A TEXT-BOOK OF IMPORTANT MINERALS AND ROCKS: WITH TABLES FOR THE DETERMINATION OF MINERALS

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Trieste

A TEXT-BOOK

OF

IMPORTANT MINERALS AND ROCKS.

WITH

TABLES FOR THE DETERMINATION OF MINERALS.

BY

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FIRST THOUSAND.

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PREFACE.

THIS book is the slow outgrowth of the efforts to meet the necessities of this institution for a convenient text-book of the important minerals and rocks. The number of mineral species has reached nearly one thousand and is constantly increasing. Of this number less than one-tenth is of common occurrence or can be considered of much economic importance, and a small proportion of this same tenth includes the essential constituents of all rocks. To embrace in descriptive text all mineral species necessarily results in an embarrassing mass of matter for the general student. Similar embarrassment, though to a less extent, is experienced in complete descriptions of all the rocks. To reduce these descriptions to a convenient yet satisfactory form for general students is the object of the present effort.

There are described in the book about seventy-five distinct species of the important and in the main common minerals, and the principal members of the different classes of rocks. It is thought that the selection is extended enough for general purposes, and it includes abundant material for the study of both minerals and rocks. The book is primarily prepared to meet the necessities of the Military Academy, whose students are well fitted for the work when they begin it, have excellent opportunity for the examination and comparison of specimens, and for laboratory work in determin-

ing them. It is hoped that the book may be of convenience to a larger class of students whose facilities in the study may be less, but whose aim is the same as ours—to acquire a fair knowledge of the important minerals and rocks.

Chapter I of the book contains in brief outline the more fundamental principles of crystallography, followed by a description of the different crystalline systems and of some of the more important crystalline aggregates and irregular forms. The subject-matter of the chapter can be almost indefinitely extended by lecture if so desired. The reason that the crystallographic branch is so briefly treated is stated in the introduction to the book, no other treatment being considered appropriate in a short general course.

Chapter II contains a short description of the general properties of minerals, of the laboratory facilities for determining them, and of the manner of using these facilities.

In Chapter III an effort has been made to give a concise and accurate statement of the more readily observed physical properties of the mineral species and of the ordinary mineralogical tests for distinguishing and determining them. There are also added many desirable facts relating to the use and occurrence of the minerals.

A table for the determination of minerals follows this chapter and is intended for a guide and companion in the practical examinations and tests of the minerals.

The table merely puts in condensed form the described properties and characteristics of the minerals as given in Chapter III. This tabular arrangement has many advantages over a descriptive text-book without tables, or with tables bound in separate form. A statement of the properties of each species in the body of the text as well as in the table has been found advantageous when recitation and practical work are conducted simultaneously.

The tables have been a slow growth, of nearly twenty years, from very simple beginnings, and have during that time been used by our pupils under separate binding. In

this preparation I have had valuable suggestions from several officers who have served as instructors in the department, but I would here especially acknowledge my great indebtedness to Capt. J. P. Wisser, 7th U. S. Artillery, who, as Lieutenant Wisser and while serving as Assistant Professor in the Department in 1890 and '91, did the larger part of the work which placed the tables in their present shape.

Part II is devoted to the common rocks. The principles of classification, the classes, and the distinguishing characteristics of each class are given; the appearance of the different members of each class is described and their mineral composition given, to which are added many important facts as to occurrence and use and the more prominent conclusions as to origin.

The greater portion of the matter contained in the book, exclusive of the mineral tables and the contents of Chapter I, has been used at the Academy for the past six years, and has been frequently added to and revised during that time.

The arrangement of mineral species in the text is modeled after that of the late Professor J. D. Dana in his manual of Mineralogy and Petrography. The mineral compounds of the same metals are brought together, except in the case of silicates. The important metals and their ores are consecutively treated, as are the important rock-making minerals. This arrangement has, from experience, been found very satisfactory.

In the preparation of this little book I have consulted many authorities, but would especially acknowledge my obligations for mineralogical matter to the works of Professors J. D. Dana, E. S. Dana, G. J. Brush, S. L. Penfield, H. Bauerman, W. O. Crosby, D. M. Barringer; for petrographic material to various published papers of the U. S. Geological Survey, to the works of Professors J. F. Kemp, W. B. Scott, and J. D. Dana; for the chapter on Crystallography to the works of Professors G. H. Williams, E. S. Dana, H. Bauerman, and N. Story-Maskelyne.

Through the courtesy of Professor E. S. Dana I have been permitted to use the crystalline figures shown under numbers 2, 3, 4, 5, 18, 20, 22, 25, and 26, which are taken from his Text-book of Mineralogy. Figures 19, 31, 32, 33, and 34 are from Williams's Elements of Crystallography, through the courtesy of the publishers, Henry Holt & Co.

S. E. TILLMAN.

U. S. MILITARY ACADEMY, WEST POINT, N. Y.,
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PREFACE TO SECOND EDITION.

In preparing a second edition of this book effort has been made to remove all errors of typography and statement contained in the first. The headings of mineral classes have been more clearly indicated by better paragraphing. All accessory minerals have been grouped together, and the chemical formulæ of all minerals referred to have been inserted.

The principal object of the book and reasons for the treatment adopted, and for the proportions assigned to the different parts of the subject, are stated in the preface to the first edition, but the author would emphasize the fact that the main object of the book is to make students of a short general course acquainted with the simple blowpipe and chemical tests for, and familiar with the physical characters of, the important minerals and rocks; those tests and those characters which usually supply the general student with all that he permanently retains or desires.

The students of this institution for whom the book was primarily prepared have immediate and full practical use, under guidance, of the laboratory facilities referred to in the text, and the descriptive study of minerals and rocks is accompanied by large opportunity to test and examine specimens and compare them with properly labelled sets. Under these conditions minute reference to the details of laboratory

facilities or to not-easily-recognized mineral and petrographical characters, which might be of use to more special students, are believed to be not only unnecessary but detrimental to best results in general study.

By the simple testing of specimens and close observation of physical characters, the great majority of the common minerals and rocks can be recognized, and many others very approximately placed. The ability to accomplish these results can be acquired to an astonishing degree even in a short course of instruction, when the practical method indicated can be satisfactorily pursued. A text-book, as this is intended to be, for such a course should avoid much of the technical matter appropriate for other purposes, but which would be inappropriate here.

WEST POINT, N. Y., Nov. 10, 1902.