and that an intermittent exposure does not give the same effect as a continuous exposure for the same total time. It is pertinent, however, to point out that the physiological response to radiation is somewhat analogous and that a photographic measurement may, therefore, be particularly valuable.

A further point for consideration appears to be the quality of the radiation recorded. It is generally agreed that little benefit is derived by man from ultra-violet radiation of wave-length greater than about 3200 A. and we note that Dr. Ashworth's filter transmits radiation between 3400 and 3700 A. Possibly the thin silver film transmitting radiation of wave-length 3130 A., described two years ago by Mr. Lamplough in a paper to the Royal Society of Arts, could advantageously be substituted.

The methylene blue method developed by Messrs. Webster, Hill and Eidinow shares with Dr. Ashworth's method the disadvantage of response to the longer wave-lengths; in addition, the sensitivity appears to be affected by temperature changes.

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[1] NATURE, June 13, p. 893.
[2] NATURE, July 4, p. 35.

The Forbidden Lines in the High Frequency Discharge of Mercury, Cadmium, and Zinc.

IN addition to the observed results of the intensity modification of spectra in the high frequency discharge in mercury, we have found the forbidden lines $1S - 2p_1$ of mercury and $1S - 2p_1$ and $1S - 2p_3$ of cadmium with moderate intensities. The quartz tube was 15 cm. long and 2 cm. in diameter, and the pressure of vapours was kept at about 0·001 mm. mercury. The spectra were excited with external electrodes by a 10-metre oscillator, and observed in it, end on. Heating the tube caused the discharge

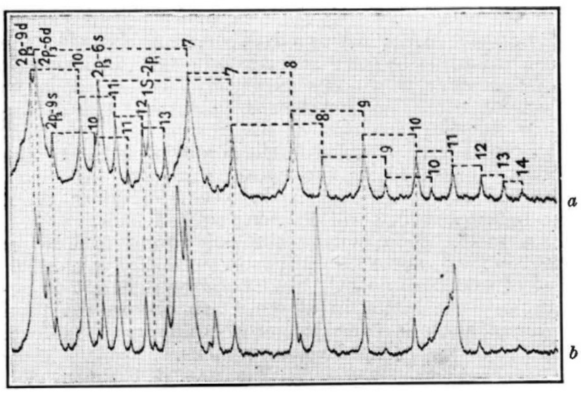

FIG. 1.—Photometric curves of the spectra of mercury, (*a*) at 70° C., (*b*) at room temperature.

to become brighter, and a remarkable intensity modification was observed in mercury, as is seen from the reproduction of the microphotometric records of the spectra at 70° C. and at room temperature (Fig. 1). It can be seen that the effects of a slight rise of temperature are: (1) the vapour emits only the series lines, while spark lines appear at room temperature; (2) the intensities of the series lines decrease quite regularly with the increase of the number of the members; (3) the forbidden line $1S - 2p_1$ enhances more than the neighbouring triplet lines $2p_2 - 12d$ and $2p_2 - 13d$.

In cadmium, in consequence of the strong concentration of atoms excited in D-levels, it was possible to observe 12 members in the singlet diffuse series and 8 members in the p-D intercombination lines. Intercombination lines which begin on the triplet levels are less affected, and the pp'-combinations which are emitted strongly in the arc are lacking in this discharge. In zinc, the singlet sharp series are strengthened and it was possible to observe 10 members, and the triplet series was slightly affected. It is to be regretted that we could not find the forbidden line in this vapour.

According to W. Hanle's work on the excitation function (*Anregungsfunktion*) of the spectral lines of helium, neon, and mercury, the maximum of the excitation function of the triplet levels is sharp in form and lies at about 10 volts, while that of the singlet levels is flat and at about 30 or more volts higher than the former. If it is assumed that electrons which have velocities of about 20 volts predominated in our exciting condition more than that of lower volts, the strengthening and weakening of the lines will be explained with reference to the observation of W. Hanle. As the pressure of vapours is very low, the interatomic field due to ionised or excited atoms will certainly be very weak, and this will also be a favourable condition for the emission of the forbidden lines. In the case of mercury, a slight rise of temperature favours the condition, probably in consequence of the increase of the frequencies of the collisions between atoms and electrons, the number of slower electrons becoming greater.

A full account of these experimental result will shortly be published elsewhere.

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Part-Absorption in X-Rays.

IN connexion with the experiments of one of us (B. R.) on the part-absorption in X-rays,[1] the results of other workers on the same subject are conflicting. While Cork,[2] Lindsay,[3] and Van der Tuuk[4] report negative results, Bhargava and Mukherjee[5] confirm our results so far as the part-absorption lines are concerned. It seems to us that the conflicting results obtained by different authors are simply due to the thickness of the absorption screens used by them in their experiments.

In the first experiment, described in NATURE of May 17, 1930, the copper $K\alpha$-radiation was allowed to pass through carbon powder lightly pressed in a slit of about half a millimetre thickness. The modified line appeared to be very feeble. Later on, the carbon powder was replaced by goldbeater's skin, which contains nitrogen and oxygen in addition to carbon. By trial, it was found that five pieces of goldbeater's skin when pressed on the slit of the spectrograph produce modified lines beautifully on the photographic plates.[6] We have further found that the increase in thickness of the absorption screen does not necessarily increase the intensity of the modified lines; or rather, on the contrary, if the absorption screen is too thick, the modified lines disappear completely.

Further investigation on the variation of intensity with the different thickness of the absorption screen is still in progress. It appears that the negative results of Cork, Lindsay, and Van der Tuuk may be due to the large thickness of the absorption screens used by them. In this connexion it may be mentioned that Bhargava and Mukherjee obtained the modified line of carbon by passing the copper $K\alpha$-radiation through only four pieces of ordinary black paper used for