



XLII. Note on the selective absorption of light by optical glass and calc-spar

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XLII. *Note on the Selective Absorption of Light by Optical Glass and Calc-spar.* By EDWARD L. NICHOLS and BENJAMIN W. SNOW*.

IN the course of some recent experiments †, the authors had occasion to measure the absorption which the rays from an incandescent lamp suffered in passing through a lens and a pair of Nicol's prisms. A number of observations upon the absorption of light by lenses have already been published, but they deal for the most part with the total absorption. Vierordt ‡, however, and very recently Kruess §, have measured the amount of absorption that takes place in each region of the visible spectrum, and Abney and Festing || have shown that such absorption may introduce very important errors into colour photometry.

For the details of the method by means of which the selective absorption in glass and calcite was determined, we must refer the reader to the article already cited. The lens and prism in question were mounted before the slit of a spectrophotometer under conditions which made it possible to compare the light from a glow lamp with rays from the same lamp after passage through the lens, or through both lens and prisms. In every other respect the two sets of rays under comparison were subjected to precisely the same treatment, in their path from the lamp to the eye of the observer. Any differences in the character of their spectra were ascribable, therefore, to losses incurred in traversing the lens, on the one hand, or to the combined action of the glass and the calcite on the other. No attempt was made to distinguish between losses due to absorption and those resulting from reflexion at the various surfaces.

In presenting our results, light of the region of the D line ($\lambda = 5890$) is taken as a standard of reference. The amount of light of this wave-length, transmitted by the lens, or by the Nicol's prisms, respectively, is taken as unity, and the relative proportions of light of other wave-lengths transmitted are given in terms of that quantity. This method expresses the character of the change. The results are

* Communicated by the Authors.

† Phil. Mag., vol. xxxii. p. 406.

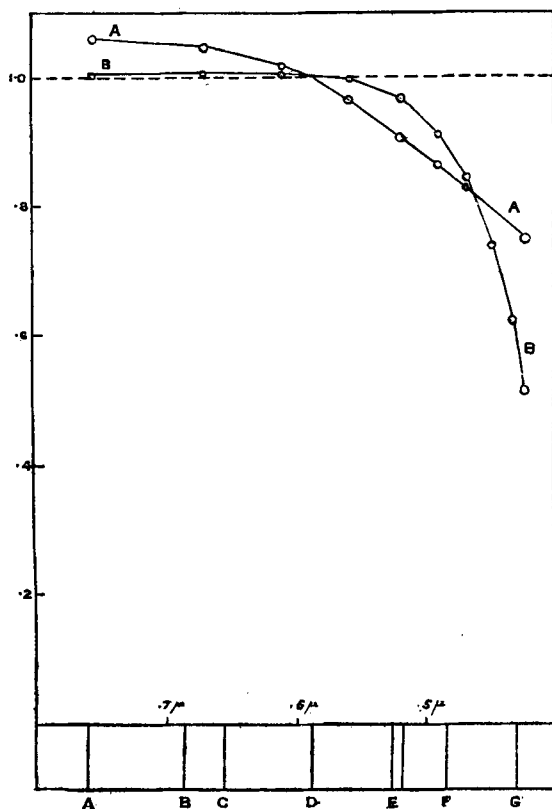
‡ *Die quantitative Spectralanalyse*, 1876, p. 113.

§ Gerhard und Hugo Kruess; *Kolorimetrie*, 1891, p. 252.

|| "Colour Photometry," 1888, Philosophical Transactions, vol. clxxix. p. 549.

merely relative. Expressed graphically, the curve of a substance the absorbing power of which is not selective is a horizontal line, with ordinate equal to unity.

Figure showing selective absorption:—(A) by a glass lens;
(B) by a pair of Nicol's prisms.



Tables I. and II. show the selective transmission in glass and calcite, respectively, expressed in the manner already indicated. Curves A and B of the accompanying figure present the data of the tables in graphic form. Abscissæ are wave-lengths and ordinates represent amounts of light transmitted.

TABLE I.

Selective transmission of light by a lens.

Wave-lengths.	Transparency for each wave-length in terms of that of the region of the D line.
$\lambda = 7530 \mu$	1.059
6685	1.046
6080	1.015
5570	0.964
5185	0.906
4920	0.867
4685	0.826
4500	0.812
4340	0.777
4250	0.750

TABLE II.

Selective transmission of light by a pair of Nicol's prisms.

Wave-lengths.	Transparency for each wave-length in terms of that of the region of the D line.
$\lambda = 7530 \mu$	1.006
6685	1.003
6080	1.001
5570	0.995
5185	0.977
4920	0.913
4685	0.844
4500	0.736
4340	0.617
4250	0.500

The lens referred to in Table I. is made of ordinary white crown glass (refractive index 1.549). It consists of two simple plano-convex lenses, the added mean thickness of the two being about 2 cm.

The Nicol's prisms were of the usual form, their thickness, measured in the direction of the path of the ray, being about 50 mm.

It will be seen that the glass of which the lens was constructed although not more strongly coloured than most optical glass, the tint being quite unnoticeable to the unaided eye, at least when seen through in the direction of the optical axis, is far from being colourless. The selective absorption begins to show itself in the red and the transparency falls off

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steadily throughout the spectrum, the transparency for the region beyond the G line being only three fourths as great as that for red light.

In the case of the Nicol's prisms, however, the transparency throughout the red and yellow is quite uniform, diminishing less than one per cent. between the A line and the D line.

In the blue and violet, on the other hand, absorption appears to be relatively more marked in calcite than in glass.

Physical Laboratory of Cornell University,
Ithaca, New York, June 1, 1891.

XLIII. *Notices respecting New Books.*

Guide through the Collection of Building-materials in the Imperial Natural-history Museum at Vienna. [*Führer durch die Baumat-erial-Sammlung, &c.*] By FELIX KARRER. Small 8vo. 355 pages, with numerous plates. Lechner; Vienna.

DR. ARISTIDES BREZINA, Director of the Mineralogical Department of the Museum, gives a short Preface, noticing the history of this special collection, giving due credit to those who have helped in the work, and especially acknowledging the industry and acumen of F. KARRER in perfecting this extensive and useful Collection. An Introduction gives (1st) a general account of the collection and of the method followed in its arrangement and in the Guide-book: (2nd) brief notices of the characteristics of the most common and useful rock-materials: (3rd) the geological order of the rocks and strata: (4th) a Bibliography of memoirs and books on constructive materials, in chronological order from 1831.

In the body of the work the main arrangement is geographical; and a city or town in each division, in many cases supplying one or more chief buildings (of which there are forty "phototypes"), has a detailed account of the nature and sources of the various building-materials used in these constructions; and its paving-stones and road-metal are also carefully noted. Thus Vienna, Linz, Salzburg, Innsbruck, Bregenz, Graz, Klagenfurt, Laibach, Görz, Triest, Parenzo, Zara, Prague, Brünn, Troppau, Lemberg, Cracow, Czernowitz, Budapest, Hermannstadt, Klausenberg, and Agram, give full opportunities for detailing the particulars of the building-stones, decorative stones, sand, lime, hydraulic cement, plaster, bricks, roofing-stone, &c., locally used in Austria-Hungary. Of foreign countries large and well-known buildings at Cologne, Regensburg, Strassburg, Nürnberg, Dresden, Rome, Milan, Paris, Brussels, and Schaerbeck are illustrated; and the materials used in them and in other buildings, as well as in streets and roads, are enumerated according to the many examples in the Museum. Shorter, but useful, notices of the building-materials in the Museum from England, Norway, Russia, Switzerland, Spain, Portugal,