LETTERS TO THE EDITORS

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Absolute X-ray Wave-lengths

IN a letter under this title, Messrs. H. Lipson and D. P. Riley[1] have made some suggestions regarding the values of the X-ray wave-lengths to be used in diffraction measurements. All wave-lengths in the X-ray spectra determined by crystal measurements are based on the value $d_1 = 3029 \cdot 04$ X.U. for *the lattice constant of calcite at* 18° and the corresponding values of d_2, d_3 . . . for the higher orders[2]. As secondary standards for the longer wave-lengths, quartz $d_1 = 4244 \cdot 92$, gypsum $d_1 = 7579 \cdot 07$ and mica $d_1 = 9927 \cdot 58$ X.U. have been used. Rock salt, which was used in the very first days of X-ray spectroscopy, was abandoned because the spectral lines obtained with this crystal did not have sufficiently good definition to allow the desired precision in the measurements.

As was first shown by Bäcklin[3], there is a discrepancy between the values of the X-ray wave-lengths from crystal measurements expressed in X.U. and those obtained with ruled gratings. Bäcklin pointed out that this could be explained by supposing that the value of the electronic charge was a few tenths per cent higher than the value commonly accepted at that time. As is well known, the more recent determinations of e have proved the correctness of this view.

Measurement of the X-ray wave-lengths with ruled gratings naturally gives their values in centimetres or Ångstrøm units ($= 10^{-8}$ cm.). Unfortunately, wave-length measurements in this region with ruled gratings do not yet give the same accuracy as those with crystals. As the large number of wave-lengths now determined by the crystal method in X-units form a consistent system, it is in my opinion inadvisable to make a general recalculation of them before we have a sufficiently accurate value for the conversion factor.

From the direct comparisons of some wave-length values determined both with crystals in X.U. and with ruled gratings in A.U. by Bäcklin, Bearden and Thyren[4], a conversion factor of $1 \cdot 00201 \times 10^{-3}$ is derived, with an error of some units in the last place. The X-unit, which then differs from 10^{-11} cm. by very nearly 0·2 per cent, may be retained for the scale employed to express crystal measurements. In the few cases where values in centimetres or A.U. are desired, the conversion factor just given may be used.

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March 24.

[1] Lipson, H., and Riley, D. P., NATURE, **151**, 250 (1943).
[2] Siegbahn, Manne, "Spektroskopie der Rontgenstrahlen" (2nd Edit., Berlin, 1931).
[3] Bäcklin, E., Dr. Diss., Upsala Universitets arsskrift, 1928 ; *Z. Phys.*, **93**, 450 (1935).
[4] Thyren, F., Dr. Diss, *Nova Acta Regia Soc. Sci. Upsaliensis*, iv, **1** (1940).

WE are glad that Prof. Siegbahn has been able to give his attention to this matter, as his opinion is certainly of great weight. The complication has arisen because crystallographers have not obeyed his original instructions to use the X-unit ; this is inconveniently small for expressing lattice spacings and it has therefore been the general custom to quote all results as though they were in Ångstrøm units.

A copy of Prof. Siegbahn's letter arrived in time to be read at the Institute of Physics conference held in Cambridge on April 10. The consensus of opinion was the same as his—that it would be better to wait for a more accurate value of the conversion factor. Nevertheless, it seems to us that it cannot be assumed that the accuracy will increase with time. Because the angles involved in diffraction by ruled gratings are necessarily small, it is probable that the accuracy attainable will never reach that with which the angles of diffraction from crystals can be measured.

May we suggest the adoption of the following conventions ? These will lead to factual correctness and to less confusion when the change to absolute measurements is ultimately made. When an accuracy not better than 0·1 per cent is claimed, the result should be given in Ångstrøm units, but for higher accuracy it should be given in X-units. Thus the lattice parameter of iron could be given as 2·86 A. or 2860·4 X., but not as 2·8604 A. The value of the wave-length adopted should always be explicitly stated.

It is, however, undesirable to have to use a unit or length that is not simply related to the C.G.S. system, and we are still of the opinion that the X-unit should be eliminated as soon as possible.

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Renal Excretion of Pituitary (Posterior Lobe) Extracts

IT is somewhat puzzling to notice that J. A. Shannon on p. 312 of the latest (1942) volume of the "Annual Review of Physiology" regards it as established that the kidney can excrete the antidiuretic principle of the posterior pituitary lobe, whereas J. P. Peters on p. 110 of the same volume appears to regard this as at least extremely doubtful. In neither case is the conclusion supported by a full reference to the work published on the subject. It may, therefore, be worth while to enumerate the papers concerned with the renal excretion of posterior pituitary extracts in the hope that such a survey will clear the issue.

After intravenous injection of posterior pituitary extracts, renal excretion of an antidiuretic activity has been observed in rats[1], rabbits[2] and dogs[3]. These results can be supplemented by those of Dale[4], Jones and Schlapp[5] and Larson[6,7], who reported the elimination of a pressor and an oxytocic activity after intravenous administration of posterior pituitary extracts. Opinions about the result of subcutaneous injections of posterior pituitary extracts are less unanimous. Gilman and Goodman[8] and Ingram, Ladd and Benbow[9] reported the urinary excretion of an antidiuretic activity after subcutaneous injections of large doses of posterior pituitary extracts into rats and dogs respectively. However, Walker's experiments[10] were positive in only two out of ten experiments on rats.

Summing up, there is satisfactory agreement that the kidney of all mammalian species investigated can