nic Institute and dealing with various special phases of the chemistry of paper-making and the chemical and physical properties of paper.

Vol. II opens with a thoughtful discussion of Technical Education as Applied to Paper-making, while the body of the volume is made up of the carefully considered answers made by the author to the questions propounded by the City and Guilds of London Institute to candidates who had taken its Course in Paper Manufacture. As to the questions themselves it may be said that very few American paper mills superintendents could hope to pass them with credit. Mr. Beadle's answers cover in what is usually an eminently practical way many subjects of which paper-makers generally have only the most empirical knowledge and as to which it is only fair to say they have few sources of information.

Volumes III and IV are the outcome of the publication by *Paper and Pulp* of a series of test questions on paper-making technology addressed to workers in English mills. These questions developed an astonishingly frank and intelligent discussion of the subjects propounded, and in these last two volumes Mr. Beadle has brought together abstracts of the best answers to each question and has extended and unified the whole by critical discussion and comments of his own.

In spite of the serious handicap which the method of treatment has imposed on the author, these volumes will well repay careful study by all who have to do with the art of paper-making. A. D. LITTLE.

The Principles of Copper Smelting. By EDWARD DYER PETERS, Professor of Metallurgy, Harvard University. Hill Publishing Co., New York and London. Price, $5.00.

Whoever will carefully read through every page of this book of 569 pages will undoubtedly have become acquainted with the principles upon which the modern practice of copper smelting is based. He would hardly, however, agree with the statement that it represents a boiling down of principles; rather would he be likely to consider that the explanation of these principles could have been made considerably more concise. This extended style is no doubt admirable in a lecture room, but makes continuous reading rather wearisome. It is, nevertheless, a most instructive book. The facts are clearly stated, and the reasons gone into thoroughly, examples and problems being continually given to elucidate the various points, and the influence of business considerations is kept constantly in view. The work is divided into fifteen chapters, embracing: Methods and Collectors; First Principles of Smelting; Principles of Roasting; Chemistry of Smelting; Practice of Roasting; Blast Furnace Smelting; Reverberatory Smelting; Pyrite Smelting; Practical Study of Slags; Matte; Production of Metallic Copper from Matte; Refining of Copper; Principles of Furnace Building; Applica-

tions of Thermochemistry; Miscellaneous and Commercial. The chapter on blast furnace smelting contains a very interesting description of the development of the gigantic furnaces constructed by E. P. Matthewson at Washoe, Anaconda, Montana, smelting 3,000 tons of charge per 24 hours. The chapters dealing with pyrite smelting are largely written and are reviewed by R. Sticht, of the Mt. Lyell mine in Tasmania. Throughout the parts dealing with Bessemerizing methods, it is disappointing to find that no credit is given to the pioneer work of the recently deceased John Holloway, of London (in whose laboratory the reviewer found his first occupation), who clearly foresaw, and endeavored to put in practice the principles of these methods, and from the adoption of which others have received the rewards. The chapter on Thermochemistry is written by Prof. Joseph W. Richards, of Lehigh University. In the portion dealing with the refining of copper, but passing mention is made of the electrolytic methods, as they are of very special nature, and the art has a literature, though a meagre one, of its own. While the book is primarily intended for students, and for those who have not an exact knowledge of chemistry, it should be found useful to all who have interests in the mining, refining, or chemistry of copper.

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