. It has been shown<sup>1</sup> that

TABLE I.

	<i>A</i>	<i>B</i>	<i>C</i>
Zinc	2139	2064	2002
Cadmium	2288	2212	2114
Mercury	1849	1808	1692

for cadmium and mercury the bands *A* and *C* appear in emission in an electrodeless discharge but not the band *B*. The present experiment was undertaken to see if the same thing were true for the zinc bands.

A quartz tube was evacuated and sealed off after having had some zinc distilled into it. Nicrome wires wrapped around the ends served as external electrodes. One electrode was grounded and the other attached to a small Tesla coil (leak chaser). When the tube was heated by blow torches to give a stream of zinc vapor through the tube, a bright discharge was obtained. In stagnant vapor the discharge was very weak. This may have been the result of impurities as observed by Wood and Voss<sup>2</sup> in mercury vapor. Spectra were photographed with nitrogen flowing through the spectrograph to eliminate oxygen.

The resulting discharge through zinc vapor showed band *A* with great intensity and with the maximum reversed, and showed also band *C*. No trace of band *B* was observed. These observations are the same as those on the corresponding bands for Cd and Hg.<sup>1</sup> An interpretation for one set of these bands will apply to all since the bands are shown to have the same properties. One interpretation<sup>1</sup> gives energies of dissociation of zinc, cadmium, and mercury molecules of 0.24, 0.20, and 0.15 volts respectively.

There was observed only one difference in the behavior of these bands relative to each other for the various elements. In the absorption spectra, the zinc bands *B* and *C* appeared with increasing pressure at practically the same pressure; the cadmium band *C* required about 1.7 times that required for band *B*, and the mercury band *C* needed about 5 times as much pressure as the mercury band *B* for equal intensities. This does not affect the interpretation given to the bands but it may indicate an interesting change in properties of similar elements with increasing atomic weights.

<sup>1</sup> Winans, Phil Mag, 7, 555 (1929); Phys. Rev. 37, 897 (1931).

<sup>2</sup> R. W. Wood and V. Voss, Jour. Frank. Inst. 205, 486 (1928).