

and the subject index makes reference to particular compounds agreeably speedy. A valuable feature of this book is the critical approach adopted by the author to the material taken from the literature.

It seems a pity that with Colton's book, *The Chemistry of Rhenium and Technetium*, published in 1965, there are now two very similar books covering the same ground.

D. C. BRADLEY

## GAS CHROMATOGRAPHY

### Gas Chromatography 1964

Edited by A. Goldup. (Proceedings of the Fifth Symposium organized by the Gas Chromatography Discussion Group of the Institute of Petroleum held at Brighton, September 8-10, 1964.) Pp. xii+386. (London: The Institute of Petroleum, 1965.) 90s.

THIS is an account of the proceedings of the fifth symposium organized by the Gas Chromatography Discussion Group held at Brighton during September 8-10, 1964.

The book is on similar lines to previous volumes with the exception of an additional section dealing with the informal discussion periods which were an innovation at this symposium. The main content, however, is a collection of the twenty papers presented and verbatim reports of discussions following each paper. These papers are presented under three headings, dealing with (a) column design, (b) techniques of separation and identification and (c) exploitation of molecular interaction.

Apart from one paper dealing with the preparation and operation of high-efficiency columns, section (a) is devoted to theoretical aspects of column evaluation and design. Although bridging the gulf between theory and practice will present many formidable problems, the possibility of very-high-efficiency columns of the order of a million theoretical plates performing separations within minutes is fascinating. The theory is aimed in general at extending established principles and correlating them with practice. The non-mathematical student of gas-chromatography must sometimes be perplexed with the number of parameters required to express the theory and he is unlikely to welcome the addition to this list of a "performance parameter". This section also contains a comprehensive appraisal of packed capillary columns, a relatively new aspect of column technology.

The second section begins with a philosophical discussion of the gas-chromatographic process of separation in terms of the entropy of a hypothetical system. The remainder, in contrast, is entirely practical in aspect. For example, pyrolysis, normally a "finger print" technique, is discussed in a paper which describes an apparatus claimed to give better reproducibility than a mass spectrometer. Because of the time factor involved, normal elution chromatography is not always a satisfactory method when applied to process control, and a number of alternative techniques involving continuous sample flow through a column are discussed. Other papers include the complementary use of thin-layer chromatography and mass spectrometry. This symposium, which has always been a forum for the introduction of innovations, includes papers describing the adaptation of the flame ionization and argon detectors for monitoring the effluent of non-volatile substances in solid/liquid chromatography.

The third section on exploitation of molecular interaction is mainly concerned with the growing potential applications of gas/solid chromatography. Appreciations of present views on molecular interactions in liquids and solutions, and solid interfaces, are made, with particular reference to their application to the interpretation of gas solid chromatography. The relationship between the surface chemistry of solids and retention data is also discussed at some length. Considerable point is made that one of the great virtues of gas/solid chromatography is the

stability of many of the types of absorbants over relatively wide temperature ranges. Several developments in this direction are described and the impression emerges that here there is a whole new area for research worthy of greater attention than has hitherto been given, particularly with modified types of absorbants.

The editor, A. Goldup, is to be congratulated on maintaining the high standard one has come to expect of this biennial publication. The book should be of great value both to research and analytical chemists, particularly those who wish to remain in step with developments in the sphere of gas chromatography

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## A MODERN LIBER DE ARTE DISTIL?

### Distillation

Edited by E. S. Perry and A. Weissberger. Second completely revised and augmented edition. (Technique of Organic Chemistry, Vol. 4.) Pp. xx+838. (New York and London: Interscience Publishers, a Division of John Wiley and Sons, 1965.) 180s.

DESPITE the large number of books and papers published over the years on various aspects of distillation processes and apparatus, there is still room for works which either make an original contribution to the field or else provide a comprehensive account of the state of knowledge.

With the relatively few fundamental advances in distillation theory over the past 40 years, there has been a tendency to treat the details of the latest apparatus and techniques in some isolation, without presenting a critical appraisal of the application of theory to practical problems.

The appearance of a comprehensive work which covers the field of laboratory distillation in both its theoretical and practical aspects, and which includes a wealth of details of apparatus and operating techniques, is therefore particularly welcome.

The new edition of *Distillation*, volume 4 of the Interscience "Technique of Organic Chemistry" series, provides much useful material in addition to that given in the first edition published in 1951. This volume in its augmented form covers all aspects of experimental distillation theory and practice from laboratory to pilot scale, and not only constitutes a valuable and comprehensive handbook for all those directly involved in such experimental work but also presents an admirable and concise summary of basic distillation theory.

The contents cover basic distillation theory, with particular reference to laboratory distillation. The theoretical basis and experimental determination of vapour-liquid equilibria, apparatus and procedures for fractional distillation under a wide range of conditions from low-temperature to high-vacuum with particular emphasis in the latter case on ancillary apparatus and the special requirements of extractive and azeotropic distillation and sublimation, are all dealt with.

Of particular value are the new sections on continuous distillation, pilot plant distillation and automation in distillation.

The theoretical section, written by Arthur and Elizabeth Rose, occupies more than 200 pages and provides a thoroughly detailed account of the development of distillation theory and its application to the practical problems. Of particular importance is the emphasis on batch distillation and fractionation and the methods of determining the number and height of theoretical plates, with details of still sampling techniques, and the use of specialized test mixtures for which detailed vapour-liquid equilibrium, density and refractive index data are given. One further aspect which is dealt with and which is particularly important in laboratory work is the effect of hold-up on performance. This is of interest not only