directly to another empty luminescence centre, and one is driven to the conclusion that a large part of the luminescence of ZnS–Cu does not involve electrons travelling freely through the crystal. The photoconductivity of ZnS–Cu may be simply due to a limited displacement of the electrons within the trap and luminescence centre.

Finally, we would like to answer a possible criticism of the work of Randall and Wilkins (*loc. cit.*), who maintain that there is continuous distribution of trap-levels in such phosphors as ZnS–Cu. It has been correctly pointed out that some of the glow curves in these papers, quoted as evidence for a continuous trap distribution, could be explained on the basis of a single trap-level if retrapping is taken into account. This theory would require, however, that the shape of the glow curve should be a function only of the number of traps filled. This is not the case, however, and the glow curves in Fig. 2 show the quite different curves obtained if the traps are partly filled by strong excitation at a high temperature (the phosphor being afterwards cooled in the dark) or by feeble excitation at a low temperature. These results seem to show conclusively that the trap-levels are distributed in depth.

We hope to publish shortly further details of this work.

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Ozone and Auroral Spectra

In 1941, we published a theory[1] which provided, among other things, an explanation of seasonal and latitude variations in the thickness of atmospheric ozone. From this theory we were able to predict ozone thicknesses in latitudes for which, as yet, there are no direct observations—for example, in polar regions. Furthermore, we have shown that near the poles the ozone thickness should be practically zero soon after the winter solstice.

Now routine measurements of ozone thickness, carried out by E. Tönsberg and K. L. Olsen in Tromsö[2], have shown values so low as 0·05 cm. in December. It may be assumed that these occurrences are due to the movement of air masses from higher latitudes, so that the results afford good confirmation of our theoretical predictions.

When so little ozone is present, opportunities are offered for making spectrographic observations, as, for example, by observing the trans-auroral line 2972 A. ($^3P_1 - {}^1S_0$), O I. For this wave-length the optical density of the atmosphere is 0·60 (due to molecular scattering) and 0·365 (due to absorption by ozone), so that the intensity of radiation reaching the ground is about a tenth of that in the upper atmosphere. According to Pasternack's transition probabilities[3] and to the experimental confirmation by L. and R. Herman[4], we must expect a greater intensity for the line 2972 A. than for the line 6300 A. ($^3P_2 - {}^1D_2$), so that even allowing for a reduction of intensity of a tenth, the trans-auroral line should be observable in a zenithal aurora, in Tromsö, during a winter night when the ozone thickness does not exceed 0·05 cm.

Of course, this observation should be easier at a higher latitude, for example, in Spitsbergen, and preferably at some altitude above sea-level, in order to reduce molecular scattering. It is also to be expected that at other stations, at the same or even a lower latitude than Tromsö, the existence of polar air flows might offer still more favourable observing conditions.

It may be added that considerations of atmospheric absorption indicate that, under similar conditions, it might be possible to extend, by at least 200 A., the observed spectra of stars suitably located.

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Mass-Spectrographic Separation of Isotopes of Gaseous Elements

Experiments recently carried out in this Institute[1] have shown that, by bombarding silver disks with beams of ions of neon isotopes obtained from a high-intensity mass-spectrograph[2,3], it is possible to prepare targets, containing the separated neon isotopes, that are suitable for certain investigations in nuclear physics. Due to the high energy of 60 keV., the ions penetrate into the silver surface to a depth of about one hundred atomic diameters, and to this depth a high concentration of neon atoms can be obtained. The experimental results (*loc. cit.*) indicate that a maximum concentration is approached when the surface has been hit by about 6×10^{16} ions per cm.^{2}, corresponding to the collection of 2 μgm. of neon per cm.^{2}, if all the neon atoms remain in the surface.

In the meantime, it has been demonstrated that it is possible to release the neon atoms almost completely from the silver by heating the target material by means of high-frequency induction *in vacuo*. If a sufficiently large target area has been irradiated with neon ions, it is possible in this manner to isolate quantities of neon gas, containing one isotope only, sufficient for many experimental purposes. Experiments of this kind have also been carried out with aluminium, nickel and tungsten as target materials.

The experiments were carried out in the following way. The targets, 6·0 cm. × 2·5 cm. in size, were cleaned by means of a suitable acid, rinsed with distilled water and then strongly degassed by high-frequency induction *in vacuo*. After a target had been mounted in the mass-spectrograph, its surface was exposed, a portion at a time, to the bombardment of $^{20}Ne^+$-ions at a current of about 40 μamp., for about one hour altogether, so that maximum concentration of neon atoms in the entire surface would be ensured. Then the target was removed from the apparatus and rolled around a steel cylinder of 6 mm. diameter, in order to give it a shape appro-