

the latter derivatives of a dihydrobenzene, which would account in the simplest way for the comparative ease with which phenol rings are oxidized and opened. It is well-known that the analogy in the behavior of 1,3-dihydroxy- and 1,3,5-trihydroxybenzenes and that of 1,3-dicarbonyl derivatives is even more striking.

The puzzling and central fact that benzene and its derivatives appear to be more stable in the unsaturated condition (Kekulé's formula) and react in most cases as saturated compounds (in the ring) is also not without parallel in the aliphatic series; for instance, the organic acids certainly resist reduction in the unsaturated carbonyl group almost as vigorously as do certain benzene compounds; even when their carbonyl group absorbs certain reagents, yielding temporarily ortho derivatives, there is a rapid reversion to the more stable unsaturated carbonyl group—in the acid esters, amides, etc.). At the same time this same unsaturated carbonyl group has an unmistakable effect on the activity of the hydrogen of the immediately neighboring groups, *e. g.*, such groups as CH and OH—much as the activity of the hydrogen atoms adjacent to the unsaturated groups of the benzene nucleus is enhanced, and when we have two such neighboring unsaturated groups in aliphatic compounds, *e. g.*, in the 1,3-dicarbonyl series, the analogy is even more marked. Again, we have all degrees of gradation in such relations—the carbonyl group in aldehydes is readily reduced by hydrogen, but towards very many other reagents shows again the same tendency to reversion to the unsaturated condition as a stable form. Benzene derivatives are likewise not all equally resistant to reduction and saturation, as shown by Baeyer, Bamberger and others for the phthalic acids, the naphthalenes and similar compounds. Stability in the so-called unsaturated condition may therefore well be simply a question of peculiarities of structure and energy content, common to all fields of chemistry. It may not be amiss to recall parallel cases of the resistance to saturation of unsaturated compounds in inorganic chemistry, as shown by the phosphines and arsines at ordinary temperatures, and by ammonia above 400°.

The arrangement used by Noyes, treating the aromatic compounds with the aliphatic ones, appears to the writer therefore logical, both pedagogically and scientifically; exhaustive studies of the relation between the two series and especially of the question of stability and reactivity of unsaturated molecules, as made in the investigations of Baeyer, Nef and Thiele, may solve that perplexing problem of the structure of benzene in the simplest of all ways, by demonstrating that there is no real benzene problem, but a broader, greater problem of equilibrium conditions of unsaturated valences.

J. STEIGLITZ.

Exercises in Elementary Quantitative Analysis for Students of Agriculture.

By AZARIAH THOMAS LINCOLN, PH.D., and JAMES HENRI WALTON, JR.,

PH.D. New York: The Macmillan Co. 1907. Svo. pp. xv + 218. Price, \$1.50 net.

The work includes introductory exercises in gravimetric analysis, acidimetry and alkalimetry, permanganate and dichromate titrations, iodimetry, stoichiometry, and a section on agricultural analysis covering the examination of milk, butter, cereals and feeding materials, fertilizers and soils.

The book is well written and contains a number of good illustrations. It will be welcomed by those beginners in agricultural analysis who have been obliged to use the methods of the Association of Official Agricultural Chemists in bulletin form in lieu of a text-book. The procedures are clearly and explicitly described and the explanatory notes are generally good. The numerical data selected to illustrate normal composition could in some cases be improved, but the only figures likely to be seriously misleading are those for starch in grain products on page 121.

The failure of the authors to make use of the conceptions of ionization, mass action and solubility product in the discussion of inorganic reactions and the entire omission of electrolytic methods are unfortunate in a text-book which is likely to represent the sole training in quantitative analysis of many of the students who use it. These, however, are omissions which may be supplied by the teacher and which the authors will probably correct in a subsequent edition.

The book will fill a real need in the case of the agricultural student for whom it is especially intended and will be found useful and suggestive to many others. It is commendably free from typographical errors and its general make-up is excellent.

H. C. SHERMAN.

Testing Milk and Its Products. By FARRINGTON and WALL. Madison, Wis.: Mendota Book Co. 1908. pp. 292. Price, \$1.00.

The authors have revised their useful book. The present constitutes the eighteenth edition, the first edition having been issued over ten years ago. Considerable matter has been added, which includes new methods that have come into recent use.

L. L. V. S.

The Chemistry of Commerce. By ROBERT KENNEDY DUNCAN. Harper Brothers. Price, \$1.50.

It is perhaps questionable whether "Chemistry of Commerce" should be reviewed in a scientific journal like that of the Chemical Society, inasmuch as the book can only be regarded as a report on certain spectacular topics, some of which barely lie within the broad domains of chemistry.

At the present time, anything which tends to stimulate industrial and applied chemistry in the United States, will be hailed with delight by every chemist of the land. That "Chemistry of Commerce" is intended to do this, is evident from the author's preface and introduction. Whether he has succeeded in stimulating the masses in this highly tech-