

## BOOK REVIEW

MINERAL CLASSIFICATION ACCORDING TO CLEAVAGE AND CRYSTAL HABIT, W. A. SEAMAN. 4th edition. 1935. 51 pages with 13 illustrations. Price 60 cents. Supply department, Michigan College of Mining and Technology, Houghton, Michigan.

Professor W. A. Seaman has revised, enlarged, and greatly improved this booklet which is used as a guide for sight identification both in his classes and in the field. The physical properties which he uses for mineral determination, arranged approximately in the order of their importance are: cleavage, crystal habit, luster, specific gravity, tenacity, fracture, hardness, streak, magnetism, taste, and color. It will be readily apparent from the above order that these determinative tables differ from most others in the great importance placed on cleavage, while streak and color are considered to be much less important. The basis for this choice is the fact that those properties which depend directly on molecular arrangement are the most constant and characteristic.

For the purpose of accurately describing the degree of perfection, Professor Seaman has divided cleavages into 8 groups, varying from very perfect to imperfect. Partings are also listed, but because of their variability no attempt is made to describe their degree of perfection. The minerals are placed in groups with 1, 2, 3, 4, or 6 directions of cleavage and these groups are subdivided according to the angles between cleavages, the number of zones present, and whether the cleavages are alike or unlike. For each mineral listed, some distinguishing fact and a page reference to the mineral description in Dana-Ford's *Textbook of Mineralogy*, 4th edition, is given. Dana-Ford is also followed in regard to the naming of crystal forms.

There are a few things in regard to the arrangement of material and the lack of accuracy in definitions that might be improved, but the need for brevity in a work of this type makes the attainment of accuracy difficult. In discussing crystal habit the statement is made, "For convenience, all possible crystal developments are classified into about 32 Crystal Classes or Groups; . . ." (Italics by L. W. S.). The classification of crystals into 32 classes, of course, is not as arbitrary as one might be led to suspect from the above statement.

Among the interesting features of the tables is a graphical presentation of the scale of hardness showing the approximate variation in hardness between the different points in Mohs' scale. Three methods for approximating the angles between cleavages are described. One of these depends on the rotation of a pencil and although quite simple, the method is very effective. The booklet also contains tables for the identification of minerals with characteristic streak, marked sectility, taste, or fibrous structure. Cryptocrystalline minerals without characteristic streaks are arranged on a chart according to specific gravity and hardness, and those minerals closely resembling each other are connected by lines. The last 2 pages of the tables are devoted to a rock classification designed primarily for field use.

Although there is likely to be a feeling among mineralogists that Professor Seaman's method lays too much emphasis on cleavage, especially imperfect ones, there will be general agreement that these tables represent a definite contribution to the sight determination of minerals. Not only has Professor Seaman made available the results of a careful study of cleavage, but his work is also important in emphasizing the usefulness of this physical property which mineralogists often undervalue.

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