The growth structure obtained by the above method obviously bears a close relation to the structures which Buerger[1] has obtained by etching with strong hydrochloric acid the cleavage and outer surfaces of zinc single crystals grown by the Bridgman method. The method described here has been successfully extended to other metals ; a fuller account of the results will be published elsewhere.

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[1] Buerger, M. J., Z. Kristallogr., 89, 195 (1934).

Gloss of Papers

WE have completed a psycho-physical study of the gloss of several series of coated and uncoated papers differing widely in surface finish and in colour, including a black, a green and a mauve, besides an assortment of shades of white, cream, yellow and brown.

Over such a wide range considerable disagreement is found between judgments of individual observers, and marked shifts in ranking occur when the conditions of illuminating and viewing the specimens are changed. Judgment appears to be based upon an appraisal of a physical situation taken as a whole. The factors of this physical situation are weighted differently by different observers under the same conditions and by the same observer under different conditions. Consequently it is possible only to devise a method of instrumental grading which shall satisfy the mean judgment of a large number of observers under certain average conditions of grading. Within these limitations, an extension of an empirical equation previously suggested[1] enables instrumental measurements to be fitted to visual gradings tolerably well. The general expression is :

$$G = AS(a+b \tanh 10/bL) - B \tanh [cS(P-1)/100]^3,$$

and is applied to papers illuminated by a nearly parallel beam incident at 45°, where S is the intensity of light reflected at the specular angle (45°), L the intensity in the direction of the normal (0°) and P

is defined as the ratio of intensity at 45° to that at 40°. A, a, B, b and c are constants and G is the numerical estimate of the visual gloss. All intensities are expressed as a percentage of the intensity reflected normally to a surface of magnesium oxide under the same incident beam.

It is seen that the equation represents a weighted mean of three factors. The first is S, the intensity at the specular angle. For papers of high luminance factor and moderate gloss, this factor predominates. The second is $(S \tanh 10/bL)$ and provides a measure of the contrast observed when the eye is transferred from the specular angle to a direction remote from the specular angle : the hyperbolic tangent has no physical significance but is introduced in order to prevent G from rising to abnormally high values for black and dark grey papers. The third term, $\tanh [cS(P-1)/100]^3$, is appreciable only for papers at the higher end of the gloss scale. For highly glossy papers having the same values of S and L, the one having the more sharply peaked polar curve is adjudged the less glossy by most observers, and the third term of the equation makes allowance for this.

It appears that in order to get the best possible correlation between G and visual observations, the weighting constants A, a, B, b and c must be adjusted to suit the individual observer and the prevailing conditions of observation. This is generally impracticable and undesirable, and for most purposes we find that the equation reduced to the form :

$$G = S(0 \cdot 390 + 0 \cdot 325 \tanh 20/L) - 100 \tanh [0 \cdot 115 \ S(P-1)/100]^3$$

gives with visual observations product-moment and rank correlation coefficients of the order of $+0 \cdot 94$ for all types of paper, and it is suggested that it may be made the basis of a practical method of gloss specification. For comparative work with similar papers where P is small and L nearly constant, the equation can, of course, be simplified. The incident and reflected beams used in this work were in the form of truncated wedges of vertical angle 0° 30′.

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[1] Harrison, V. G. W., and Poulter, S. R. C., Brit. J. App. Phys., 2, 92 (1951).

Trans-Ethylenic Structure of Sphingosin

THE molecular structure of sphingosin (I) has been established with reasonable certainty by degradation[1] and by the synthesis of the dihydro derivative[2]. Concerning the spatial structure, however, no more can be inferred at present from the available data of optical rotations than that the compound would seem to belong to the D-(—)amino carboxylic acid series[3].

An attempt was made by Ono[4] to decide on the steric disposition of the substituents of the ethylenic