part is concerned with the application to the many different types of chemical substances which have been developed over the years, including the identification of inorganic ions.

It is true that Kirchner and his associates were among the first workers in this field—the dates given with the references testify to this—but it can be somewhat irritating to readers to be constantly reminded in the text that the author was the first to do this or to do that. Apart from this, the book is well written and well documented, giving, as well as the references quoted in the text, an additional list of related references. It is unfortunate that some of the topics mentioned in the list of additional references are not dealt with more substantially in the text, for example, gradient TLC as distinct from gradient elution as applied to TLC. It is understandable that the time of going to press (which by the dates of references, seems to have been about the middle of 1965) precluded a more detailed discussion on precoated plates and foils so that this cannot really be considered as an omission. Yet this is the kind of development that readers of the latest textbooks on TLC would hope to see.

The book contains something for everyone using TLC to-day, though the depth of knowledge and explanatory detail varies from chapter to chapter. Even to most experienced workers the first part gives much useful information while to those who are relatively new to TLC it gives very considerable help. The chapter on reproducibility of R_F values, however, is very superficial and while listing some of the factors which have been reported as affecting R_F values, no attempt is made to give a serious explanation as to why and how these factors affect the rate of movement of the solute. No reference is made to the fact that substances applied as single substances may have different R_F values from those given by the same amount of the substance when applied in admixture on the same plate. This is important because one of the methods of identifying substances in admixture is to apply the authentic substance on the same plate. Unless this fact is known, the results can frequently be misleading.

The same superficiality applies to the chapter on quantitative analysis, which merely summarizes about 250 reports without really discussing the problems which arise when trying to evaluate the separated components either directly on the plate or after elution. By and large the same approach applies to the twenty-one chapters in the second part of the book but they do bring together many of the reports published in the particular fields; for example, in the chapter on lipids, 245 references are cited together with seventy-seven additional references, and in the chapter on steroids 249 references are summarized with a further seventy-seven references given at the end of the chapter. In this respect this is a very valuable reference book. It is a pity that the list of addresses of commercial firms supplying TLC material gives only two British companies but perhaps the price indicates that it was not published with British scientists in mind. In spite of this, it is a book which should be on the working bench of every thin-layer chromatographer.

E. J. Shellard

NON-AQUEOUS TITRATION

Titration in Non-Aqueous Media

By I. Gyenes. English translation edited by D. Cohen and I. T. Millar. Pp. 13+461. (London: Iliffe Books, Ltd.; Princeton, N.J.: D. Van Nostrand Company, Inc., 1967.) 75*s*. net.

The application of non-aqueous titrimetry to the determination of organic compounds and particularly of pharmaceuticals is well established as leading to rapid, convenient and accurate methods, but has suffered in the past from a lack of suitably comprehensive English language monographs on the subject. In view of the increasing number of research articles, it is appropriate that the very few earlier publications are now being supplemented by others; albeit with confusingly similar titles to the earlier volumes. This book is the enlarged and updated English version of *Titrálás Nemvizes Közegben* first published in Hungary in 1960, and is the most comprehensive of the publications on non-aqueous titrimetry.

Treatment of the subject matter follows a somewhat standardized pattern. The first 238 pages are devoted to a theoretical introduction in which there is an account of the historical development of acid-base concepts followed by chapters on the strength of acids and bases; on general properties and other aspects such as choice and purification of solvents; a description of acidic and basic titrants; then chapters on potentiometric and photometric end-point detection and on visual indicators. The remaining pages contain an account of the methodology of determination of a wide range of types and of specific examples of individual and mixtures of, mainly, organic compounds under classified headings. Methods for the determination of multiple bonds and specific groups, such as carbonyl and alkoxyl, are also given, and included in the final chapters are applications involving redox and complex formation.

Perhaps the main omission is the absence of details of particular electrometric methods, other than potentiometric and photometric, for end-point detection. This is not a serious omission however because conductometric, voltammetric and amperometric methods are not widely applicable, although it is possible that high frequency methods may become of greater importance in the future, for they are well suited for titrations in non-aqueous solvents. Again, little is said about the possible applicability of electrometric procedures to automatic working; a field that is increasing in scope with the production of better and more suitable instrumentation for controlling and recording the flow of titrant and for measuring the change in the particular parameter involved in the titration.

The book is well written and is illustrated by numerous diagrams, contains many references and an excellent author index. By contrast, the subject index could be improved as it has some anomalies in alphabet order and contains insufficient cross-references. The print is clear and although the paper appears to be good it is of varying quality so that some pages are partially translucent to print which shows through the paper from the following backing page.

Otherwise this volume can be recommended as a reference work for all laboratories requiring to make quantitative assessments of organic compounds and for individual chemists who want an up-to-date survey of the more important aspects of non-aqueous titrimetric analysis.

W. H. S. Massie

CLEAN BREAK?

Fundamental Phenomena in the Materials Sciences

Vol. 4: Fracture of Metals, Polymers and Glasses. (Proceedings of the Fourth Symposium held January 31–February 1, 1966, at Boston, Mass.). Edited by L. J. Bonis, J. J. Duga and J. J. Gilman. Pp. xi+310. (New York: Plenum Press, 1967.) $16.

How hard must I pull this piece of solid to make it break? At first sight, nothing could be more straightforward than this question; its meaning appears obvious, and the answer a matter of the simplest of experiments. In fact, the question is subtle in the extreme, the answer hedged about with qualifications, and the interpretations

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