SCIENCE

VOL. 102 FRIDAY, NOVEMBER 9, 1945 NO. 2654

SCIENCE: A Weekly Journal, since 1900 the official organ of the American Association for the Advancement of Science. Published by the American Association for the Advancement of Science every Friday at Lancaster, Pennsylvania.

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Communications relative to articles offered for publication should be addressed to Editors of Science, The Science Press, Lancaster, Pa.

Communications relative to advertising should be addressed to THEO. CHRISTENSEN, Advertising Manager, American University, 3801 Nebraska Ave., NW, Washington 16, D. C.

Communications relative to membership in the Association and to all matters of business of the Association should be addressed to the Permanent Secretary, A.A.A.S., Smithsonian Institution Building, Washington 25, D. C.

Annual subscription, $6.00 Single copies, 15 cents

VISIBLE PATTERNS OF SOUND

By RALPH K. POTTER

BELL TELEPHONE LABORATORIES

THE automatic representation of speech sounds by visible traces or symbols has long been a subject of interest to acousticians and phoneticians, and especially to those concerned with the development of electrical communication. Techniques for automatically recording the wave forms of sounds have been very highly developed; but there has remained unsolved, until recently, the problem of recording sounds in a manner permitting their ready visual interpretation and correlation with the auditory sense. An outstanding difficulty with the interpretation of the records of wave forms is the effect of phase relationships between fundamental and harmonics. These effects may produce a marked difference in the appearance of the wave forms of two sounds that are quite indistinguishable to the ear. Consequently, wave traces of even simple vowel sounds do not permit of easy identification by the eye.

The facts are that wave traces contain too much information. To portray sound in a form that the eye can encompass in a glance requires that some means be provided for selecting the essential information and displaying it in an orderly fashion. A form of display that meets these requirements has been developed in the Bell Telephone Laboratories as described below.

The work here described was begun before the war. Because of related war interests it was given official rating as a war project, and has progressed far enough during the war period to justify its being brought now to public attention.

The possible uses of an automatic system for translating sound into patterns which may be readily interpreted by the eye are very numerous. It opens the prospect of some day enabling totally deaf or severely deafened persons to use the telephone and the radio or to carry on direct conversation by visual hearing. [The latter, incidentally, was an objective

many excellent structure sections and small-scale tectonic maps. There are, however, no very satisfactory geologic maps, and only in one instance is a structure section accurately tied to a map. At no place in the text did the reviewer find any contour maps or any discussion of contours. Unfortunately many of the photographs are very poorly reproduced. This is due largely, no doubt, to the use of inferior paper in wartime. The text appears to be relatively free of typographic and other minor errors and the index is reasonably complete.

The book has a distinctly cosmopolitan flavor, and examples to illustrate the subjects discussed are chosen from many little known parts of the world. Where not used as a text it should prove invaluable as collateral reading. It is a book, furthermore, that an interested layman can read with great profit.

HARRY S. LADD

U. S. GEOLOGICAL SURVEY,
WASHINGTON, D. C.

GENERAL CHEMISTRY

General Chemistry. By JOHN A. TIMM. Illustrated. xii + 692 pp. New York and London: McGraw-Hill Book Company, Inc. 1944. $3.75.

THIS is one of few really excellent general chemistry text-books; a clear, understandable presentation of orthodox, descriptive general chemistry. It is for the beginner, not the advanced freshman.

Fact and theory are skilfully blended by alternating the descriptive and theoretical material throughout the text; the following content of chapters illustrates this: (1–6) introduction to scientific methods and literature; elements and compounds; a brief statement of atomic theory and molecular weights; balancing equations; (7–8) preparation and reactions of oxygen; fire; (9) valence; (10) hydrogen; (11–12) gas laws and kinetic theory; (13) reactions of oxides; (14–16) liquids, liquefaction and solids; (17–18) chlorine and hydrochloric acid; (19–20) molarity, molality; freezing point depression and other laws of solutions; (21–22) molecular and atomic weights and problems based thereon; (23) halogens; (24) periodic table; (25–29) atomic structure, radioactivity; (30–33) ionization, reaction velocity, protolysis; (34) sulfur and sulfides; (35) precipitation; (36–39) oxides of sulfur, the atmosphere, nitrogen chemistry; (40) oxidation and reduction, electron balancing, electromotive force series, electrode potentials; (41–43) phosphorus family, carbon, boron and silicon; (44) colloidal state; (45–48) electrometallurgy, metallurgy, alloys, alkali and alkaline earth metals; (49) complex salts as illustrated by Cu, Hg, Ag and Au; (50) amphoteric properties as illustrated by Zn, Al, Sn and Pb; (51) oxidation and reduction as illustrated by Fe, Cr and Mn; (52–55) organic chemistry of aliphatic hydrocarbons and their derivatives, aromatics and the chemistry of life, with approximately one page each devoted to coal tars, dyes, plastics, medicines, hormones, photosynthesis, carbohydrates, rayon, fats, proteins, nylon, etc.

Especially commendable are a separate chapter on liquefaction, critical temperature, etc.; a simple arrangement for solving weight and volume problems based on equations; clear-cut emphasis of the importance of Cannizzaro's contribution in interpreting Avogadro's paper; an excellent treatment of light emission and energy levels; probably the most understandable elementary treatment of the Lowry-Bronsted system of acids and bases to be found in any general chemistry text; unusually fine chapters on precipitation, the significance of the electromotive force in oxidation and reduction, and ferrous and non-ferrous alloys. Modern industrial processes are well represented. There are a number of fine photographs, particularly of atomic models.

Sins of omission and commission fortunately are few. Vitamins do not appear in the index, although several pages of vitamin chemistry are given; the old-fashioned fire extinguisher is represented as extinguishing with both water and carbon dioxide, although in reality the latter serves only to eject the former; detergents and a few other topics are missing.

Style is conversational. Such statements as the one on page 42, "Chemistry . . . is far more than a museum of forms, but rather an arena in which interesting and even exciting changes take place," does much to humanize the text and inspire the student.

The author is obviously a teacher of much experience, unusually sympathetic and skilful in training the beginner to learn and to grow in wisdom. He has succeeded in translating these good qualities into his text.

HUBERT N. ALYEA

PRINCETON, N. J.

BOOKS RECEIVED

BEAVER, WILLIAM C. *Laboratory Outlines of General Biology.* Third edition. Illustrated. Pp. 268. The C. V. Mosby Company. $2.00. 1945.

HARVEY, H. W. *Recent Advances in the Chemistry and Biology of Sea Water.* Illustrated. Pp. vii + 164. Cambridge University Press. $2.50. 1945.

LIMA, A. DA COSTA. *Insetos do Brasil. 5.° Tomo. Capítulo XXVIII, Lepidópteros, 1.ª Parte.* Illustrated. Pp. 379. Escola Nacional de Agronomia. 1945.

LOWY, ALEXANDER, BENJAMIN HARROW and PERCY M. APFELBAUM. *An Introduction to Organic Chemistry.* Sixth edition, revised. Illustrated. Pp. xiv + 448. John Wiley and Sons, Inc. $3.50. 1945.

RUSSELL, E. S. *The Directiveness of Organic Activities.* Illustrated. Pp. viii + 196. Cambridge University Press. $2.00. 1945.