Book Reviews

Works intended for notice in this column should be sent direct to the Editor (P. P. Ewald, The Queen's University, Belfast, Northern Ireland). As far as practicable books will be reviewed in a country different from that of publication.

Où en est la question de la discontinuité d'absorption *K* des rayons X et des franges qui l'accompagnent? By C. KURYLENKO. Pp. 104. Brussels: Hayez. 1946.

In an article of about 100 pages in the *Bulletin de la Société Royale des Sciences de Liège*, the author has treated the X-ray *K* absorption edges and their fine structure. The underlying physical phenomenon is this:

If the absorption of a beam of X-rays by a thin sheet of a certain element is investigated in its dependence upon the wave-length of the X-rays, it is found that on the side of longer wave-lengths the absorption abruptly decreases when a certain wave-length has been exceeded. If the X-rays are registered on a photographic plate, the corresponding 'absorption edge' is clearly visible. Kurylenko's article intends to give a general survey of the work done in this region of physics. I regret to have to show that this effort has become a failure.

The article has been divided into five chapters. In the first the author gives a general experimental survey of the *K* absorption edges, as measured in the course of nearly 40 years. The selection of literature quoted is arbitrary, and it is often difficult to understand what led the author to his choice. Many of the earlier data quoted in this chapter could have been suppressed without any harm.

On p. 242 the author's measurements on the *K* edge of Fe in the compound magnetite, Fe_3O_4, are recorded. According to the traditional interpretation, this substance should contain two kinds of Fe ions, Fe^{2+} and Fe^{3+}. Kurylenko, in fact, finds for this substance a kind of 'double-edge', which he interprets as the two edges of Fe^{2+} and Fe^{3+}. If, however, he had analysed the *K* edge of pure FeO or of Fe_2O_3, or even of pure metallic iron, he would have found a similar 'doubling of *K* edge'. It has nothing to do with the presence of two valencies of Fe in magnetite; rather it is due to the fact that Fe is a transition metal with incomplete 3*d*- and 4*s*-bands of electrons. Similar doubling has been found in the case of other transition metals, both for the metals themselves (by Barnes and by Beeman and Friedman) and for their oxides (by Sanner).

In Chapter 2 the theory of the fine structure of X-ray absorption edges is treated. On the short wave-length side of an absorption edge fluctuations of the absorption are found adjoining the edge. This 'fine structure of X-ray absorption edges' is a phenomenon which, when interpreted by wave-mechanics, yields important information. A complete and clear treatment of the phenomenon has been given by Kronig in his original papers in the *Zeitschrift für Physik*. Those who have difficulties in reading these brilliant articles, because of the language, will gain little aid, I fear, from Kurylenko's survey.

In Chapter 3 technical details are given of various types of spectrographs, and their principles are discussed. Kurylenko compares on p. 396 the iron absorption edges taken by Beeman and Friedman with the double X-ray spectrometer, those of Kurylenko taken in the classical way with rotating crystal, and those of Sanner obtained with a curved crystal. Kurylenko fails to notice that he used a much smaller dispersion than in the first and the third methods. Therefore it is meaningless to compare his curves with those of the other investigators.

In Chapter 4 various experimental matters having very little in common are treated. In discussing the influence of a magnetic field of 10,000 gauss on the position of the iron absorption edge (p. 480) the author believes he has found a shift corresponding to an energy of 2·5 V. Already years ago I myself looked in vain for this effect and I think it improbable that it exists. At any rate, Kurylenko's dispersion was certainly too small to measure such a shift.

In the same chapter many experimental results are given which might have been placed in Chapter 1. I have some serious objections against the photometer curves reproduced in this work. A photometer curve is of little or no use if the dispersion is not mentioned at the same time. This is done nowhere by Kurylenko. Several of the photometer curves have been taken by Kurylenko himself. As a rule they are rather bad, sometimes extremely bad, as he neglected to take care that the original radiation had a constant intensity in the region of wave-lengths in question. Furthermore, Kurylenko obviously believes that the fluctuations recorded by him are real ones, i.e. that they correspond to a fine structure of absorption edges, but in more than one case they are so small that they are scarcely distinguishable from fortuitous ones. At any rate, Kurylenko does not care to convince his readers of their reality.

On the other hand, where Kurylenko reproduces curves from other authors the reproduction is often so bad that nothing of the original remains. (Compare, for example, Fig. 46, p. 485, where two curves 'according to Veldkamp' (*Z. Phys.* **82**, 776, 1933) have been recorded; nothing analogous to the right-hand figure has ever been published by Veldkamp; the left-hand figure has been thoroughly spoiled in reproduction.)

About Chapter 5 the same may be said as about Chapter 2.

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