

tull operation, no restriction being placed on the quantity used, the daily consumption amounted to seventy-eight gallons per head of the whole population, or ninety gallons for each water consumer.

From time to time the works have had to be enlarged and additional reservoirs built, until in 1875 it was determined to build a second aqueduct connected with a new reservoir to hold 1900 millions of gallons.

The new aqueduct, including a short length of pipe line, is thirty-four miles long, twenty-nine miles of which are in tunnel through gneiss rock. This aqueduct is lined throughout with masonry. The standard shape, where not under pressure, is of horseshoe section with a diameter of fourteen feet, the sectional area being equal to a circular masonry culvert having an internal diameter of fourteen feet. The available head is 33.70 feet, which is absorbed in overcoming friction through the conduit and pipes. The grade is at the rate of 0.7 feet per mile, and the velocity of the flowing water 3.27 feet per second. It is capable of discharging 300 millions of gallons in twenty-four hours.

The "Cornell" reservoir, now under construction, will contain when completed 32,000 million gallons. The central masonry dam is 600 feet long, with an earthen continuation of the same length. The maximum height of the masonry dam is 260 feet, the height above the river-bed being 159 feet, the top being 10 feet above the water-line. It is to be 18 feet wide at the top, and 18.5 feet at the base.

The total capacity of the conduits now supplying the city, which has a population at the present time of one and a half millions, is 425 millions of gallons. The total storage capacity of the reservoir is 75,000 millions of gallons, equal to a minimum supply in the driest years of 280 millions of gallons.

Mr. Wegmann's book is almost entirely of an historical and descriptive character, and is confined entirely to the works carried out for the water supply of New York. The details of these various works are, however, so copiously illustrated that they give the book an eminently practical character, which renders it of value to any engineer engaged in water-works construction.

A NEW CHEMICAL DICTIONARY.

A Dictionary of Chemical Solubilities. Inorganic. By Arthur Messinger Comey, Ph.D. Pp. xx + 515. (London: Macmillan and Co., Ltd., 1896.)

THIS is a book about which it is impossible to get up any feeling of enthusiasm; but one cannot resist a sense of wonder and admiration at the patient, plodding spirit in which the compiler must have set about his weary task, and carried it on through months or years of labour to the dreary end. Of course he is an American. In no other nation of the earth using or abusing the English tongue would a man have been found to undertake such an enterprise; but why the busy, rushing life of that great country across the Atlantic should breed so many compilers of catalogues and bibliographies and indexes, especially of physical science, of books which Charles Lamb would have called no books, *biblia a-biblia*,

it seems hard to say. The world ought to feel grateful to them, but usually it does not. It often uses such cyclopædias, though ready enough to grumble if it finds them less than perfect. In this volume the only smack of literary flavour is to be found in the preface, wherein the extract from "Peter Shaw's Chemical Lectures, publicly read at London in 1731 and 1732," shows that the plan of such a book was foreshadowed long before its accomplishment. For, according to the author, the first work that undertook to carry out the idea in its entirety was produced by Prof. F. H. Storer in 1864. All chemists are familiar with Storer's "First Outlines of a Dictionary of Solubilities of Chemical Substances," though long since out of print. It will at once be noticed that there is an important difference in the titles of the two works. Dr. Comey is, however, justified in using the expression "chemical solubilities," inasmuch as he does not confine his work to data concerning solutions in water and alcohol or other neutral solvents, but includes the action, for example, of acids upon metals, and the effects of various liquids, such as solutions of potash and aqueous acids. Moreover, certain physical facts are mentioned, such as changes of temperature on dilution, also any data obtainable regarding the boiling-points of solutions, and tables giving the specific gravities of aqueous solutions.

After all, the more modest title—"First Outlines"—adopted by Storer, seems to assume quite enough; for the materials for such a work amount at present to little more than a most miscellaneous collection of more or less inaccurate estimations of solubilities, without any clue as to the cause of solubility, and theories as to the condition of the dissolved substance still in conflict. This, however, has not deterred the compiler, who, on the whole, has done his work carefully and well. It would, perhaps, help the users—we can hardly speak of readers—of the Dictionary if in a future edition the general statements were somewhat amplified, and gathered together into an introductory chapter apart from the alphabetical array of details concerning particular cases. For example, it is obvious in regard to salts that the solubility in water is determined more by the nature of the negative radicle than of the metal. We can say truly that all nitrates are soluble in water except a few basic compounds, but we cannot predicate anything general concerning the solubility of the compounds, say, of lead. Some of these broad statements are given in the Dictionary, but they might be extended with advantage. A classification of the metals according to the action of water and of acids upon them might be given; it might also be worth while to state what is known of the colours of dissolved inorganic substances, concerning which there are some very curious facts which probably have an important significance could we only find the clue to their explanation.

From what has been said, it is obvious that this volume contains a mass of information brought together from a great variety of sources. It will certainly be found useful not only in the chemical laboratory, but also by the manufacturer and practical man to whom time is money. It may therefore be fairly described as one of those books which no chemist's library should be without.