

## NOTE.

**Correction.**—The formula for methylguanido-glyoxylic acid, given on page 1110 of the July, 1919 number should read  $\text{NH}_2\text{C}(\text{NH})\text{NCH}_3\text{-COCOOH}$ .

ISIDOR GREENWALD.

## NEW BOOKS.

**The Preparation of Substances Important in Agriculture. A Laboratory Manual of Synthetic Agricultural Chemistry.** 3rd Edition. By CHARLES A. PETERS, Ph.D., Prof. of Inorganic and Soil Chemistry, Dept. of General and Agricultural Chemistry, Mass. Agricultural College. John Wiley and Sons, Inc., New York: Chapman and Hall, Ltd., London, 1919. vii + 81 pp. 13 × 19 cm. \$0.80.

The laboratory course outlined in this small volume makes use of the preparation of substances important in agriculture to train the student who has already had a one year course in chemistry at high school, or its equivalent. The table of contents includes: Superphosphate, Sulfate of Ammonia, Potassium Nitrate, Potash Salts, Lead Nitrate, Lead Arsenate, Lime-Sulfur, Copper Sulfate, Paris Green, Bordeaux Mixture, Emulsions.

Under each of these headings the main object of the process is first stated; the laboratory directions are then given; following this are notes on the chemical, commercial, and agricultural aspects of the subject; lastly comes a series of questions to be answered by the student in the laboratory note book.

Many teachers are of the opinion that the kind of laboratory work presented in this book is of the greatest value as chemical training. The experiments are sustained, so that the interest centers on one point over a considerable period of time. Incidental problems come up in connection with the major problem, so that they have a significance they would not possess if they were taken as independent experiments. There is a distinct incentive to use judgment and skill in manipulation because the amount and quality of the final product are influenced thereby. Professor Peters remarks in his Preface: "The method of presentation aims to put a few major points before the student and extend the work on such points over so long a time that the student will absorb it. The author feels that when a student, in his earlier years in college, works interestedly for a whole exercise around one thing he grasps something while if a dozen important points pass in review during the time he is left in a maze and gets little but technical benefit. While, however, the student is busy on the one major piece of work other minor points may be gathered round it and readily absorbed."

A trip over the northern peaks of the White Mountains from which the reviewer has just returned, although somewhat remote from chemistry, offers a convenient analogy. He found those peaks swarming with young girls from the various girls' camps. This was delightful on one of the days

which was sunny, but horrible on one of the days which was rainy, when 74 girls arrived at the Madison Hut (which has bunks for 46). All were wet and cold and hungry; they had no change of clothing and they had to sleep in wet things, some of them on the floor. They were being guided by inexperienced young women councillors who did not know the mountains well. The prospectuses all advertise the hike over the northern peaks as one of the features of the camp life, and the camp directors therefore feel it is imperative to send the children off on the hike even if it is inadequately prepared for.

Many topics in first year text books and manuals of chemistry are rushed into with inadequate preparation because the author has not the courage to leave them out. There is probably no writer of such books that has not been guilty of this sort of offense. The subject of colloids is certainly of great importance in agricultural chemistry. Professor Peters briefly discusses colloids in the chapters on lead arsenate, and emulsions. The subject is as fascinating as the high peaks in sunny weather, but if the student expects to understand the principles which are very briefly stated in the text, he is likely to find himself like the hiker in a dense and chilly fog on the high ridge, with precipices in most directions and the trail lost. This is not said in condemnation but simply in emphasis of the fact that judgment in choice of topics and their presentation is the most important factor in planning a course for students who are not far advanced. It is probably true that mention of colloids could not have been omitted from such a manual of agricultural substances.

In conclusion, the book under review must prove of great value to students of agricultural chemistry, for it is essentially a laboratory course in the fundamental principles of chemistry, using substances important in agriculture as illustrations. Excellent judgment has been shown in the selection of material for the experiments and topics for the discussions and questions.

ARTHUR A. BLANCHARD.

**Introduction à la Chimie Générale**, Lois Fondamentales de l'Atomisme et de l'Affinité Exposées à des Chimistes Débutants. By H. COPAUX. Gauthier-Villars et Cie., Paris, 1919. 208 pp. 18 × 11.5 cm.

In the preface, the author states it as his intention to reduce the number of false starts made by students who depend upon oral instruction and lecture notes. The reviewer, however, suspects that many college students, even after 4 years' study of chemistry, have not mastered the ground covered by the book. Two hundred small pages contain a remarkably complete outline of the subjects foreshadowed by the title, including 53 pages dealing with the properties and theories of solutions. The advanced student will be astonished to find experimental methods, data, diagrams, and discussions for so many generalizations, all com-

pressed into so small a space without appearance of haste or lack of clarity. Sympathy is felt, nevertheless, for "debutants," confronted on page 5 by  $\Delta m = \Delta E/V^2$ , and so on. One can only hope that they, like most "debutantes," have already been vouchsafed at least an informal view of the intricacies among which they must function. Lack of balance is sometimes, though not often, sensed, 5 pages, for instance, on supersaturation of salts in water solution and 12 on the ionization theory, including conductivity and hydrolysis. The difficult field of concentrated solutions, so profitably explored of late years by Washburn and others, is avoided except for a discussion of solubility. But how much easier to criticize than to plan a book half as meritorious! One closes it with profound respect for the vitality and elegance of French instruction in chemistry.

G. S. FORBES.

**Chimica delle sostanze esplosive.** By MICHELE GIUA, Professor of General Chemistry in the University of Sassari. 556 pages, 83 figures and 7 tables. Ulrico Hoepli, Milan, 1919. L. 28.

The author treats his subject in 6 parts, the first dealing with the historical development of the knowledge of explosives during the nineteenth century, the principles of thermochemistry, the gas laws, Nernst's theory, explosion temperatures, pressures and, potential and other generalities; the second with definite explosive compounds; third, explosive mixtures; fourth, explosive gases and detonating gaseous mixtures; fifth, primarily unstable substances; and sixth, chemical and physical tests of explosives; a classification which works out admirably in bringing related substances together and permitting of a systematic treatment of a group. The book is supplied with an admirable table of contents and excellent indexes of authors and subjects. Of the remaining 524 pages devoted to subject matter part one occupies 16% of the space, two 49, three 16, four 1, five 6 and part six 12%. But as the fulminates, hydronitrides and diazo compounds treated of in part five are as truly explosive compounds as any in part two, there is really 51% of the space devoted to the primary explosive bodies. Of the 252 pages in part two 161, or 64%, are devoted to the nitro derivatives of aromatic hydrocarbons and 91, or 36%, to the nitro and nitric derivatives of the aliphatic hydrocarbons. Or noting with more particularity it is observed that 6% of this space is assigned to naphthalene and its derivatives, 10 to benzene, 12 to glycerin, 13 to phenol, 15 to cellulose, and 25% to toluene and its derivatives. Considering the fact that, excepting the members of the gunpowder class, in general all explosive mixtures derive their significant characteristics from explosive compounds with which modifying components are admixed, and considering the further fact that the nitro substitution derivatives of the aromatic hydrocarbons, and especially those from toluene, have in recent years played a most important part as explosives, good judgment

has been exercised in the allotment of space to the various substances and subjects treated.

The method of treatment is excellent, being concise, simple and direct while space is conserved and use of the information collected facilitated by the presentation of the data in numerous well designed tables and the liberal use of graphs and diagrams. The writer has adhered more closely to his text than writers on the chemistry of explosives usually do and has completely resisted the temptation to describe the applications and uses of explosives. He has dwelt on the technology but only as regards the manufacture of explosives which, for explosive compounds, are strictly chemical operations. Even in these instances he has restricted his description of the parent substances in each case to that one which is the source of the positive radicals in the product. As nitric, sulfuric, and mixed acids, sodium nitrate, alcohol, acetone, and the other reagents generally used in these operations are already dealt with in great detail and in an authoritative manner by Lunge and others, it is evidently unnecessary to repeat such descriptions. However Giua does include tables of specific gravities of several of them in the section of his book devoted to tests, and essential data for them, such as the most suitable strengths and best proportions for nitration mixtures and the like, are given elsewhere when important or recently determined. The technological descriptions are brief, covering, as a rule, only the essential principles. One who intended erecting a manufacturing plant would find more complete details of construction and operation elsewhere, but he would find here much suggestive data which is not usually given in strictly technological books.

The author has, in this development of his text, placed the emphasis on the pure chemistry rather than the applied chemistry phase, and more particularly on that of physical chemistry. Thus in approaching the subject of nitro-aromatics he devotes a section to the reactivity of the nitro-groups in aromatic compounds, stating and discussing here the laws of Laubenheimer and of Koerner, while, as those acquainted with the author's own researches might expect, eutectic temperatures and equilibrium curves are given for many different systems.

The footnote references which abound on nearly every page show a wide acquaintance with the best authors and they constitute a most valuable bibliography of explosives. The publications of investigators in the United States are more generally cited than is usual with European authors and the citations are quite up to date, E. J. Hoffman's recent report on his excellent investigation of the nitration of toluene, for instance, being presented in considerable detail.

The fulness of treatment of topics may be illustrated by the nitrogen containing derivatives of glycerin under which appear detailed accounts

of the mono-, di- and trinitroglycerin, tetranitro-isobutyl-, tetranitrodi- and chloro-dinitro-glycerin, in the course of which due consideration is given to Hibbert's study of the tautomerism of trinitroglycerin, and Snelling and Storm's determination of the detonation temperature. Among the explosive mixtures in part three one is surprised to find so large a proportion of the space devoted to chlorate and perchlorate powders. It is possible that Giua is one of the not inconsiderable number of the students of explosives who believe that the chlorate or perchlorate mixtures may yet be so controlled as to play a useful part, a hope based on the knowledge that they are cheap sources of energy. Most of the special compositions and some of the compound substances which played a significant part in the Great War are not mentioned but it is surprising that the U. S. composition should be omitted from the section on smokeless powders, which section is perhaps, considering the amount of literature available on the subject, the least satisfactory part of a very satisfactory book. Considering that hexanitrodiphenyl sulfide was an enemy product and weapon its omission is also surprising.

The book is made up in a most attractive form with good paper, wide margins, clear impressions and intercalated titles. Errors appear to be but few and most of those have been already noticed in the appended "Errata-Corrige." In addition to these we notice that on page 184 Koerner is spelled "Korener." It is suggested also that on page 38 the heat of explosion of one kg. of nitroglycerin should be stated as 1570.5 cal. instead of 1781 cal. as at present. These are of inconsequence in view of the marked excellence of the work and the spirit of approach of the author voiced in his opening paragraph on the Historical Development during the Nineteenth Century in the following phrase: *La scienza degli esplosivi fu fondata da Berthelot di immortale memoria.*

CHARLES E. MUNROE.