matter closely follows that book. In a few cases the wording is identical.

"A Practical Survey of Chemistry" will find ready acceptance with teachers who must stress the cultural side of chemistry, and to such Dr. Dyer has made a timely and valuable contribution.

R. W. GETCHELL
IOWA STATE TEACHERS COLLEGE

Fundamental Chemistry. By HORACE G. DEMING. xviii + 756 pp. Illustrated. New York: John Wiley and Sons; London: Chapman and Hall. 1940. $3.50.

AN interestingly different text-book, in which general chemistry is carefully boiled down to elementary principles, with minimum attention to descriptive, industrial and cultural aspects. Written for the inquisitive student.

HUBERT N. ALYEA
PRINCETON UNIVERSITY

General College Chemistry. By JOSEPH A. BABOR and ALEXANDER LEHRMAN. xiv + 659 pp., 151 figs. Thomas Y. Crowell Company, New York City, 1940, price $3.75.

Introductory College Chemistry. By JOSEPH A. BABOR and ALEXANDER LEHRMAN. xiii + 663 pp., 138 figs. Thomas Y. Crowell Company, New York City, 1941, price $3.50.

GENERAL COLLEGE CHEMISTRY is designed primarily for students who have had high-school chemistry, whereas "Introductory College Chemistry" (this book replaces "Elements of General Chemistry," by Babor, Estabrooke and Lehrman) is designed for two types of courses: (1) courses composed for students who have had high-school chemistry and (2) courses in which no differentiation between students is made on the basis of high-school preparation.

Frankly, the essential difference in the two books seems to be mainly in the order of presentation of the material. The sequence of topics in the "Introductory College Chemistry" is arranged to avoid the presentation of all the theoretical principles in a continuous order, whereas the "General College Chemistry" presents the working portion of theoretical principles previous to any discussion of the properties of the elements and their compounds. In other words, the only differences in the two books are the necessary changes in the introductory paragraphs of the various chapters resulting from the different arrangement of the material. One example will illustrate the point. The discussion of organic chemistry is introduced early in the list of topics in the "Introductory College Chemistry." On the other hand, all the material about organic chemistry is placed in the last chapter of "General College Chemistry."

Both books apply current views of atomic structure to the explanation of the properties of the elements. Quantitative experimental data are employed in the discussion in the fundamental principles and modern theories. The hydrogen ion, H^+, is used for simplicity instead of the hydronium ion, H_3O^+, in the discussion of oxidation-reduction reactions. However, the latter ion (H_3O^+) is used exclusively in the discussions of ionic equilibrium following the chapter on acids and bases. The more recent concepts of acids and bases are presented in a very clear manner.

In each book the chapters on atomic structure, electronic distribution and valence furnish splendid examples of the evolution of material presented in elementary courses over a period of years. The books illustrate how possible it is to utilize our present knowledge of atomic structure in the discussion of the laws of chemical combination, valence and the structure of matter.

A wealth of material written in a very clear manner is included in each text. Carefully selected problems and questions are utilized to illustrate the principles discussed and correlate various concepts. Several tables of data which are useful to the teacher and to the student for the solution of problems and the illustration of principles are included in the appendices. The two books are not as extensively illustrated as some of the books now on the market, but the illustrations are well chosen and well drawn.

Teachers of elementary chemistry should find either of these books to be very satisfactory for class use, or, if not, as an excellent reference book to supplement another text.

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REPORTS

SOME EDUCATIONAL EFFECTS AND IMPLICATIONS OF THE DEFENSE PROGRAM[1]

I CAN say with propriety that our defense work is concerned with problems of urgent importance to our country's military effectiveness and that gratifying progress is being made in attaining objectives. These statements are true not only of the activities under

[1] From the report of Dr. Karl T. Compton, president of the Massachusetts Institute of Technology, to members of the corporation.

way at this institution, but of the over-all Federal scientific research program in which more than a hundred other educational institutions and many industrial organizations are collaborating in the greatest scientific mobilization in the history of our country.

While the diversion of energies to defense work has disrupted many normal activities and retarded important developments in both education and research, the defense program promises some important gains in terms of the peace-time objectives of educational institutions which are actively engaged in it. It is serving to bring educational staffs into closer contact with industry and operating agencies of the government. It is promoting cross-fertilization among many different fields and many fine minds from different backgrounds. Much of the research is actually an intensification of investigations already under way and is so fundamental that we would have welcomed at any time the opportunity to undertake it with the effectiveness that subventions from government and industry now make possible. While contributing directly to war-time needs, it is yielding new developments, new techniques and new understanding which will have important peace-time applications and which presage a new prosperity for science and engineering after the war.

The program has likewise provided a dramatic demonstration of the national usefulness of an educational institution which maintains a great staff and facilities for research and development in those forward-flowing streams of science which become the reservoirs of power when engineering art has harnessed them. This harnessing of science is accelerated in a time of national emergency. Nowhere else in our country, except in our great educational centers of research, is there a comparable reserve of scientific man-power, of new technological ideas, of laboratory facilities. A few such outstanding institutions become, in time of emergency, centers of concentration on objectives of first magnitude. Other institutions, less powerful in research facilities, play their important rôles as centers for other important work of less magnitude and as reservoirs of technical man-power. In normal times, each and all contribute to the education of our people, the operation of our industrial economy and the increase of scientific knowledge in this technological age.

From the lessons of the present situation I see emerging as a clear objective the outlines of an educational and research institution based upon the present ideals and objectives but incorporating a greatly magnified capacity for national service and commanding a wider recognition of the availability of its technological assets for use by government and industry.

Let me describe this institution of to-morrow as a "super institute of technology" and suggest some of its features, as drawn from the lessons of past and present. It should possess an operating organization flexible enough to meet emergency conditions, alert enough to provide the *modus operandi* for meeting unusual needs in normal times and farsighted enough to provide the means of dealing with new needs or opportunities in advance of their urgent demands. The institution must be organized quickly and effectively to assist industry and government in the solution of both normal and emergency problems and in obtaining highly qualified men. Through the possession of advanced and specialized equipment and laboratories it must have investigatory resources anticipating future needs and not available elsewhere. Of major importance, it must have a staff of outstanding experts marked not alone by individual brilliancies but by a homogeneous strength that insures cooperative, creative work, capable of developing a body of advanced thought and applying it to new problems. And finally, it must have a student body of the highest possible caliber—graduate students of distinction and undergraduates of honors caliber and treated as honors students.

In idealized terms this is the type of institution toward which we should aspire. Our trend has been in this direction; our resources, traditions and prestige give us a good basis from which to proceed. The experiences of the present emergency serve to reenforce our faith in the social values and the practical feasibility of this educational ideal. What we need to have are considerably ampler financial resources and wisdom in using them.

Of our actual trend in this direction there have been many evidences, aside from the defense program, in the past few years. The increasingly careful selection of undergraduate students, the growth of our graduate school without prejudice to the undergraduate program, the mounting volume of pure scientific research and of research and development projects brought to us by government and industry, the increasing number of graduate fellowships supported by industry and the growing demand for technically trained men, especially those with graduate training, are indications of the trend. Certainly it is not idle speculation to observe that when the demands of the present emergency have been fulfilled, science and engineering will be faced with the task of creating new wealth to replace the colossal waste of war, and that this will require technological institutions of ampler resources and instrumentalities for public service than we have to-day, and that the Massachusetts Institute of Technology should serve in these directions with all the effectiveness and resource which we can muster.