The Metallurgy of Lead and the Desilverization of Base Bullion

Hofman Heinrich Oscar
THE
METALLURGY OF LEAD
AND THE DESILVERIZATION OF
BASE BULLION

BY
H. O. HOFMAN, M.E., PH.D.
PROFESSOR OF METALLURGY, MASSACHUSETTS INSTITUTE OF TECHNOLOGY

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To the Memory of
J. L. Hofman
This book is dedicated by
The Author
PREFACE

TO THE FIRST EDITION.

In 1870 Dr. Percy published his great work, "The Metallurgy of Lead, Including Desilverization and Cupellation," which has become the standard book for England and America, and is also highly esteemed by the Germans and the French, into whose languages it has been translated. It contains an exhaustive discussion of smelting and desilverizing as carried on in the principal European works. During the past 20 years, however, so much that is new has been introduced in American practice that a book embodying the latest improvements seems almost a necessity for the student. It is the aim of the present work to supply this need. Thus, while European practice is not at all excluded from the book, the main object has been to make it a guide for Americans, and European methods have been discussed more in connection with their applicability in this country than from any other point of view. In the subject of the blast furnace, for instance, only such features have been brought out as seemed useful for America. Reverberatory furnace practice, on the other hand, which has not made much progress as yet in this country, is given more in the European way, while the ore-hearth treatment follows both English and American methods, which supplement one another. Three classes of readers have been kept in mind—the student, for whose use the ground principles and many definitions are given a prominent place; the metallurgist, who needs minute detail for his practical operations; and the investigator, who will find in the footnotes the principal references for the subject in its various branches.

To insure the latest data a number of important German works were visited in 1890 and the representative American ones in 1891, and the information obtained has been embodied with the name of the authority given, whenever this has been permitted. The author desires to thank all who have assisted him in this way and otherwise to amplify his notes, gathered through many years of practical life.

H. O. H.

MASSAC HUSETTS INSTITUTE OF TECHNOLOGY, MAY, 1892.
PREFACE

TO THE SECOND EDITION.

As the first edition of this book only appeared in December, it is impossible to do more for the second, which has been called for in an unexpectedly short time, than to add a list of errata. The author will be grateful to readers who will call his attention to any still uncorrected errors, whether of type or otherwise, or who will favor him with suggestions through which his work can be improved in each new edition. A treatise on any technical branch of science must necessarily represent to a great extent the personal experience and conclusions of the writer. Thus he is very liable to emphasize difficulties or advantages familiar to himself in a given mode of practice at the expense of others with which he has not happened to be brought in contact. It is only by comparing the experiences and views of others with his own that any one can hope to produce in the end a book of general and lasting value.

H. O. H.

Massachusetts Institute of Technology, January, 1898.
PREFACE

TO THE FIFTH EDITION.

Since the first appearance of this book six years ago there have been so many important changes in the smelting of silver-lead ores and the refining of base bullion that a new and enlarged edition has now become a necessity. In order not to increase too much the bulk of the volume, all discussion of the dry and wet assay of ores and metallurgical products has been omitted. This could be done the more readily as several treatises have appeared within a short time with full details of the quick methods in common use.

The most important change in the book is the new chapter on the roasting of ores. Perhaps it may be said that more attention has been given to mechanical roasters than is appropriate to a treatise on the metallurgy of lead. But lead smelters to-day treat all kinds of silver and gold-bearing ores, which are often rich in copper, lead being only the collector of the precious metals, and thus encroach quite unavoidably upon the field of copper smelting. Therefore the subject of mechanical roasting seemed to demand considerable notice. At the present time a reaction has apparently set in against it; the writer cannot but believe, however, that this is only temporary. The chapter on the properties of lead and of some of its compounds contains all the new facts published since 1892. In the short review on ore deposits the many references to sources of information have been omitted, because several treatises giving full details have recently appeared. A large number, however, of technical analyses of ore shipments from the different districts have been added and the references given. The chapter on sampling and purchasing of ores will be found to be much altered. The F. L. Bartlett process for treating zinc-