CHEMISTRY

Gmelins Handbuch der anorganischen Chemie

Achte völlig neu bearbeitete Auflage. Herausgegeben von der Deutschen Chemischen Gesellschaft. System-Nummer 63: Ruthenium. Pp. xxvi+124. (Berlin: Verlag Chemie, G.m.b.H., 1938.) 6.50 gold marks.

THE section on ruthenium in Gmelin's "Handbuch" contains an account of the physical and chemical properties of this polyvalent element and of its compounds. The sources and preparation of the metal are being dealt with in conjunction with other members of the platinum group. No fewer than seven isotopes have been detected by the mass-spectroscope, and artificial radioactivity has been effected by bombardment with slow neutrons and deuterons. Ruthenium is very resistant to atmospheric corrosion and the attack of strong acids, but it can be oxidized in the presence of potassium chlorate to the tetroxide and by fused alkalis to ruthenates.

Ruthenium is an excellent catalyst, particularly for oxidations, being superior to platinum in this respect. A list of references to this application as catalyst is given. It gives rise to a large number of complex co-ordination compounds, including a stable, volatile carbonyl $Ru_2(CO)_9$, a red pentanitrosyl and many ammines and derivatives of organic bases. Among these complex compounds is the deeply coloured derivative of tervalent ruthenium called 'ruthenium red', which has the power of dyeing natural silk. Morgan and Burstall have shown that it is a chloro-hydroxo-tetrammine monochloride with co-ordination number 6. They have prepared from it a dichlorotetrammine monochloride, which reacts with ammonia to regenerate ruthenium red. The constitution of this derivative seems to be uncertain, since Gleu and Breuel have recently described both *cis*- and *trans*-dihalogenotetrammine halogenides, which do not react with ammonia. A list of derivatives of organic bases containing ruthenium is given.

Physico-Chemical Experiments

By Prof. Robert Livingston. Pp. xi+257. (New York: The Macmillan Company, 1939.) 10*s*.

THEORETICAL introductions to physical chemistry are plentiful—practical books on the same subject are only too rare. Dr. Livingston's compact and informative book arrives at an opportune period. Physical chemistry has now become so wide a subject, and uses such specialized technique, that it becomes increasingly difficult to write a practical book which will include a selection of experiments illustrating new principles with sufficiently modest and fool-proof apparatus.

In the volume under notice, classical physical chemistry is there with all up-to-date improvements. There are, however, many welcome innovations in so small a book. For example, some experiments in radioactivity are described, absorption spectra find a useful place; there is a good discussion of, and a simple experiment with, a plate still. Chemical kinetics is represented by more interesting types of reaction than are customarily found in practical books. The section on electrochemistry is equally good. Even simple photochemical and colloidal experiments assume their proper place in the volume. But especial commendation must be accorded to the author for his excellent chapter on measurements, errors and computations. This is a chapter which may be read with great profit by advanced students of physical chemistry. This apparently modest little book, full of relevant information, therefore puts modern physical chemistry within the reach of any laboratory. H. W. M.

Factual Tests in Inorganic Chemistry

(Post School Certificate Standard.) By F. A. Philbrick. Pp. 80. (London: G. Bell and Sons, Ltd., 1939.) 1*s*.

Answers to Factual Tests in Inorganic Chemistry

By F. A. Philbrick. Pp. 13. (London: G. Bell and Sons, Ltd., 1939.) 6*d*.

THIS book of "Factual Tests" is designed to test the student's grasp of inorganic chemistry up to Higher Certificate and Intermediate B.Sc. standard. Each question is set in such a way that the student has merely to select the correct answer from five alternatives and write down its number. Thus to answer: "34. The ammonium salt used in the Leclanché cell is the 1 sulphate, 2 chloride, 3 nitrate, 4 carbonate, 5 phosphate"; the student merely writes down the figure 342.

The questions are set out in 'papers' which cover the chemistry of either one element or a group of related elements, and the numbering is devised so that all answers require a three-digit figure. The correct answers are supplied in a separate booklet, as recorded above.

There are clearly many advantages in having a book which can be used by student and teacher to test rapidly and objectively the factual information which has been acquired, without always having recourse to the wearisome tasks of writing out and correcting answers to the conventional type of question. In the opinion of the reviewer, "Factual Tests" should also have included questions which require a one- or two-word answer, but in spite of this omission it should prove of use to both students and teachers. A. C. C.

A Course of Study in Chemical Principles

By Prof. Arthur A. Noyes and Prof. Miles S. Sherrill. Second edition, rewritten. Pp. xxv+554. (New York: The Macmillan Company, 1938.) 21*s*. net.

THE subject-matter has been thoroughly revised in the second edition of this book. A considerable improvement has been made by dealing with the first and second laws of thermodynamics at the beginning instead of at the end of the book. The kinetic theory has been considered in greater detail, and the essential features of the Debye-Hückel ion attraction theory have been added. The text, as in the old edition, is interspersed with problems which should prove of considerable value to university students. A. C. C.