

strength of double refraction, and sign of elongation. By using, in addition, a high-power objective, inserting the condenser and removing the eyepiece, the interference phenomena in convergent polarized light are obtained. From the character of the figures it may be determined whether the substance is uniaxial or biaxial, whether its sign is positive or negative, and to what extent it exhibits dispersion.

Before measuring these optical properties the substances must be purified, and the effect of the solvent from which they are crystallized must be considered, for solvent-of-crystallization is frequently taken up, modifying the crystallographic properties considerably. When working with very minute amounts of alkaloids it is convenient to extract them with benzene. The solutions are allowed to stand until reduced to small bulk. Large drops are then placed on several microscope slides and covered at once with small cover-glasses. Evaporation then takes place and the alkaloid crystallizes out round the edge of the cover. After the solvent is completely gone the immersion liquids may be introduced and the usual observations made. The data obtained in this way with the four cinchona alkaloids are to be published in a separate paper.¹

THE IDENTIFICATION OF THE CINCHONA ALKALOIDS BY OPTICAL-CRYSTALLOGRAPHIC MEASUREMENTS.²

By Edgar T. Wherry and Elias Yanovsky.

[ABSTRACT.]

THE probable value of optical-crystallographic measurements for the identification of alkaloids difficult to distinguish by chemical means being evident, the cinchona alkaloids—cinchonine, cinchonidine, quinine, and quinidine—have been exhaustively studied from this point of view. Samples were purchased on the open market and purified and identified chemically by the junior author, the optical properties being then measured by the senior author.

¹ To be published as a Professional Paper by the United States Department of Agriculture.

² Read at the November, 1917, meeting of the Association of Official Agricultural Chemists. To be offered for publication in the *Journal of the American Chemical Society*.

For determining the refractive indices by the immersion method, solutions of potassium-mercuric iodide in 50 per cent. glycerine were used.

The four alkaloids were found to be quite distinct in properties, and to be readily distinguishable. For instance, if crystallized from benzene and immersed in a liquid with refractive index 1.670, quinine is recognized at once by crystallizing in needles; all the refractive indices of which are much lower than that of the liquid, and which show between crossed nicols only first-order polarization colors, indicating the double refraction to be very low. Cinchonidine is in rods or plates, with the refractive index lengthwise somewhat less than that of the liquid, showing between crossed nicols mostly second-order colors, and yielding no interference figures in convergent light. Both cinchonine and quinidine have indices lengthwise higher than the liquid, but they may be recognized by immersion of another sample in liquid with index 1.690. Cinchonine shows the index lengthwise equal to that of this liquid; and yields an interference figure with a small axial angle. Quinidine has the index lengthwise equal to, or slightly lower than, the liquid, but its axial angle is large.

Experiments with mixtures and with drugs containing these alkaloids have shown these methods to be of considerable practical value, and application to other groups of substances is planned.

ARSENIC IN SULPHURED FOOD PRODUCTS.

By W. D. Collins.

[ABSTRACT.]

SMALL amounts of arsenic, from one to four parts of arsenic (As_2O_3) per million parts of product, have been found in hops and dried fruits treated with fumes from sulphur which contained arsenic. A number of samples of Japanese sulphur contained from 100 to 500 milligrammes of arsenic (As_2O_3) per kilogramme. It is generally known that sulphur from the largest source of supply in the United States is free from arsenic. A sample from this source, and samples from five other sources in the United States, all proved to be free from arsenic, or to contain less than one milligramme per kilogramme. Producers can avoid contamination of food products with arsenic from sulphur by