

This is not the place to describe our results in detail, but they may be summarized by saying that, at zero D.C. plate potential and with the minimum space current required for oscillation maintenance, the oscillation gave a pure heterodyne note corresponding to a single oscillation with a period approximately equal to one half the time  $T$  of ion transit from filament to plate and back, as given by the Scheibe expression<sup>2</sup>:

$$T = 4r_g \left\{ f \left( \sqrt{\log_e \frac{r_g}{r_f}} \right) + g \left( \sqrt{\log_e \frac{r_p}{r_g}} \right) \right\} / \sqrt{\frac{2eV_g}{M}}$$

Here  $T$  is the transit time in seconds,  $r_f$ ,  $r_g$  and  $r_p$  are the radii of the filament, grid and plate respectively,  $V_g$  is the grid potential in E.M.U.,  $e/M$  is the specific ionic charge in E.M.U./gm., and  $f$ ,  $g$  are functions given in Scheibe's paper<sup>2</sup>. "Resonance rectification" effects were observed at periods of about  $T$ ,  $T/2$  and  $T/3$ .

As the space current was increased, the period of the oscillation became increasingly smaller than  $T/2$ . At a critical space current the type of oscillation suddenly changed, and the single oscillation was replaced by a set of oscillations of slightly different frequencies, which gave an impure heterodyne note. With further increased current the frequencies of the multiple oscillations diverged, and when the condition of space-charge-limited emission was approached, there was an abrupt change to a single oscillation period of rather less than  $T$ .

It appears that much information concerning the mechanism of electronic oscillations might be obtained by applying this method of investigation to valves with different electrode structures, and preferably to valves with structures which can be altered without opening up the tube.

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<sup>1</sup> NATURE, 141, 1009 (1938).

<sup>2</sup> Scheibe, *Ann. Phys.*, 73, 70 (1924).

## Optical Anisotropy of Cellulose Sheet

THE birefringence<sup>1</sup> of 'Cellophane' (regenerated cellulose sheet) has been measured for more than two hundred samples, kindly supplied by the makers. Three main points have emerged:

(1) The birefringence ( $B$ ) varies with the wavelength of the light used, the law being approximately

$$B = B_0 (1 - 0.000016 \lambda),$$

where  $\lambda$  is in angstroms.

(2) Results for the birefringence of the thinnest material (about one thousandth of an inch) vary from 0.0056 to 0.0132, with a concentration around 0.0089. The thicker materials (1.2 and 1.6 thousandths of an inch) give, on the average, lower values of birefringence.

(3) The birefringence is least in the middle of the web, and is about 30 per cent greater near the selvages.

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<sup>1</sup> Drummond, D. G., NATURE, 145, 67 (1940).

## Kornerupine from Ceylon: a New Occurrence

SOME years ago we discovered specimens kornerupine in mixed parcels of typical cut Ceylon gem-stones, and this prompted us to search for the mineral in gem gravel concentrates kindly sent to us direct from Ceylon by Mr. Hans Van Starrex. From the first lot of rough so examined, which consisted mostly of green zircons, two small pieces of kornerupine were recovered, so that yet another species must be added to the already long list of gem mineral found in the Ceylon gravels.

These two specimens, greenish-brown in colour and weighing 0.430 gm. and 0.436 gm. respectively have the following properties: density, 3.33; refractive indexes,  $\alpha$  1.671,  $\beta$  1.683,  $\gamma$  1.684;  $2V$ ,  $25^\circ$   $r < v$ ;  $\alpha$  light brown,  $\beta$  yellow,  $\gamma$  dark green. I may be noted that Madagascar kornerupine differ in having  $r$  greater than  $v$ .

Credit for the identification of our specimens is due to Dr. L. J. Spencer, and confirmation was provided by Dr. G. F. Claringbull, who kindly carried out X-ray measurements.

It is hoped that later a fuller account, together with a complete analysis, will be published in the *Mineralogical Magazine*.

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## Blue Rocksalt

SPECIMENS of natural rocksalt are frequently coloured, the more usual colours being blue, violet and pink. Blue halite from Stassfurt in particular has received much attention, and many suggestions have been offered to account for the tint. Siedentopf's<sup>1</sup> theory that the colour is due to colloidal sodium was regarded generally as satisfactory until Spezia<sup>2</sup> pointed out that its solution should then be more alkaline than that of the colourless form—which it is not. Doelter<sup>3</sup> regards the colour as caused by foreign inclusions, colloidal or otherwise, and favours a mixture of iron and manganese, though sulphur and organic substances are not ruled out.

More recently, however, Kennard, Howell and Yaeckel<sup>4</sup> have decided against any pigmental theory, as the result of a spectroscopic examination of a specimen of colourless Stassfurt rocksalt containing a distinct zone of blue. No difference in composition between the coloured and colourless parts could be detected; traces of several foreign elements, including aluminium, lithium, silicon and titanium, were present in both. The authors regard their results as supporting the views of those earlier investigators<sup>5</sup> who have attributed the colour to some structural cause.

Apparently, however, gold has not been specially looked for; it may easily escape detection spectroscopically because it is not one of the very sensitive elements, some 10 p.p.m. being the lower limit of detection by ordinary methods. The *Glimmschicht* procedure, developed by Goldschmidt and his