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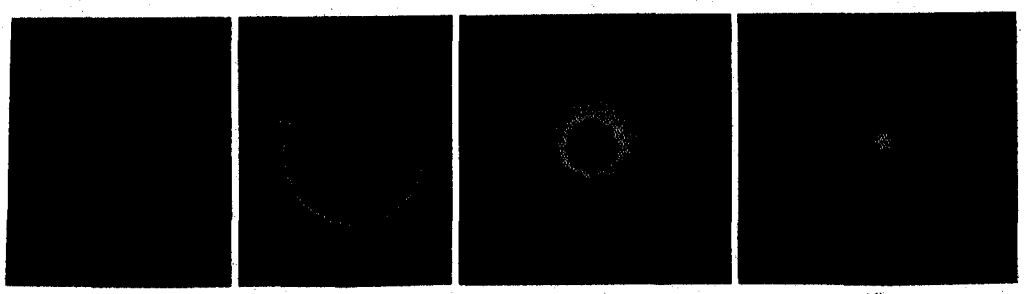
Conical refraction in naphthalene crystals

The birefringence of many organic crystals of the aromatic class is large, and when the intermediate index differs widely from the upper and lower indexes, the angles of internal and external conical refraction assume very high values. These angles in naphthalene, for example, are both about 13° 45′, which may be compared with 1° 54′ and 1° 44′ respectively in the classical case of aragonite. By fusion followed by very slow solidification, it is fairly easy to obtain transparent blocks of naphthalene and other aromatic compounds. When suitably cut and mounted between glass cover-slips, naphthalene crystals exhibit the phenomena of conical refraction in a very striking way, and enable their features to be critically examined.

The photographs reproduced with this note are the images of a fine illuminated pinhole held against the face of a naphthalene crystal 2 mm thick and viewed



(1) (2) (3) (4)

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through it in the appropriate direction. In the first of the series, the pinhole is seen in perfect focus and appears as a very sharp and perfect circle. The three other pictures illustrate the effect of moving the focus from the pinhole, until, finally, in the last picture, the second surface of the crystal is in focus. The central bright spot seen in the fourth picture is actually an image[1] of the fine pinhole used, and appears at the point where the axis of single-ray velocity meets the rear surface. This bright spot continues to be the most conspicuous feature in the field for a great distance behind the crystal.

It will be seen on a comparison of the first and second pictures that, at least in the case of naphthalene, *the so-called Poggendorf dark circle vanishes when the pinhole is seen in perfect focus.*

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[1] Raman, C V, *Nature*, **107**, 747 (1921), and *Phyl. Mag.*, **43**, 510 (1922).