SYSTEMATIC MINERAL RECORD, WITH A SYNOPSIS OF TERMS AND CHEMICAL REACTIONS USED IN DESCRIBING MINERALS, PREPARED FOR INSTRUCTORS AND STUDENT'S IN MINERALOGY

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Trieste

SYSTEMATIC

MINERAL RECORD,

WITH A

SYNOPSIS OF TERMS AND CHEMICAL REACTIONS

USED IN DESCRIBING MINERALS.

PREPARED FOR

INSTRUCTORS AND STUDENTS IN MINERALOGY,

BY

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ADAPTED TO ANY MINERALOGY.

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INTRODUCTION.

THERE is no study that can be made more interesting and useful than that of mineralogy, and in no branch of science is the use of a text-book, alone, so inadequate as in this one. To study minerals, the student must have the specimens not only before him, but actually in his hands, that he may feel, examine, and test for himself, and it is to aid him in this original investigation that these Tables have been prepared.

The established value of the various Plant Records in the study of Botany, first suggested to the writer the use of a printed Mineral Analysis, which he has used in his classes for four years, and with such success as, seemingly, to justify placing it before a larger public than it has hitherto served. The Tables presented in this little work are a slight amplification of what he believes to have been the first Mineral Analysis ever published.

It is hoped that this schedule will prove useful in training the student to habits of thorough observation and correct methods of reasoning, while, used in connection with some good work on Determinative Mineralogy, it will become the means, not only of gaining familiarity with a very practical department of knowledge, but of providing him with valuable mental drill.

The following is suggested as an excellent method of using the Tables:—Give each student a mineral to take home for study; let him write out a careful description of the different physical and optical properties, after which he may take it to the laboratory to determine its chemical characters.

This having been done, the mineral may be analyzed from some Determinative Mineralogy and its name ascertained. This work should be followed by lectures from the instructor upon the varieties, localities, etc., of the mineral, differences between it and minerals resembling but not allied to it, the uses of the mineral in the arts and in nature, and its origin. A summary of the instructor's lecture, written on the back of

the schedule containing the description of any given specimen, completes the student's work, which, if carefully performed, will give him a better acquaintance with the subject than he can obtain in any other way.

In preparing the Tables, the writer has consulted freely all books on mineralogy at his command, especially Prof. Brushes' Determinative Mineralogy, Prof. Dana's Manuals and the works of Collins and Bauerman. He will be glad of any suggestions or corrections that may add to the usefulness of this work.

SPRINGFIELD, Mo., Jan. 1884.

EXPLANATORY TEXT TO ACCOMPANY THE SCHEDULES.

A MINERAL is defined as any natural, homogeneous, inorganic body found free in nature. Rocks are aggregations of different minerals, or masses of one kind of mineral. For example, granite is an aggregation of three mineral bodies, mica, quartz, and feldspar; while calcite, a homogeneous, inorganic body, is ordinarily called a mineral, but when occurring in large masses it is called a rock. Most minerals are solid bodies, as quartz, calcite, etc.; a few are liquid, as bitumen, petroleum, asphaltum, etc., while several are gases, as air and sulphuretted hydrogen.

All minerals possess certain peculiar properties which are, for convenience, arranged under such heads as the following:

I.—Physical Properties.
II.—Optical.*
III.—Form.*
IV.—Chemical Characters.

The student should observe the above characteristics in all mineral bodies, and the following tables are so arranged that a carefully tabulated examination, in connection with some good work on Determinative Mineralogy, will give him a more perfect knowledge of a certain mineral than he would obtain in any other way.

The student will notice that a general knowledge of chemistry and physics is necessary to a perfect understanding of these tables. A small blow-pipe laboratory can be arranged with trifling expense, a few dollars and a little ingenuity sufficing to make a very respectable outfit, although a greater expenditure will, of course, result in a more satisfactory equipment. The writer performed the most of his early work in a home-made laboratory that cost less than four dollars. Lists of apparatus and chemicals necessary for blow-pipe analysis will be given elsewhere, also hints for the construction of some of the more simple parts of the laboratory outfit.

* Separated from Physical characters for convenience only.

I.—PHYSICAL PROPERTIES.

Under physcical properties, the following characteristics are to be noticed:

1. TOUCH.	4. HARDNESS.	7. CLEAVAGE.
2. SPECIFIC GRAVITY.	5. FRACTURE.	8. MAGNETISM.
3. STRUCTURE.	6. TENACITY.	9. ELECTRICITY.

1. **Touch**, the peculiar feel that some minerals possess. The touch may be

(a.) *Unctuous*, having the greasy feel characteristic of soapstone.
(b.) *Harsh*, the scratchy feel of actinolite.
(c.) *Meagre*, dry and rough to the touch, as chalk and magnesia.
(d.) *Soft*, as asbestos, or mountain leather.
(e.) *Smooth*, as the plane of a quartz crystal.

2. **Specific Gravity.** The specific gravity of a body is its weight as compared with any other body that is taken as a standard. Hydrogen gas, the lightest substance known, is, under specified conditions of temperature and pressure, usually taken as the standard for gases, and water, at its maximum density, as that for solids. Specific gravity is said to be

(a.) *Highest*, when more than fifteen times as heavy as water. Ex. Gold, sp. gr. 19.
(b.) *Very high*, when between ten and fifteen. Ex. Silver, 10.
(c.) *High*, when between five and ten. Ex. Galena, 7.
(d.) *Medium*, when between three and five. Ex. Barite, 4.5.
(e.) *Low*, when between one and three. Ex. Quartz, 2.5.

Specific gravity is readily found by obtaining first the weight of the mineral in air, then its weight in water, after which, subtract the second weight from the first to find the loss by immersion; divide the first weight by this difference, and the quotient is the result sought. By a little practice with minerals of known specific gravity, the student will soon be able to judge quite accurately of the specific gravity of any given specimen. The table given above will be found a convenient one for common use.

3. **Structure** is the next point to be noticed, and the following terms are usually employed to distinguish the various kinds of structure.

(a.) *Massive*, when in rock-masses, without regular form. Ex. Limestone.
(b.) *Tabular*, in thick plates or layers. Ex. Feldspar.
(c.) *Lamellar*, in rather thin plates. Ex. Selenite.
(d.) *Micaceous*, in very thin plates or scales. Ex. Mica.
(e.) *Foliated*, in thin, irregular plates, schist-like. Ex. Talc.
(f.) *Plumose*, scales arranged in a somewhat feathery form. Ex. Plumose mica.
(g.) *Capillary*, fine, hair-like crystals embedded in the same or another mineral. Ex. Rutile penetrating quartz.
(h.) *Fibrous*, in fine, straight or curved fibres. Ex. Gypsum.
(i.) *Stellate*, fibres radiating from centers in every direction. Ex. Stibnite.
(j.) *Radiate*, the fibres diverging less regularly from a common center than the last. Ex. Pyrolusite.
(k.) *Reticulate*, the fibres so crossed as to form meshes. Ex. Tremolite.
(l.) *Bladed*, composed of long narrow plates, like the blade of a knife. Ex. Actinolite.
(m.) *Septate*, divided into compartments by intersecting plates. Ex. Some varieties of tabular quartz.
(n.) *Banded*, the alternating layers giving the mineral a striped appearance. Ex. Agate.
(o.) *Pisolitic*, agglutinated, pea-shaped masses. Ex. Pisolite.
(p.) *Oölitic*, agglutinated grains, resembling the roe of fish. Ex. Oölitic limestone.
(q.) *Mossy*, resembling moss in appearance. Ex. Native silver.
(r.) *Coralloidal*, when several pointed branches proceed from a common stem. Ex. Aragonite.
(s.) *Nodular*, the surface having irregular protuberances.
(t.) *Acicular*, sharp and fine-pointed, like a needle. Ex. Pectolite.
(u.) *Drusy*, the surface covered with minute crystals. Ex. Drusy quartz.

4. **Hardness.** The degree of hardness in all solid minerals is arranged, by Mr. Chapman, upon a scale of ten, the softest ranking as one, and the hardest substance known as ten. The following is the scale used by most mineralogists:

1. *Talc*, can be scratched with the finger-nail.
2. *Rock-salt*, a little too hard to be scratched with the nail; will not scratch a copper cent.