that makes no pretense to being an exhaustive treatise on electrolytes but is, rather, a critical, detailed account of some of the most important aspects of the subject presented with refreshing vigor. Although it is not, properly speaking, a textbook, graduate students and particularly those who have more than a cursory interest in the electrochemistry of solutions will welcome this book.

The subjects discussed from both an experimental and theoretical point of view are conductance, chemical potential, and diffusion. A considerable amount of critically selected experimental data is included covering a substantial range of concentration. The theoretical treatments are based on the Gibbs free energy, on the Debye-Hückel interionic attraction theory, and on the work of Onsager, Fuoss, and Falkenhagen. The authors have attempted to extend the theoretical limiting dilute solution equations to practical concentrations with some success. However, I cannot agree that these extensions are not empirical. Thus, although the manner in which they introduce the ion size factor for the electrophoretic term of the Onsager conductance equation is theoretically valid, it does not appear to be so for the ionic relaxation term. Fuoss and Onsager have recently pointed out that in the latter case a transcendental function appears which cannot be approximated in such a simple manner. But this new theoretical development appeared after the publication of the book and should not detract from its very substantial merits.

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Papirova Chromatografie. I. M. Hais and K. Macek, Eds. Czechoslovakian Academy of Sciences, Prague, 1954. 720 pp. Illus.

Although this book is not easily available in this country and is written in Czechoslovakian, it seems desirable to review it here as a matter of scientific interest. I was fortunate in obtaining the services of H. Korbel, who carefully translated a chosen 15 percent of the text. On the basis of this translation, the copious illustrations, and a table of contents supplied by the editors, this review is written.

The book is the work of 23 collaborators, two of whom are the editors. The selection of material for the book was made partly on the basis of methods worked out and checked by the authors of the various chapters or else compiled from the literature. The literature cited in the text was as complete as possible up to early 1953, and references accumulated between March and September 1953 were included in the bibliography. There are 3795 literature references cited, with the titles given in the language of original publication. This makes it possible for the reader who is limited to English, German, and French to understand the majority of the references, for most are in these languages. There are 243 pictures and diagrams, including eight pages of black-and-white plates and two pages in color at the end of the book. There are 73 tables in the text and, at the end of the text, some 19 pages of detection agents (177 of them) and 11 pages of solvent systems (241 of them). The book is then, within the time limitations, the most complete work on this subject that has yet appeared.

The most important characteristic of the book is the approach that it takes to paper chromatography. The subject is treated as a science. The authors analyze logically the background material and the great diversity of observations on paper chromatography and draw what generalizations seem permissible, always giving examples to illustrate their meaning. The result is that, although there are many aspects of paper chromatography that are not well understood, so much is brought into an ordered form and so much else in addition is given a rational explanation that the reader is left with great confidence in the method, and with the feeling that its problems have solutions that he can arrive at following the precepts of others as described in this book. The authors describe applications of chromatography primarily in order to help the reader solve his own problems.

Of what value can a book like this be for a person who does not read Czechoslovakian? The greatest value, that described in the preceding paragraph, is largely lost to him. However, much value still remains. The book has the most complete bibliography available, which can be read since the majority of the titles are in English, French, or German. There are also references to publications in Czechoslovakian and to Soviet journals which indicate that much work in this area is going on in those countries. Most of the tables and lists of detection agents and solvents are useful to the reader, because international chemical nomenclature is used, and because references are given to literature in the more widely current languages. Also, with a dictionary, all the large number of figures and photographs become available. Hence, even though the text may be hard going, a tremendous amount of material that is not collected in this way elsewhere is available to the reader.

It is scientifically most unfortunate that the authors of this book, when they undertook such a monumental task, should have chosen to publish it in a language of only local interest scientifically. It is to be hoped that when a new edition is forthcoming it will be published in German, or better yet in English. One essential of scientific progress is communication.

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The Method of Trigonometrical Sums in the Theory of Numbers. I. M. Vinogradov. Trans. by K. F. Roth and Anne Davenport. Interscience, New York–London, 1954. x + 180 pp. $5.

This book, so ably edited by K. F. Roth and Anne Davenport, is an account of the so-called "method of exponential sums" introduced by Vinogradov. It is well known that this method has helped to solve many outstanding problems of additive number theory and analytic number theory. To give an example, Goldbach conjectured in 1742 that every large odd number can be represented as a sum of three prime numbers. This is proved, with almost complete details, in Chapter 10 of the present book. Another problem of great interest is whether it is true, and the reader can check without difficulty the truth for small values of x, that there exists at least one prime between x^2 and $(x+1)^2$, where x denotes a natural number. While this is still unsettled, a somewhat weaker theorem—namely, that there exists at least one prime between x^3 and $(x+1)^3$ for all large values of x, has been proved by the British mathematician A. E. Ingham, using Vinogradov's estimates on trigonometric sums.

It should, perhaps, be mentioned that the methods of Vinogradov are very heavy and complicated, and that the estimates he obtains for exponential sums are, at least sometimes, very far from the probable truth. To give an example, let $f(x) = a_n x^n + a_{n-1} x^{n-1} + \ldots + a_o$ be a polynomial with integer coefficients, where a_n is not divisible by the prime p. Then A. Weil's recent proof of the Riemann hypothesis in function fields implies that

$$\left| \sum_{x=1}^{p} e^{2\pi i f(x)/p} \right| \leqq (n-1)\sqrt{p}$$

So far as is known, this deep result lies beyond the range of Vinogradov's method. However, Vinogradov's results still give the best information, to date, on the root-free regions of the classical zeta-function of Riemann in the critical strip!

The translators must be congratulated