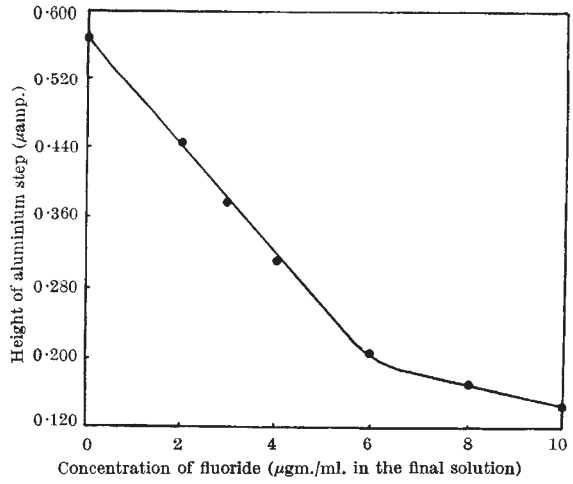

the method holds for concentrations of fluoride up to 6 μgm./ml. in the final solution, and that the aluminium/fluoride ratio does not correspond to AlF_3.

The method has been made much more sensitive by reducing the concentrations of aluminium and dye to one-tenth of those given above. In this way, concentrations of 0·2 μgm./ml. fluoride in the final solution have been satisfactorily determined.

This determination is being applied to a wide range of materials in order to eliminate the use, wherever possible, of the time-consuming distillation procedure. In particular, it has been applied to the determination of fluoride in hydrochloric acid, it being only necessary to neutralize the acid with sodium hydroxide of known fluoride content.

When the more dilute final solution of dye is employed, no precipitation of the dye takes place even in the presence of saturated sodium chloride, and the determination may therefore be carried out in this medium with consequent improvement of the lower limit of detection of fluoride in hydrochloric acid. Full details of this work will be published later.

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Jan. 4.

[1] Willard, H. H., and Dean, J. A., *Analyt. Chem.*, **22**, 1264 (1950).

Non-Quadrupole Lines in X-Ray Spectra

It is well known that, by giving prolonged exposures, many forbidden lines appear in X-ray emission spectra violating the dipole selection rules derived from theory. Most of the forbidden lines obey the quadrupole selection rules, namely, $\Delta l = 0, \pm 1, \pm 2$ and $\Delta j = 0, \pm 1, \pm 2$, except $l = 0$ to $l = 0$, and $j = 0$ to $j = 0$ and $j = \frac{1}{2}$ to $j = \frac{1}{2}$. Some workers have, however, noticed a few forbidden lines which even violate the quadrupole selection rules and which cannot be explained by any multipole radiation theory. Such lines are generally known as 'non-quadrupole' lines.

In the detailed study of the L-spectrum of platinum and mercury undertaken in this laboratory, we came across some such non-quadrupole transitions. It appears from our investigations, as well as from those of others, that the following two general conditions for the emission of such lines can be stated: (1) it is impossible to observe any non-quadrupole line for which either Δl or Δj is three; (2) only those non-quadrupole lines can be observed for which both Δl or Δj are simultaneously zero.

Another feature which is very striking about these non-quadrupole lines is that the experimentally observed energies of these lines are invariably somewhat lower than those calculated from the energy-level diagrams. Though the non-quadrupole lines are very faint and the measurements are therefore correspondingly uncertain, the observed energy-differences are outside experimental errors. It thus appears as if some part of the energy of the non-quadrupole radiations is dissipated in the process of emission itself.

Details of the forbidden lines of platinum and mercury can be found elsewhere[1].

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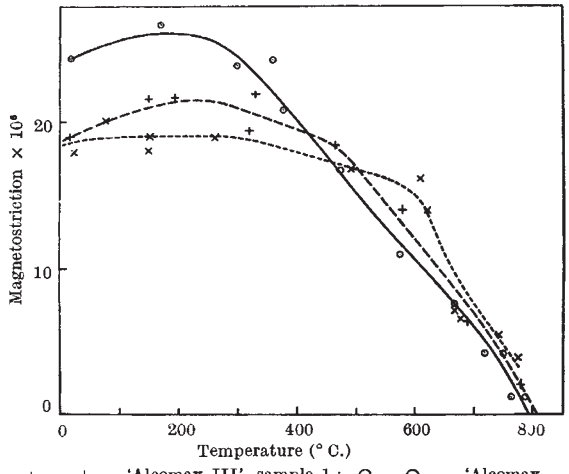
[1] Deodhar, G. B., and Mande, C., *J. Sci. Indust. Res.*, **9** B, 263 (1950); **10** B, 260 (1951); **11** B, 1 (1952).

Temperature Variation of the Magnetostriction of 'Alcomax'

The temperature variation of the longitudinal magnetostriction of 'Alcomax' and some related alloys is being investigated, and the results so far obtained are shown in the accompanying graph. The magnetostriction was measured in a field of about 1,500 Oersted, using an adaptation of Honda's rotating mirror method. The specimens were as cast or air-cooled without a magnetic field. Although these preliminary results have an accuracy of only about 10–15 per cent, they may help to decide what



+ – – + –, 'Alcomax III', sample 1; ⊙ — ⊙ —, 'Alcomax III', sample 2; × - - - × - , 'Ticonal'