

REVIEW.

QUANTITATIVE CHEMICAL ANALYSIS. By F. CLOWES, D.Sc. Lond., and J. B. COLEMAN, A.R.C.S. J. and A. Churchill. Pp. 558 and indices. Price 12s. 6d. net.

This is the eleventh edition of this work, of which the first appeared in 1891, and the changes in the successive volumes clearly indicate the great alteration that is taking place in the teaching of this branch of chemistry as the result of the fuller appreciation of its importance.

Primarily a book for the student, it may quite fairly claim to be of use to the practitioner as well. To the former it should prove a most excellent and trustworthy guide. It is extremely practical, and, without going into too great detail, deals very clearly with apparatus such as balances, water-baths, stills, and condensers, with the method for the determination of the physical constants, such as specific gravity melting-point, boiling-point, vapour density, and with all those fundamental operations the successful performance of which is the foundation of all analytical work.

In order of increasing difficulty, the gravimetric methods for the determination of the commoner elements, acids and bases, are then described; after which, in Part IV., comes work of a more technical character, commencing with the analysis of alloys, and going on to that of more complex substances such as glass, silicates, iron ores, coke and coal, superphosphates, followed by the still more technical and less direct methods employed in the examination of water, milk, butter, soaps, tanning materials, and oils, fats and waxes. In Part V. the usual routine methods for the ultimate analysis of organic compounds are described, and Part VI. treats of gas analysis by means of the Hempel apparatus and the nitrometer.

Not only does the book cover a very wide range of work, but a very considerable portion of it is devoted to the technical side of the subject, until recent years almost ignored in so many of the academic institutions of the country.

The fact of the work having passed through so many editions has insured its being well up to date and practically free from printer's errors; and the treatment of the

more academic subjects leaves little to be desired, the methods recommended by the authors being, as a rule, such as have met with general acceptance.

In dealing, however, with the processes employed for the examination of some of the more complex commercial products, the authors are not always so happy in their choice, and there are some striking omissions which should receive attention when the book is again revised. Thus, there is no mention either of the polarimeter or the refractometer. The importance of the former instrument in sugar analysis, and the fact that both the principles involved in its construction and the methods for its practical application are usually very indifferently taught in our universities and colleges, afford ample reason for referring to it. The latter piece of apparatus is so widely employed in connection with the examination of oils and fats that, at the very least, some mention should have been made of the valuable information to be obtained by its use. Space might also with advantage have been found for a description of the methods for the determination of minute traces of arsenic in commercial products and of zinc in waters. On the other hand, the separate description of the Reichert, Reichert-Meissl, Reichert-Wollny processes might have been avoided, and the cumbrous and almost obsolete method of Blichfeldt should give place to the Polenske and Kirschner processes for the examination of butter fat, which are now almost universally employed.

Although written with the greatest care, there are some statements which would be likely to convey to the novice a misleading impression; thus, on page 342, the reader is led to infer that the saponification of fat by alcoholic potash is almost completed in the cold, and on page 348 that rancidity is invariably due to acidity. The use of the term glucose to signify invert sugar might also with advantage be discontinued. Again, on page 372, dealing with the determination of the total alkali in soap by titration, the student is directed to convert the number of c.c. of $\frac{N}{2}$ acid used into potash or soda by use of the factors 1.27 and 0.775 respectively (the latter should really be 0.850); but why not use the ordinary factors for $\frac{N}{2}$ potash and soda?

In endeavouring to express within such a comparatively limited compass a mass of information intended to be serviceable both to the student and to the practitioner, the authors have set themselves a very difficult task, as the needs of one are by no means identical with those of the other. It is, therefore, not surprising that the writers sometimes fail to maintain the balance between rapidity and accuracy in the details of the methods they recommend, and are inclined to worship the second place of decimals even when it entails loss of speed with no corresponding gain of information. Such deficiencies as we have noted, however, detract but little from the general excellence of the work, and it is a satisfactory sign of the times to find a textbook for an academic developing along such sound and useful lines.

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