

cells are treated of in § 242, but not, we think, quite successfully. It is stated, among other things, "that there is a *slight* difference [of potential] at the junction of the copper and the zinc," and it is implied that the charge in potential in passing from the liquid to the zinc is considerable. "These facts, it is said, may be proved by direct experiment." While in all probability these statements would be found true if we could measure the actual potential of the zinc, the copper and the acid, direct experiments, measuring as they do the potential in the air near the zinc and copper, seem to show us that these differ in potential considerably.

Book v. deals with light, and bases the explanations entirely on the wave theory.

There is much to be said for such a treatment; still some of the proofs given necessarily want in rigidity—*e.g.* that in § 306, on the law of reflection—and the clearness of conception acquired by the student who makes a careful study by graphical methods of the phenomena afforded by lenses and mirrors is a great gain to him.

The book is clearly printed and admirably got up; the diagrams are good; the plate of spectra in black and white, facing p. 264, is a marked improvement on many of the chromolithographed plates we have seen.

#### OUR BOOK SHELF.

*A Detailed Course of Qualitative Chemical Analysis of Inorganic Substances, with Explanatory Notes.* By Arthur A. Noyes, Ph.D. Pp. 89. Third edition. (New York: The Macmillan Company. London: Macmillan and Co., Ltd., 1897.)

THE present work arose out of the difficulty experienced by the author in attempting to give a thorough course of qualitative analysis in limited time to large classes of students. Of course in a work dealing with so hackneyed a subject anything new must be looked for in the arrangement of the material. It is a common practice to preface the actual analytical separations by a course of test-tube reactions with each metal and acid, with the object of combining a course of systematic inorganic chemistry with the study of analysis. The author prefers to keep the two separate, thinking that the former is better taught by a course of inorganic preparations than by the test-tube reactions, which mostly involve mere questions of solubility. The present course accordingly plunges at once into the separations of the metals, passing on to the wet tests for acids, and concluding with dry tests and an excellent chapter on the preliminary preparation of substances for analysis. The book is intended to be used in the laboratory, and to be accompanied by lectures on, and demonstrations of, the analytical processes. When employed in this way it is thoroughly to be commended. Minute directions are given for carrying out each operation, followed by notes explaining the reason of everything which is done, and the apparently anomalous results which may arise from the neglect of the precautions specified, or from other causes. These notes form a peculiarly excellent feature of the book, and reveal the hand of the experienced teacher. The section on the tests for acids is, perhaps, the least satisfactory, the tests selected being, in the writer's opinion, not invariably the best available.

The printing, paper, and binding are uncommonly good, and a useful index is provided.

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*Physikalische Chemie für Anfänger.* By Dr. C. M. van Deventer; with a preface by Prof. J. H. van 't Hoff. Pp. 167. (Amsterdam: S. L. van Looy. Leipzig: W. Engelmann, 1897.)

PROF. VAN 'T HOFF says, in his preface, that he had experienced, in his lectures to medical students, the want of a text-book dealing with the general laws of chemistry in an elementary way, a want which was supplied by Dr. van Deventer's book. The book begins with definitions of terms, and then goes on to the laws of chemical combination, the laws regulating the behaviour of gases, Avogadro's hypothesis, atomic and molecular weights. The fourth chapter deals with the specific heats of elements and compounds, and contains an excellent *résumé* of the more important results of thermo-chemistry, concluding with the laws of mass action and some pages on distillation. The last three chapters deal briefly with the theory of solutions, spectroscopy and photo-chemical action, and the periodic law. Although it might be objected that the discussion of the asymmetric carbon atom on p. 40 is somewhat beyond first-year students, that too much space is devoted to the erroneous principle of maximum work, and too little to the hypothesis of electrolytic dissociation, which is of such great interest in connection with the qualitative analytical work which forms a considerable portion of the laboratory practice of elementary students, yet these are matters on which different teachers would entertain different opinions, and on the whole it must be said that the work is thoroughly well done and suited to the purpose for which it is intended.

*Bromide Enlargements, and How to Make them.* The Popular Photographic Series, No. 13. By J. Pike. Pp. 64. (London: Percy Lund, Humphries, and Co., 1897.)

THERE are many of us who delight in the use of hand cameras, but who find those of larger size too cumbersome and unwieldy to carry about. With the former pictures may be obtained without those numerous preliminaries which must be gone through every time a picture is required, such as putting up the tripod, setting up the camera, &c., but their size necessitates that the pictures must be rather small. These latter can, however, be enlarged when required, and it is with this special subject that the present little book deals. The process is quite simple, as will be gathered from the sixty-four pages in which the author brings together all information that the operator can require. Not only is the actual method of making bromide enlargements described, but useful hints will be found on constructing one's own apparatus, the different sources of light available, screens, skies and sky printing, &c. The book forms an interesting addition to the popular photographic series, and it should be widely read.

*The Machinery of the Universe: Mechanical Conceptions of Physical Phenomena.* By Prof. A. E. Dolbear, A.B., Ph.D. Pp. vi+122. (London: Society for Promoting Christian Knowledge, 1897.)

IN December 1895, Prof. Dolbear delivered before the Franklin Institute of Philadelphia a lecture on mechanical conceptions of electrical phenomena, and the substance of it was published in *NATURE* a year ago (vol. lv. p. 65). The lecture has been enlarged by the addition of a section in which the properties of matter and the ether are compared, and it now forms one of the "Romance of Science" series of the Society for Promoting Christian Knowledge. The aim of Prof. Dolbear is to show that the mechanical antecedents of physical phenomena are sufficient to explain the phenomena without assuming the existence of other factors.