Illustration and detection of inclined and horizontal dispersion in biaxial crystals.

By L. R. Wilberforce, M.A.,

Professor of Physics in the University of Liverpool.

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As it is not always easy to obtain for the use of students suitable specimens of crystals which exhibit inclined or horizontal dispersion of the mean lines to a marked extent, a ready method of artificially producing optic pictures which show the appearances characteristic of these dispersions may be found of service by teachers.

It is obvious that, if the optic picture of an ordinary biaxial crystal is viewed or projected through a prism whose refracting edge is either parallel or perpendicular to the axial plane of the crystal, the dispersion produced by the prism will displace the components of the optic picture due to the various colours of the spectrum through distances increasing from red to violet, and will thus reproduce the phenomena of horizontal and inclined dispersion respectively. For purposes of demonstration, these phenomena can evidently be regulated at will by the employment of a suitable series of prisms.

I should hardly have ventured to call attention to so simple a device were it not that the same principle can be utilized for the investigation of the existence of these dispersions in a crystal when they are too small for direct detection with certainty.

In this case a prism is required whose dispersion is so small that the simulated inclined or horizontal dispersion which it will produce in an ordinary optic picture is just on the verge of what can easily be detected. This prism is arranged so that the optic picture of the crystal under test is viewed through it, the refracting edge of the prism being parallel or perpendicular to the axial plane of the crystal according as horizontal or inclined dispersion is being looked for. The prism is then turned over so that the dispersion it produces is reversed in direction. If the crystal has no dispersion of the mean lines, the two optic pictures seen will of course be exactly similar in distribution of colour; but if the crystal has a small dispersion of the type under investigation, the apparent effect due to this will be increased by the prism in one of its positions and approximately neutralized by it in the other, and the dissimilarity in colour distribution between the two optic pictures can be readily observed.

A convenient compound prism for this purpose, giving suitable dispersion together with small deviation, is made by cementing together two prisms, of extra dense flint glass and of dense barium crown glass respectively, so that they oppose each other, each prism having a refracting angle of about 15°. I am indebted to the Derby Crown Glass Company for their readiness in meeting these requirements both as regards materials and dimensions. The component prisms may have refracting edges about 4 cm. long, and should be about 11 mm. wide. The thickness of the compound prism will then be about 3 mm., and it can be slipped when required into the little opening below the analyser of an ordinary polariscope designed for the introduction of a quarter-wave plate or a quartz-wedge.

It will be found that the tests for horizontal and inclined dispersion are respectively most sensitive when the optic picture is arranged so as to show the brushes as a cross in the first case and as rectangular hyperbolae in the second.