

thorough treatment of this aspect of the design is given, both analytically and graphically. Special valves developed for this purpose—the triode-pentode, triode-hexode, pentagrid, etc.,—and various circuits employing them are described in some detail. Theoretical treatment on conversion conductance and methods of its measurement as well as the problem of image signal interference in all its aspects including construction of interference charts and suppression circuits are described at length. The treatment on oscillators in Chapter 6 is similar to what is generally found elsewhere except that the emphasis is on those designed for heterodyne reception. A useful feature of this chapter is the discussion on ganging problem showing a graphical construction for the determination of the padding and trimming capacitances; approximate expressions for ganged oscillator circuit components for different intermediate frequencies are also derived. The important features of Chapter 7 on i.f. amplification are the design of i.f. transformers, generalised selectivity curves for mutual inductance coupling and for cathode feedback. The final chapter on detection describes the main three types of detectors, viz., diode type, cumulative grid and power grid types and anode bend type.

Analytical methods are freely used everywhere in the book and there are hardly a few pages where there is not any algebra or curves showing the analytical relationship of circuit parameters. Two small appendices at the end are usefully devoted to complex notation and Fourier Series method as applied to Radio Engineering problems. At the end of each chapter is given a bibliography of appropriate references to various wireless journals.

The only complaint that the reviewer feels obliged to make is that the author in giving an idea of atomic structure in the chapter on valves has based his statements on the old theory of the nucleus. For a book published in 1943 the atomic weight does not equal the gross positive charge on the nucleus for the latter has no electrons inside it—not even for a book on receiver design.

A minor slip in algebra occurs on page 37. Equation 2.5 e where  $E_0 = I_m E_{pk} Z_0$  should be read instead of  $E_0 = I_m E_{pk}$ .

The book is to be heartily recommended to all those interested in Radio Engineering; the students and teachers alike will find it an important addition to their books for study and reference. It is indispensable to those whose interests lie in the field of modern receiver design.

N. B. BHATT.

**Elementary Physical Chemistry.** By Merle Randall and Leon Eether Young. (Randall and Sons, 2512, Etna Street, Berkeley, California), 1942. Pp. xiv + 455. Price \$4.50.

One of the principal defects of the older methods of teaching Physical Chemistry has been to treat the subject as a distinct branch of Chemistry, isolated from other branches, so that its value in practical applications was not fully appreciated. This unfortunate circumstance is overcome in this new text-book, where the older abstruse handling of the subject is eminently replaced by one that treats Physi-

cal Chemistry as the very basis, or as the grammar, of the whole of Chemistry. This is achieved largely through the application of the practical experiments performed by students in the elementary organic and analytical laboratories to establish the fundamental physico-chemical principles. The laws of Physical Chemistry are no longer set in verbose enunciations, but are explained with practical illustrations and examples. The practical inseparability of Physical Chemistry from any other branch of Chemistry is thus emphasised most satisfactorily.

The arrangement of material is more stimulating to the student than the traditional order, in that the more immediate applications to his every-day experience are presented earlier in the book. In the opening chapter, a brief account of the modern concept of Chemistry is given. The succeeding chapters deal with the most familiar case of change of state, viz., the vaporisation of liquids and solids. Then follow a few introductory chapters on the properties of electrolytes, with a view to bring out the principles of acid-base titrations. The elementary principles of thermodynamics are introduced in small doses from the very beginning, so that when the subject is elaborated in the latter part of the book the student finds it void of the usual hyper-mathematical presentation and appreciates fully its value in practical applications. The more advanced treatment of electro-chemistry is taken up only after the chapters devoted exclusively to Thermodynamics. Of particular interest to students of Chemical Engineering is a chapter on Flow of Fluids. Numerous references to original papers and more advanced treatises of Physico-chemical subjects have been included in this work.

The book is by no means elementary in treatment, for it has something to say on practically every aspect of Physical Chemistry. The matter is too highly compressed into a small volume to appeal to the junior student. It can, however, be recommended to the teacher, who can advantageously adopt the newer methods of teaching and can also draw upon the numerous practical illustrations, exercises and references given in the book. The work can aptly be described as a broad, if not ambitious, survey of modernized classical physical chemistry, which would enable those who have already studied the subject to appreciate the practical worth of their learning.

M. V. C. SASTRI.

**Indian Mining: A Concise Handbook for Laymen and Specialists.** By J. A. Dunn. (The Mining, Geological and Metallurgical Institute of India, Calcutta), 1943. Pp. xi + 262. Price Rs. 10, postage extra; Rs. 5 for members of the Institute.

In India, as in most countries, the vast and growing mineral industry forms the foundation of all other industries. Much of this is of a highly technical nature, and many of its workers are necessarily specialists along certain limited channels. The object of this book is to supply a general picture of this industry as a whole, so as to be at once useful to the layman and the several specialists in the different aspects of this vast subject. Therefore,

while the basic fundamentals are clearly outlined throughout, technical details have been restricted to a minimum, as they can and must be supplemented by experienced specialists. Chapters II and III give a broad picture of the distribution and mode of occurrence of minerals in nature. Chapters IV to XV outline the various phases of prospecting, sampling, methods of estimating and grading of minerals, estimation of reserves, mining and costs, and treatment of minerals and their marketing. Chapters XVI to XVIII explain how a mine is evaluated with reference to the several variables involved such as labour, transport, and marketing trends, and how an investor can estimate the relative value of mining shares. Chapters XIX to XXIII are concerned with various legislative aspects such as mining concessions, Acts, Taxes and Tariffs, etc.

Particular emphasis is laid in the Preface on the great utility of this book to laymen including officials who are interested in administration and those "hard-working folk" who are interested in mineral matters, trying "to earn a good living from innumerable small deposits scattered up and down the length and breadth of the country"; and also, to the large body of people interested in mining shares which are considered in general as risky speculations.

Although the book is seemingly stressing the financial aspects of mining industry, it is replete with useful informations to the industrial chemists, particularly in the chapters on Tests and Grading of the Indian Minerals, the different local mining costs, the respective treatments for these minerals, the conditions for Indian and foreign marketing, and costs. The book will thus be also useful as a valuable reference book in many chemical and industrial laboratories. It is besides very neatly got up and does great credit to the printers and publishers. Priced somewhat high, at Rs. 10, the entire profits from the sales will be contributed to an Indian War Fund.

**Museum Method and the Process of Cleaning and Preservation.** By Minendra Nath Basu. (Calcutta University), 1943. Pp. iv + 34.

"Unless there is a change in the near future, proof of India's cultural greatness in terms of handicrafts will disappear before our eyes and the historian of the future will have to go to Europe for evidence that centuries ago, India could weave, carve, compose and create superb objects of art and industry. Consideration of what should be done by the authorities in India to preserve for posterity her priceless treasures can no longer be postponed." So wrote Messrs. Hargreaves and Markham who reviewed museum work in India in 1936. The present handbook—the first of its kind in India—written by Mr. Minendra Nath Basu, M.Sc., P.R.S., and published by the Calcutta University, is intended to fill the gap and impart knowledge and

training in the art of preserving museum exhibits. The author has shown initiative and enthusiasm in the choice and handling of topics. The Calcutta University may well be congratulated for taking this subject within its purview.

In the preface the author rightly complains that no work has been done on the control of humidity in the art galleries of Bengal, where problems of humidity are of great importance. Some work has, no doubt, been done on such problems for other climates in Europe and America. Unfortunately Indian museums and art galleries have not at hand the necessary resources in men and money and one can only hope that the University of Calcutta with all its resources would cope with this work.

The booklet deals with the cleaning and preservation of organic materials, pictures and paintings, foodstuffs and leaves, siliceous materials and metals. The subject of cleaning and preservation of museum exhibits is a new one in many countries in Europe and America, and it is more so in India. Exhibits are of various materials in varying stages of decay and discovered under very different conditions. Hence their cleaning and preservation become a complex subject and no generally uniform procedure can be recommended. Environmental conditions and destructive forces must be studied for each before any treatment. The author recommends the treatment of corroded copper alloys with ammonium chloride, stannous chloride and hydrochloric acid. At best this can be applied to mild cases of corrosion where there is abundance of metal. Evidently the author found the method a success in such cases. But if the metal is, however, porous, the chlorides might get lodged in the pores of the metal and give rise to 'bronze disease' and to eventual destruction of the alloy. Owing to this risk, the method is seldom followed to-day. Again he recommends that fabrics should be soaked in benzene and petrol for removing oil and grease stains or treated with alkalis. This is, no doubt, a good method for fabrics in a good state of preservation. But such a treatment hastens decay in the case of old fabrics. The author suggests the use of water for cleaning tempera, but advocates caution in its use for cleaning paintings on plaster. It is well known that certain classes of paintings on plaster such as the *fresco* do stand even rough cleaning with water. Generally the reader does not get a clear account of the conditions under which the author has worked, the nature of the objects actually treated by him, and the stability of the results attained. One interesting feature of the handbook is the suggestion for the use of a number of indigenous preparations such as potato and onion juice for cleaning paintings, green mangosteen extracts for strengthening fragile objects, chopped tobacco leaves and pepper as insecticides. In dealing with valuable antiquities, no method should be employed unless it is supported by successful experience and then the reader would have welcomed more experimental data on the subject.

S. P. S.