highly refractive materials for use in prisms, however, it has been necessary to employ two internal reflexions, preferably at the same angle of incidence to prevent deviation of the light beam, as is done in the Fresnel rhomb.

The medium most suited for use in the polarizing rhomb, in addition to being of low dispersion, must possess a refractive index such that $d\Delta/di = 0$, to minimize errors in phase difference due to any incorrect adjustment of the angle of incidence. Since the dispersive powers of the common glasses vary approximately proportionally to their refractive indices, and as $\Delta_{max.} = \pi/4$ when $n = 1\cdot497$, $n_D = 1\cdot497$ and $\varphi = 51° 47'$ are the most suitable refractive index and angle for the rhomb respectively. In practice, however, for stability reasons it is customary to use a 54°-prism constructed from the least refractive of the stable borosilicate crown glasses for which $n_D = 1\cdot51$, although $n_D = 1\cdot49$ is within the range of refractive index of the seldom used and less stable fluor crowns.

The low dispersive optical plastics, because they possess a refractive index in general less than that of glass, usually in the range $1\cdot49$–$1\cdot50$, are ideally suited for rhomb construction. A number of satisfactory rhombs have been made in the various media of this class now available.

For precision work, these prisms suffer from the defects at present common to the optical plastics, due to the instability of their surfaces and their ability to absorb water vapour; in addition, a certain amount of light scattering is apparent. It is hoped that in the future these difficulties will be overcome. For the present the plastic rhombs possess many advantages for demonstration and student use, one of which is that they can be readily constructed in laboratories where glass-working equipment is not available.

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Absorption Spectrum of Indium Vapour in the Schumann Region

THE ground-state of the indium atom is $5s^2\ 5p\ ^2P^0_{1/2}$, and the term system responsible for the ordinary series spectrum—that is, the system built on the $5s^2\ ^1S_0$ ground-state of the ion—was summarized and extended by Paschen[1]. Also included in his list are the following three terms: $5s5p^2\ ^4P$, $5s5p^2\ ^2D$ and $5s5p6s\ ^4P$. Of these, the first-named was originally identified by Sawyer and Lang[2] and by Lansing[3] independently, and seems well established; the other two terms are much more tentative. The sp^2-configuration should give other, hitherto unidentified terms, ^2S and ^2P, remembering that the use of Russell-Saunders symbols is merely conventional, as we are dealing with a case which probably departs markedly from LS-coupling. Rough estimates indicate that these terms, and those of other configurations in which two electrons are excited, will lie above the normal ionization potential.

It is well known from Beutler's studies of a number of elements[4] that a profitable method of seeking certain of such highly excited terms lies in observation of the absorption spectrum of the vapour of an element in the spectral region on the short wavelength side of the ionization limit. While the method only reveals combinations which occur in reasonable strength with the ground-state, it has the advantage of showing up transitions not readily observed in emission owing to auto-ionization.

The absorption spectrum of indium vapour in the Schumann region has been obtained in this laboratory, by the use of a one-metre normal-incidence grating, a carbon-tube furnace as absorption vessel, and a heavy-current hydrogen tube as source.
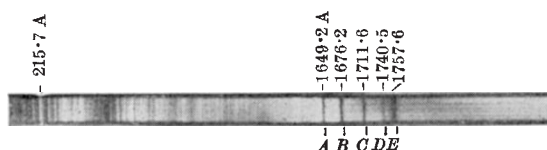
The accompanying reproduction shows a typical spectrogram, obtained at a furnace temperature of 1,250° C. The hydrogen tube yields a continuum down to 1650 A., and extending below this, the closely packed many-line spectrum of H_2. Five intense absorption lines can be seen in the region 1600–1800 A. At a furnace temperature of 950° C., the lines labelled A, B, C, E are intense, line D just visible, becoming plain at 1,100°. The lines A and C are fairly sharp, B and D rather diffuse and E very diffuse. At 1,400° a further diffuse absorption line, F, occurs upon the many-line spectrum at 1318 A., and the series lines $5^2P^0_{1/2} \rightarrow m^2D_{1/2\ 3/2}$ up to $m = 23$, as well as the series limit continua, are then seen plainly in absorption.

While the results of initial measurements of the six far ultra-violet lines are not of high accuracy, the wave-number intervals, combined with considerations of the character of the lines and probable coupling conditions, lead to the tentative conclusion that lines A to D represent the PP' multiplet $5^2P^0 \rightarrow 5s5p^2\ ^2P$, and E and F are respectively $5^2P^0_{3/2} \rightarrow 5s5p^2\ ^2S_{1/2}$ and $5^2P^0_{3/2} \rightarrow 5s5p6p\ ^2S_{1/2}$. Four new levels are thus identified:

$$5s5p^2\ ^2P_{3/2} - 13964\ \text{cm.}^{-1} \quad 5s5p6p\ ^2S_{1/2} - 31421\ \text{cm.}^{-1}.$$
$$^2P_{1/2} - 12989$$
$$^2S_{1/2} - 12439$$

The observation of the diffuse series up to $m = 23$, noted above, represents an addition of nine members to those recorded by Paschen. However, it is doubtful whether accurate measurement of these is possible on the low-dispersion pictures so far obtained; an attempt to use a higher-dispersion quartz instrument may be made later.

A full account of the work described and details of further experiments in hand will be published elsewhere.

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⁴ For references, see Boyce, J. C., Rev. Mod. Phys.. 13, 1 (1941).