

and differ only in size and shape ; he defines an atom as " an Impenetrable Expanse of the ability to Modify and be Moved by Energy." He dwells at length upon the shapes of atoms, for " the one element of Shape in the atom is capable of determining all the varieties of result found in combinations." Thus iron and gold are identical in essence, but their diverse qualities are determined by diversity in shape and size of their atoms. The book contains several illustrations showing the shape of atoms, and they resemble the building blocks used by children and the diagrams of dressmakers. Notwithstanding much space is given to the shape of atoms (pages 43 to 58), the fact that they are endowed with weights is generally ignored !

These atoms are influenced by two energies only, one attracting and one repelling, but " Energy " is not a mode of motion, it is a " distinct Entity." " Adhesion, Cohesion and Chemical Affinity in all its myriad forms," are simply different " operations of Gravitation," and the " key to the solution is to be found in the infinite factor which comes into operation when the atoms are in actual contact with each other." The different kinds of contact are thus explained : " When not in contact we have the Gaseous state ; when but a single point of contact, the Liquid state ; when so many points of contact that there is rigidity, the Solid state ; when face to face contact, Chemical Combinations."

The author demonstrates to his satisfaction that the interstellar Ether is identical with Energy ; he concludes that " the Ether is simply Energy as an Entity."

It is difficult in reviewing a book of this character to avoid doing the author injustice, but we have endeavored to prevent this by citing almost exclusively his own words. The work is endorsed (in an Introduction) by a gentleman who has been successful as an archæologist and anthropologist, especially in exploring Mexico, but his pursuits have not especially qualified him for judging a treatise on physical science. He says, however, that the work " will stimulate thought."

HENRY CARRINGTON BOLTON.

QUANTITATIVE CHEMICAL ANALYSIS, ADAPTED FOR USE IN THE LABORATORIES OF COLLEGES AND SCHOOLS. By FRANK CLOWES, D.Sc. (LOND.) AND J. BERNARD COLEMAN, A.R.C.Sc. (DUBLIN). Fifth edition. Philadelphia : P. Blakiston's Son & Co. 1900. xxiv + 592 pp. Price, \$3.50.

This is a standard laboratory guide in many of the English

colleges and has also received favor on this side the water. The subject-matter is arranged under sixteen sections. The first three of these describe chemical apparatus, careful chemical manipulation, the determination of specific gravity, boiling-point and melting-point, and the preparation of pure substances. Section IV is arranged so as to be progressive in point of difficulty and includes directions for the gravimetric determination of the more important bases and acids. Volumetric analysis is taken up in Sections V-VIII, beginning with the calibration of burettes, flasks, etc. This could be considerably improved by calling attention more prominently to the necessity of reducing the weight of water to "in vacuo," and giving the correction to be applied for the contraction and expansion of glass. The preparation of, and use of normal solutions are fully explained by practical examples. Section IX is devoted to metallurgical analysis and is the most faulty part of the book. This is probably due to the inferiority of the English to the American methods of metallurgical analysis. For example in this book, zinc is determined in its ore volumetrically by the use of sodium sulphide solution, and silicon in pig iron by evaporation to dryness with nitric acid, etc. The fire assay for lead, silver, and gold, is condensed "past all understanding" into five pages. Sections X and XI are very much better and cover water, food, and soap analysis and the valuation of tanning materials. The methods given for the latter purpose are excellent. Organic analysis and the determination of molecular weights are taken up in Section XII, and the concluding sections treat of simple gas analysis. A collection of tables and miscellaneous matter is appended. The book is well printed and freely illustrated. The methods all through are fully explained and the calculations involved in the analyses are made clear by examples. The entire absence of any references to the periodical literature of the profession and the failure to give credit for the methods, except in rare instances, do not add to the value of the book. Even students should be taught to avail themselves of this wealth of information and experienced chemists usually wish to know sufficient of the history of their methods to enable them to consult the original description and subsequent modifications.

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