

sive reading is needed to find the best system for a given separation: the separation of lithium from other alkali metals, for example, is dealt with on pages 6-10, 15, 68 and 106.

The article on anion exchange in nitrate solutions by Faris and Buchanan starts with an account of their work at the Argonne National Laboratory, and proceeds to show how this is confirmed and amplified by the work of others. It is perhaps not surprising to find some overlap with the review by Korkisch. The chapter ends with a description of spectrochemical methods for trace metal analysis.

The past five or six years have seen the development of a wide range of organic derivatives of the oxyacids of phosphorus as reagents for the solvent extraction of metals. These may be used not only in solution but as stationary phases for paper or column partition chromatography. O'Laughlin reviews the applications, also giving information about methods for preparing the compounds and comments on the theory of extraction. The chapter on neptunium by Burney, Dukes and Groh and that on polonium by Lange are not confined to recent developments but give comprehensive reviews of the analytical chemistry of the two elements including radiochemical methods of measurement.

In view of the widespread analytical use of ion exchange and solvent extraction, this book will be of interest to most inorganic chemists. It is well bound and produced and almost free from misprints, but I was surprised to find "elutrient" used repeatedly by Korkisch instead of eluant.

D. A. LAMBIE

ELECTRONICS FOR BEGINNERS

Electronics for Experimenters in Chemistry, Physics and Biology

By Leon F. Phillips. Pp. xii+266. (New York and London: John Wiley and Sons, 1966.) 45s. cloth; 30s. paper.

THIS book is intended to assist chemists, physicists and biologists in the design of electronic instruments. It is obvious that in 266 pages the author can only give an introduction to the subject. At times, this lack of space has resulted in descriptions that are too terse to be readily understood by someone with no knowledge of physics or mathematics. Even more important, certain aspects of design procedure are omitted or glossed over. This could either result in an unsound or even dangerous design or produce the erroneous idea that design work is easy. This book must therefore be supplemented by a suitable course of lectures before the reader can attempt to invent his own circuits. Otherwise, he should study the many excellent designers' handbooks available.

The present book does, however, do much to introduce the student to the elements of design technique. There are several worked examples and illustrative circuits. These encompass most of the common circuits, such as amplifiers, oscillators, rectifiers and switches. This is preceded by a description of the various vacuum and semi-conductor devices and indications of their uses. The book is up to date and includes paragraphs on unijunction transistors, tunnel diodes and field effect transistors. Thus the student obtains a broad picture of what type of device and circuit will suit his purpose. The lack of space is again apparent in that rule of thumb techniques are introduced with little theoretical justification.

Dr. Phillips has tried to reduce the mathematics to a minimum. This is generally successful apart from an unfortunate lapse into matrix algebra in the opening chapter on circuit theory. The appendix on the subject is worse. This very short section can, however, be omitted and the remainder of the book only requires A-level calculus.

It would be good to see more space devoted to construction and testing. The choice of a suitable layout for the circuit, and the need to produce a soundly constructed instrument, can never be overemphasized. Perhaps a few hours spent with some back copies of the popular electronics and radio constructional magazines would not be amiss for the reader. Safety precautions such as fuses and earthing are worth describing in detail. These and the few other dubious points could soon be explained by a competent engineer—who could also keep a fatherly eye on any constructional work. The volume, then, is a useful introduction to electronics, and it is hoped that it will stimulate the reader to delve deeper into the subject.

C. P. MAX

CURIOUS ASTRONOMER

Edmond Halley

By Angus Armitage. (British Men of Science.) Pp. xii+220. (London and Edinburgh: Thomas Nelson and Sons, Ltd., 1966.) 42s. net.

"FORTUNATE Newton, happy childhood of science." So wrote Einstein of the age that saw the foundation of the Royal Society. Among "the extraordinary assortment of characters who made up the membership of the Royal Society", none was more prominent and, in his own way, more extraordinary than the eponymous subject of Dr. Armitage's latest book.

Armitage disclaims the intention of writing a definitive biography of Halley; he attempts rather a historical evaluation of Halley's scientific researches. Halley, however, was no armchair scientist, and some account of his adventurous life is essential to an understanding of his work. For example, his early expedition to St. Helena to chart the southern skies, and his later voyages as master of the *Paramour* to investigate the variation of the magnetic compass, gave him a life-long interest in the problem of determining longitude at sea. Dr. Armitage livens his story of Halley's life with delightful historical tidbits, such as the information that the Tsar of Muscovy was wont to push members of his entourage (and Halley ?) through hedges in a wheelbarrow!

There are difficulties in attempting to describe and evaluate Halley's scientific achievements. He lived in an age when a scientist could be versatile without being a dilettante. "For over sixty years he poured out discourses, papers and books on an indiscriminate variety of topics", from atmospheric physics to stellar astronomy, thermometry to fossils. As the tireless accumulator of extensive observational data, he was constantly urging "the Curious" to "leave behind us observations that may be confided in, and to propose Hypotheses which after Ages may examine, amend or confute". Dr. Armitage has successfully organized this mass of material into manageable form by adopting a logical rather than chronological classification. So complete an account of Halley's work has not hitherto been published, and it is extremely valuable.

Nevertheless, its very completeness is in one respect a drawback. Researches which, standing by themselves, would ensure the reputation of Halley as a scientist seem paradoxically to lose effect by their very number. Halley's stature as a scientist might have been better illuminated by concentrating on a few of the more important investigations. In the end, Halley's greatest contribution to science may well have been his constant encouragement of Newton, embittered by controversy, to proceed with the investigations that led to the appearance of *Principia*, which Halley edited and published at his own expense. Fortunate Newton, to have had so selfless a friend; and we are fortunate, too, in having Dr. Armitage to tell his story.

MICHAEL W. OVENDEN