totally inadequate. While I am all in favour of publishers supporting young authors rather than running after the big names, reviewing by experienced people is essential to avoid some of the mistakes made in this book. Second, I regard the quality of the production as very near scandalous. If one buys a textbook of 350 pages for £7.50, one does not expect to find such a low standard of printing.

H. GUTFREUND

Elements of Fluidics

A Guide to Fluidics. Edited by Arthur Conway. Pp. 146. (Macdonald: London; Elsevier: New York, March 1971.) £2.50.

THE first dynamic fluidic elements were announced a little over ten years ago by the Harry Diamond laboratories, Washington, but if the extensive bibliography at the end of this book is anything to go by, almost no books—as distinct from papers and conference proceedings—seem to have been published on the subject. This book would therefore appear to be timely, although it is much more difficult to assess its quality than that of a solid state physics or electronics text, for example, which can be compared with a countless number of similar books—some good, some very bad—all of which claim to be the last word in lucid communication.

Contributors to the eight independent chapters of *A Guide to Fluidics*—of fluidics in particular industries and fields of endeavour—are an interesting mixture of industrialists and academics. The opening chapter on the fundamentals of the subject would certainly give adequate and self-sufficient information to any reader who wants to know what fluidics is all about—the basic physics of most devices, the various types of amplifier and the logic operations which can be performed. The intelligent layman should not fail to grasp the gist, if not the finer detail, of what is described.

One of the boasts of the advocates of fluidic elements is that they are more dependable than electronic components and can operate under much more adverse conditions. It is therefore inevitable that the medical profession should have taken advantage of this new technology to provide reliable control circuits for heart pumps, lung ventilators and an ingenious self cleaning filter circuit for an artificial kidney system. All are described in the chapter on medical applications.

Halfway through the book, the reasons why the rapid development of fluidics in the early 1960s has tended to fall off recently become clear. It certainly seems that the development of interface devices—to translate the signals from fluidic elements dependably into controlling actions—has lagged behind, and the whole technology must mark time while it catches up.

The extreme conditions encountered by monitoring devices in nuclear reactors rule out most conventional electronics, except, perhaps, for thermocouples, and indeed fluidics have turned out to be extremely valuable for examining, for example, the state of coolant. A particularly interesting marine application for fluidics is a bow thruster for ships manoeuvring in confined spaces; a large wall-attachment amplifier can be used for this purpose. Aerospace applications include guidance systems for missiles and conventional aircraft alike.

The concluding chapter on trends and prospects succinctly sums up the state of the art by saying that "fluidics is just beginning to be taken seriously". This book has doubtless made a successful attempt to help it on its way.

ROGER WOODHAM

Infrared Analysis

IR Theory and Practice of Infrared Spectroscopy. By Nelson L. Alpert, William E. Keiser and Herman A. Szymanski. Second edition. Pp. xiv +379. (Plenum: New York; distributed in Europe by Heyden: London, December 1970.) £8.80.

THOSE who are familiar with the first edition of this book will note, probably first, that the second edition is almost twice the price, but that it has gained an additional author as well as some rewritten and some entirely new material. By dint of squeezing the type slightly, the publishers have kept the length of the second edition to within a few pages of the first.

Chapters 2, 4 and 5, which together constitute some three-quarters of the book, are virtually unchanged. Some figures have been added to chapter 2 (on instruments) to illustrate the effect of changing scan speed and resolving power on a recorded spectrum, and some formulae relating various operating parameters have been included, which will be useful to the beginner when operating an infrared instrument. With the exception of a very brief nod in the direction of computer assistance, the remainder of the chapter is unchanged.

The body of the text of chapter 4 ("Theoretical Considerations") is quite unaltered; this is good, for I heartily recommend Professor Szymanski's approach, with his clear discussion of group theory and the concomitant behaviour of fundamental, overtone and combination vibrations of a wide range of molecules. I note, however, that an error in the first edition in Fig. 4.30 has been carried into the second; the long and short arrows on the diagram illustrating the Coriolis forces on the ν_2 vibration should be interchanged. In fact the only change in this chapter has been a slight extension to the final list of references.

Similarly, chapter 5 is identical in both editions, except for the addition of an eight-page section outlining a logical method for analysing an unknown infrared spectrum; this also offers some twenty practice spectra (for the strong-minded only, for a discussion of each spectrum is given in the text). In almost every one of these examples—as in real life—a complete analysis is not possible from the infrared spectrum alone, and it is a pity that the necessity for using supporting data from other techniques is not made clearer in the text—the logical gap between, for example, recognizing a spectrum as that of a primary alcohol, and the bald statement that the substance is n-butyl alcohol, will be very disconcerting to the beginner.

The original chapter 3 ("Laboratory Techniques and Preparation of Samples") has been replaced by a useful general chapter on accessories, which includes mention of polarizers and ATR units, as well as a description of the more common gas and liquid cells. Much of the material from the original chapter 3 has been moved, with additions, to a new chapter 7, "Sample Handling Techniques", where we learn about infrared solvents, mulling and pelleting techniques and so on. The large spatial separation between chapters 3 and 7 in this edition is somewhat misleading, for some of their material is common, although covered from slightly different viewpoints.

The twenty pages of chapter 6, "Quantitative Analysis", represent the real difference between the two editions. The chapter has been entirely rewritten and, though somewhat shorter than before, contains sufficient information for an unskilled operator to tackle quantitative work in a useful and logical way. And finally chapter 8, outlining a spectra reference library, has been updated in a token fashion by the inclusion of three or four books published since 1964. The discussion of DMS and similar spectral card series is useful, but it is now many years since the DMS literature card system was discontinued in favour of a literature list indexed by IBM punched cards.

In summary, this book is still a very valuable and worthwhile addition to the infrared library; whether or not possessors of the first edition will, or should, flock to bring their library up to date with the second is another question.

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