

tration on the other side of the membrane may be evaluated on the basis of some semi-theoretical standard curve. Or, these potential values may be compared to an empirical curve, determined for a specific membrane in advance. A third method consists of an electrometric titration: the membrane separates the solution of unknown concentration from water, to which electrolyte solution of known (higher) concentration is added stepwise, whereby the potential difference is diminished stepwise and finally is reversed. Zero potential difference indicates that the activity of the critical ion is the same on both sides of the membrane. The preliminary results listed below were obtained using the third method.

TABLE I
THE DETERMINATION OF CATIONS WITH COLLODION MEMBRANES

Electrolyte (0.01000 mole/liter)	Concentration, found, mole/liter
KCl	0.00998
KClO ₃	.00988
KClO ₄	.01008
KNO ₃	.01022
K ₂ SO ₄	.01012
NaCl	.01014
LiCl	.01012
NH ₄ Cl	.01000
MgCl ₂	.01018

TABLE II
THE DETERMINATION OF ANIONS WITH PROTAMINE COLLODION MEMBRANES

Electrolyte (0.01000 mole/liter)	Concentration found mole/liter
KCl	0.01016
NaCl	.00980
MgCl ₂	.01008
NaF	.01012
KNO ₃	.01016
NaNO ₃	.00980
NaAc	.01012
KClO ₃	.01018
KClO ₄	.00988
KIO ₃	.01018

This method should be useful in studies of the activity of the counter-ions in colloidal systems, for the determination of the anion and cation binding capacity of proteins, and similar problems.

A detailed description and evaluation of this method will be published shortly. In how far "oil-chains" can be employed in a similar way for organic ions in general will also be discussed at a later date.

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KARL SOLLNER

RECEIVED OCTOBER 14, 1943

X-RAY FIBER PATTERN FROM AMYLOSE WITH A GLYCEROL PLASTICIZER

Sir:

Reports from this Laboratory¹ have been made of films and fibers of amylose,² and a structure for the "B" modification of starch has been proposed on the basis of amylose film and fiber diagrams.³ In the course of attempting to produce amylose fibers, plasticizers were employed to aid in the stretching of the amylose films. The X-ray fiber diagrams obtained from fibers containing plasticizers were by no means identical with those produced by fibers containing no plasticizer.³

In Fig. 1, a fiber diagram is reproduced of amylose with a glycerol plasticizer. The diagram was taken with Cu K α radiation and a sample to flat film distance of 3 cm. The fiber spacing is 7.5 Å. This is very different from the 10.6 Å spacing found for the "B" modification of starch, and indicates a flexibility of the starch chain not found in the cellulose chain.

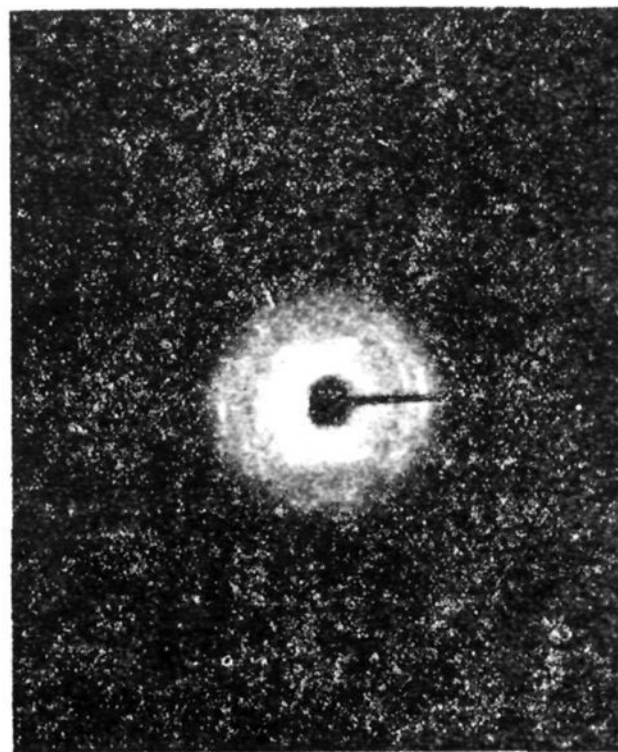


Fig. 1.—X-Ray fiber diagram of amylose with glycerol plasticizer. Fiber axis is vertical.

Alcohol-precipitated starch, the "V" modification, is found to have a helical structure and a periodicity along the helix of 8 Å.⁴ The optical properties of this material indicate that the greatest polarizability is normal to the helix axis,^{5,1} or normal to the long axis of the molecule. The greatest polarizability of the glycerol-amylose

(1) R. Rundle and D. French, *THIS JOURNAL*, **65**, 558 (1943).

(2) The amylose used was prepared by T. Schoch's fractionation, *ibid.*, **64**, 2957 (1942). For a discussion of its purity and properties see L. Bates, D. French and R. Rundle, *ibid.*, **65**, 142 (1943).

(3) R. Rundle, L. Daasch and D. French, *ibid.*, in press.

(4) R. Rundle and D. French, *ibid.*, in press.

(5) R. Rundle and R. Baldwin, *ibid.*, **65**, 554 (1943).

fiber is parallel to the fiber axis.¹ The chains are probably extended linearly, rather than possessing the helical configuration of the "V" modification, but they must be folded, less extended than in the "B" modification, as indi-

cated by the difference in the fiber spacings.

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RECEIVED JUNE 23, 1943

NEW BOOKS

Organic Syntheses. Collective Volume 2. A Revised Edition of Annual Volumes X-XIX. Edited by A. H. BLATT, Secretary to the Board, Queens College, Flushing, New York. John Wiley and Sons, Inc., 440 Fourth Avenue, New York, N. Y., 1943. ix + 654 pp. 15.5 × 23.5 cm. Price, \$6.50.

The material in the annual Volumes 10 through 19 is here collected, edited, revised to date, and indexed in the same manner as in Collective Volume I which embraces the first nine annual volumes. This great contribution to the serviceability of "Organic Syntheses" has been made with all the care and accuracy of editing and printing which are generally associated with this series. Eleven new sets of directions are included as alternates to those previously given, and the literature is surveyed through the 1941 volume of *Chemical Abstracts* for reports of methods of preparation. The only obvious ways in which the usefulness of future collective volumes might be further increased are by making at least the general index cumulative for the entire series and, if the times permit, shortening the present interval of four years between the publication of the material in its annual and collected forms. The latter purpose might be promoted by substituting a collective volume entirely for Volume 29.

PAUL D. BARTLETT

Micromeritics, the Technology of Fine Particles. By J. M. DALLAVALLE. Pitman Publishing Corp., New York, N. Y., 1943. 376 pp. 100 figs. 15 × 25 cm., Price, \$8.50.

Micromeritics, a new term in the vocabulary of the scientist and engineer, means, according to the author, the science of small particles.

In the introduction the author defines the size of the particles as those ranging from 10^{-1} to 10^6 microns. In other words, the text is for the most part limited to a discussion of particles ranging from the upper limits of the colloidal range to fairly large ones. The systems, therefore, are identical with those which O. Chwala termed cloudy systems or mechanical turbidities. That a better understanding of the properties of such systems, as well as a more comprehensive knowledge of the methods available for their study, is becoming of increasing importance, not only to the chemical engineer, but to the soil physicist, to geology, hydrology, etc., induced the author to write this text. For this alone he deserves lasting credit.

The book is divided into eighteen chapters which deal with the dynamics of small particles, their shape and size distribution, methods of particle size measurements, sifting and grading, packing characteristics, electrical, optical, sonic and chemical properties, thermodynamics, flow of fluids through packings, infiltration and moisture relationships, capillarity, determination of particle surface, a discussion of muds and slurries, the transport of particles, the theory of fine grinding, the separation from air, and finally a chapter on atmospheric and industrial dusts.

The book is clearly written, and the mathematics necessary for complete understanding as well as application of

the subject matter are well balanced and precise. The incorporation of specific problems at the end of every chapter materially increases the value of the book, which fills one of the remaining gaps in our scientific and technological literature. It therefore should be of real value to anyone—student, teacher and men in industry alike—who is faced with problems in which systems containing small particles are involved. Besides being an excellent textbook, it should serve admirably as a reference book, particularly in view of the selected bibliography and a list of useful constants and conversion factors appended to the main text.

The print as well as the many illustrations are excellent. In the chapter on methods of particle size measurements no reference could be found to the valuable contributions of A. Casagrande, as well as those of Norton and Spiel.

In the discussion of light scattering the contributions of Pihlblad would have deserved mentioning.

In the chapter dealing with fine grinding reference to the work of men like von Weimarn, Stein and Utzino would have contributed to completeness.

Entirely omitted in the discussion of ball mill operations is the well-known phenomenon of mechanical coagulation, a factor which may not be overlooked even with particles larger than colloidal.

Although the author purposely omits the discussion of colloidal systems, the influence of surface properties of matter particularly during disintegration or comminution may no longer be entirely overlooked.

These statements, however, do in no way reduce the interest this book should have and are offered merely as suggestions for future developments in micromeritics.

If any unfavorable criticism of the book could be made at all it would be the price, which may seriously hamper the distribution it deserves.

E. A. HAUSER

A Textbook of Elementary Quantitative Analysis. By CARL J. ENGELDER. Third edition. John Wiley and Sons, Inc., New York, N. Y., 1943. viii + 283 pp. 14 figs. Price, \$2.75.

The third revision of this textbook for a one semester course in quantitative analysis is not unlike the previous edition. It contains a selection of the simpler procedures of volumetric and gravimetric analysis and a discussion of the principles on which they are based. In addition there appears a new chapter on "Systematic Quantitative Analysis" which outlines some of the separation procedures used in rock and alloy analysis and gives a tabular summary of methods for the determination of the elements. The appendix contains pages devoted to the literature of analytical chemistry, plans and suggestions for the instructor, density tables for solutions of acids and bases, five-place logarithms, and chemical factors.

With respect to the treatment of practical matters such as directions to the student for performing the experiments, the principal criticism of the material presented is that much of it is repetitious. For example, directions for the reduction of ferric ion given on page 130 are repeated al-