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Complete Mineral Catalog

COMPILED BY W. M. FOOTE

TWELFTH EDITION, ENTIRELY REVISED AND ENLARGED
WITH THREE HUNDRED FIGURES AND PLATES
COVER ILLUSTRATION IODYRITE

PUBLISHED BY THE

Foote Mineral Company

107 North 19th Street, Philadelphia, Pa., U. S. A.

ESTABLISHED 1876 BY DR. A. E. FOOTE

— 1909 —

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PART I. Introductory

PART I

Introductory

Terms, Labels, Trays, Sizes, Cabinets, Etc.

Acknowledgment.

The complete revision and expansion of most of the lists throughout the present edition is exemplified in the very useful combining of the Complete Type Collection List with the oft published Synopsis of Dana's "System of Mineralogy." The different types and varieties thus follow each species heading with fuller descriptions of the form and physical characters of each than was practicable formerly. A feature which will especially commend itself to mineralogists, is the insertion in proper position in the systematic arrangement, of all recently discovered minerals. This includes the minerals described in the new "Second Appendix" to the "System," access to the manuscript being kindly given by Prof. Dana. The compiler is especially indebted to Dr. F. Ward for the selection of data from the Supplement and two Appendixes, and locating the new minerals; to Prof. Wm. E. Ford for advice concerning species of doubtful relationship; to Prof. Amos P. Brown for suggesting the presentation of the hardness by group; and finally to Prof. Edward S. Dana and Messrs. Wiley & Sons for permission to reproduce from the "System" the numerous figures which add so much to the value of the catalog.

Rare Minerals

In Commercial Lots for Manufacturers

Progress in metallurgy, lighting and other special industries in the past decade has been marked by a rapidly increasing use of the rare metals. One of the obstacles which the technologist faces is the limited and irregular supply of raw material. Our facilities for acquiring these ores are exceptional, as we employ traveling experts and are constantly receiving samples from correspondents throughout the world. The results of thirty-three years of wholesale collecting affords a choice of over two thousand different varieties of minerals, as listed in the Complete Type Collection, Part II. Specimen prices of several hundred useful minerals are given in Part V, Economic Mineralogy. The more important are mentioned in the Laboratory List, Part VIII, with prices by weight for samples. Correspondence is solicited with consumers or experimenters desiring ton lots.

Highest Awards

AT THE EXPOSITIONS OF

PHILADELPHIA, 1876 CINCINNATI, 1881 NEW ORLEANS, 1884-85
NEW ORLEANS, 1885-86 LOUISVILLE, 1886 LONDON, 1887
PARIS, 1889 PARIS, 1900

Assurance of Quality

We Pay Transportation To Any Address In The World.

SPECIFIC GUARANTEE. If you do not like the specimens return them at our expense. We take responsibility of loss or breakage in transit. The risk of double transportation we assume, gives assurance that your requirements will be met.

WE REFER TO curators and teachers of mineralogy in all countries.

PRICES ARE UNIFORM. The "one-price" system simplifies buying, and wins universal favor.

PAYMENTS. For convenience, we accept the following rate of exchange: $1.00 = 4/- = M. 4. = Fcs. 5. = L. 5.

The "Traveling Exhibit."

An

Oak Mineral Chest

Is presented, if requested, with each purchase

of Hand size or larger specimens, totaling $20.00 or over. If chest is not requested,

we deduct instead 10 per cent.

from total price. These offers apply only when all specimens are kept.

PLATE I. OAK CHESTS NOS. 1 AND 2.

OUR DISTRIBUTION of specimens (transportation paid) takes two forms:—

FIRST.—Shipments to those who prefer to select from the specimens themselves. Our knowledge of the needs of the buyer are often indefinite and the selection we make may not always accord with his individual taste. The result is that some specimens may be returned at large expense to the seller and trouble to the buyer.

DISCRIMINATING BUYERS are requested to give us full advice as to their requirements, thus permitting us to choose specimens which may win entire approval.

SECOND.—Many are able to order from a catalog, and to such our material gives universal satisfaction. Those ordering in this direct way benefit by the chest offer, or equivalent 10 per cent. allowance, having always the right of prompt rejection.

THE CHESTS are iron-bound and made in the best and strongest manner, of ⅞ in. (22 mm.) first quality oak, antique wax finish. There are three sizes:—

No. 1. Flat Mineral Chest. Measures inside 23½ x 17⅞ x 2¾ in. (60 x 45 x 7 cm.). Given with not less than $20.00 worth of minerals. See upper chest in Plate I.

No. 2. Two-tray Mineral Chest, with handles. Measures inside 24⅝ x 19 x 6¾ in. (63 x 48½ x 17 cm.). Given with not less than $35.00 worth of minerals. See Plate II, also lower chest in Plate I.

No. 3. Four-tray Mineral Chest, with handles. Measures inside 24⅝ x 19 x 12¾ in. (63 x 48½ x 32½ cm.). Given with not less than $50.00 worth of minerals.

THE OAK TRAYS are of uniform size, measuring inside 23½ x 17⅞ x 2¾ in. (60 x 45 x 7 cm.). They are made of ½ inch (13 mm.) solid oak, with hand-holes at ends, being more convenient to handle than drawers. Each oak tray is fitted with 25 white pasteboard trays measuring 4¾ x 3$^9/_{16}$ in. (12 x 9 cm.). Two of these 12 x 9 cm. pasteboard trays are interchangeable with one 18 x 12 cm. tray, or one is interchangeable with two 9 x 6 cm. trays. Thus each oak tray holds from 15 to 50 fine pasteboard trays. These are indispensable in keeping orderly arrangement.

THE COST (WHEN NOT GIVEN WITH SPECIMENS) delivered to any address is, for No. 1, $4.00; No. 2, $7.00; No. 3, $12.00. If made singly by a good cabinet maker they would cost double these figures. Chest prices do not include pasteboard trays.

If a chest is not desired, then deduct 10 per cent. from your remittance (of $20.00 or over.) This is the average per cent. saved us by avoiding return transportation and handling, when you retain the entire lot. *This allowance is only on hand size or larger specimens and only when no specimens are returned.*

Plate II. Oak chest no. 2, holding about 60 hand size specimens or 30 museum size specimens

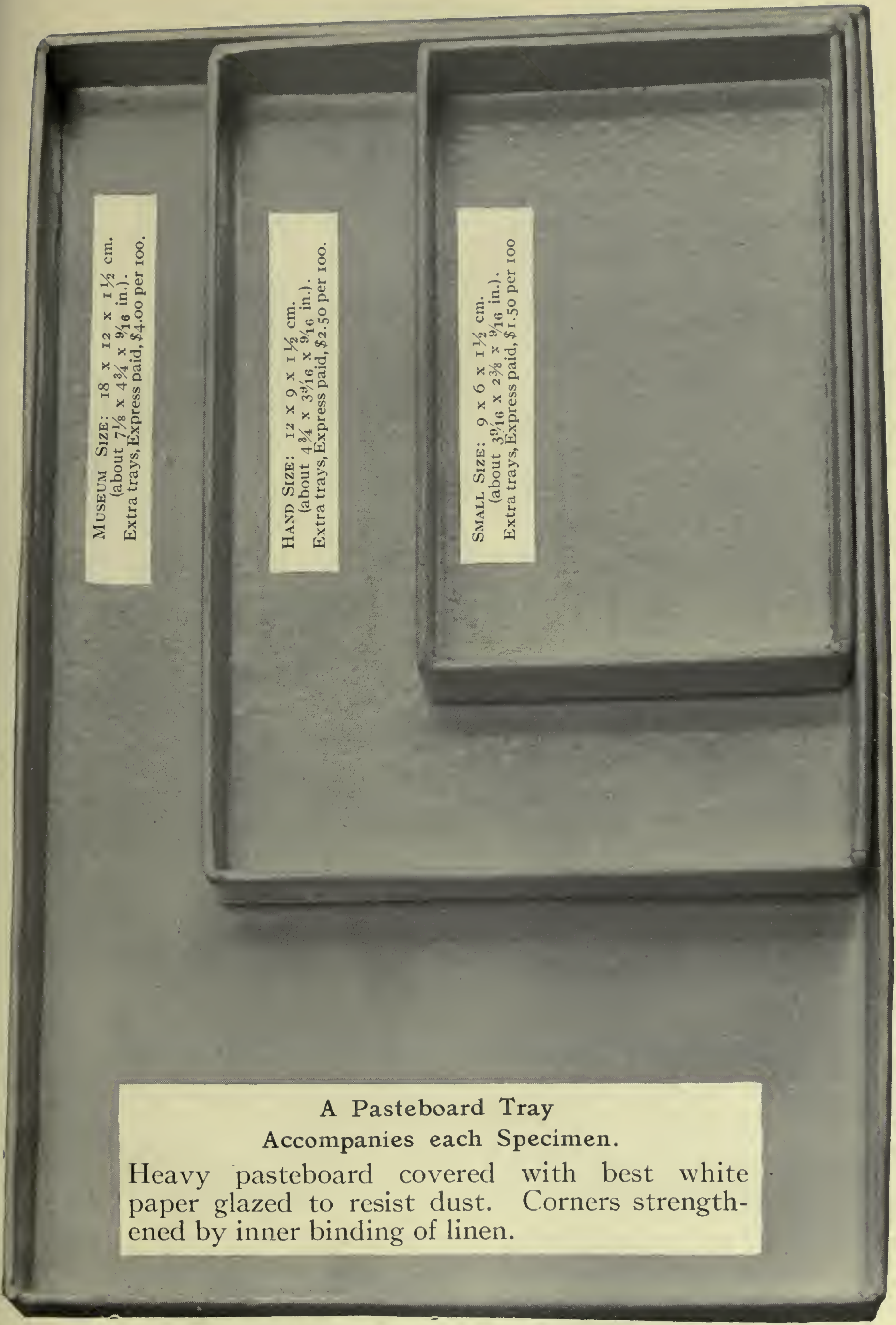

Museum Size: 18 x 12 x 1½ cm.
(about 7⅛ x 4¾ x 9/16 in.).
Extra trays, Express paid, $4.00 per 100.
Hand Size: 12 x 9 x 1½ cm.
(about 4¾ x 3 9/16 x 9/16 in.).
Extra trays, Express paid, $2.50 per 100.
Small Size: 9 x 6 x 1½ cm.
(about 3 9/16 x 2⅜ x 9/16 in.).
Extra trays, Express paid, $1.50 per 100
A Pasteboard Tray
Accompanies each Specimen.
Heavy pasteboard covered with best white paper glazed to resist dust. Corners strengthened by inner binding of linen.

Plate III

PLATE IV. EXAMPLES OF SMALL LABLES USED.

PLATE V.

Sample of Attached Label
On Hand Size Specimen in Pasteboard Tray

LABELING is one of the features of our business in which our clients rely upon the careful and conscientious work of the trained mineralogists in our employ. The name of the mineral, both species and varietal, and the composition in chemical formula, are essential on a reference specimen. The correct locality is of importance and is given especial attention. The reference number in Dana's "System of Mineralogy" is useful in arranging a collection.

The larger size of the universal loose label makes it more easily read and permits mention of the crystalline system. A great disadvantage is the frequent misplacement of the loose labels. Hence our use of the small attached label. *Every specimen leaving our establishment has pasted on the back one of these miniature labels. The museum size specimens are also accompanied by the large Exhibition Label when requested.*

PLATE VI. SAMPLE MUSEUM SIZE SPECIMEN ON BLOCK-MOUNT. (In practice the small label is attached to back of specimen.)

Museum Size Specimens

Averaging 12 x 9 cm. (4¾ x 3½ in.)

Weight averages about one kilogram (2⅕ lbs. avd.)

The illustration opposite shows the average size of specimens listed by us for private or public museums, for the school or college-class room, or for office or laboratory display, where large examples of showy appearance are desired. While intended for glass cases, as shown in Plate VII., they may be held in a drawer cabinet fitted with pasteboard trays, the drawer being 7 cm. (2¾in.) deep. In preparing collections in the museum size, especial attention is paid to the shapeliness of each specimen, and to the selection of bright colors and striking crystallizations, wherever this can be done without impairing the representative character of the collection.

Where specimens are desired for the lecture table or passing among the class, a generously proportioned specimen tells the various properties and characteristics of the mineral, much better than a smaller piece requiring longer study.

A PASTEBOARD TRAY ACCOMPANIES EACH SPECIMEN. See Plate III.

OUR IMPROVED PASTEBOARD BLOCK-MOUNT SUBSTITUTED FOR TRAY, if requested, with museum size specimens. See opposite page. It is made of extra heavy pasteboard, covered with fine white paper, glazed to resist dust. This neat and light paper block, affording a simple white background, displays the average specimen much more effectively than the old-fashioned and sombre wooden one. The depth of the mount is: Top, 9 cm. (3½ in.); base, 13 cm. (5 in.). The slanting front measures 4¼ cm. (1⅝ in.). The length is 16 cm. (6¼ in.) and the height 2¼ cm. (⅞ in.). Price for extra blocks, express paid, $8.00 per 100.

LABELING is illustrated in Plates IV., V. and VI.

PRICES for museum size are double the prices for hand size, following mineral names in this catalog.

Plate VII. Collection of museum size specimens with exhibition labels.

Hand Size Specimens

Averaging 10 x 7 cm. (4 x 2¾ in.)

Average weight about 450 grams (approximately 1 lb. avd.)

"Size is a secondary factor in the utility of a specimen, but it is one about which opinions vary greatly. What have you found to be *the most desirable size for mineral specimens, intended for use of students, and for practical purposes of reference?*"

In 1907 the above inquiry was addressed to teachers of mineralogy throughout the world. In nearly 100 replies received, the average or composite size preferred was 10 x 7 cm. (4 x 2¾ in.). Few preferred a smaller size and some preferred a size even larger. The result of our canvass of the opinion of experts led us to adopt this as our principal stock size, as illustrated in Plate V.

THE CHARACTERISTICS of the mineral and its associations are displayed far better in this size than is possible in a fragment. The representative character of the specimens in illustrating physical properties and crystallization, is considered of first importance, but incidentally many of the specimens are of attractive appearance.

PRICES given after mineral names in all collection lists, save the crystal lists, are for standard Hand Size Specimens averaging 10 x 7 cm. (4 x 2¾ in.).

A PASTEBOARD TRAY ACCOMPANIES EACH SPECIMEN. See Plates III and V.

LABELS are illustrated in Plates IV and V.

Small Size Specimens

Averaging 7 x 5 cm. (2¾ x 2 in.)

Weight averages about 225 grams (½ lb. avd.)

If purchased in lots of less than 10 of one kind, the prices are the same as for the hand size specimens. When purchased for classes, in lots of 10 or more pieces of one kind, the cost per specimen is one-half the catalogued prices for hand size specimens. This includes delivery to any address, but does not include chests.

Drawer Cabinets

Prices include crating and transportation to any address. Made after our own designs, based on long experience in handling specimens, being like cases recently manufactured for our own equipment. The work of a conscientious cabinet maker is here combined with the practical knowledge of the mineralogist's requirements.

FINE SOLID MAHOGANY (⅞ in. or 12 mm.) is used for the drawer fronts and for all parts except the back of the case, sides, back and bottom of drawers, which are made of ⅝ in. (16 mm.) cherry. Quartered oak, at the same cost, will be used if specified in order.

FINISH is in three coats of shellac, rubbed to a dull light natural finish. (Stained dark if specified in order).

SOLID BRASS KNOBS, firmly secured on inside.

THE DRAWERS measure inside 28¼ in. wide x 17⅞ in. deep x 2¾ in. high (72 cm. wide x 46 cm. deep x 7 cm. high). Each drawer will hold (1) 30 hand size trays, or (2) 24 hand size and 12 small size trays, or (3) 12 museum size and 6 hand size trays. A groove is cut in the sides of the drawer, which slides smoothly on runners. Corners are hand-dove-tailed.

Size A. Eighteen drawers in two tiers. Measures, over all, 66 in. wide x 20½ in. deep x 36 in. high (168 cm. wide x 52 cm. deep x 92 cm. high). Holds about 600 to 700 specimens, averaging 4 x 2¾ in. (10 x 7 cm.). Price, $72.00.

Size B. Ten drawers in one tier. Measures, over all, 35 in. wide x 20½ in. deep x 38 in. high (85 cm. wide x 52 cm. deep x 89 cm. high). Holds about 350 to 400 specimens averaging 4 x 2¾ in. (10 x 7 cm.). See Plate IX. Price, $45.00.

Size C. Six drawers. Measures, over all, 34½ in. wide x 20½ in. deep x 24½ in. high (88 cm. wide x 52 cm. deep x 61 cm. high). To hold Collections Nos. 14, 27, or 111, about 200 specimens averaging 4 x 2¾ in. (10 x 7 cm.). Price, $30.00.

Prices do not include duty on cabinets or chests delivered in the few countries where Customs' duty is charged on same.

Note

Since the appearance of our former complete catalog, an improvement in the form of label used by us and increasing care devoted to the preparation of material, has resulted in a general raising of the already high standard for which our collections are noted. As in the past, our aim is always to select the most typical representatives of each mineral obtainable in the mines and quarries of the world.

A price is given opposite each specimen in the collection lists, the figure quoted being for the popular hand size. One who does not desire an entire set exactly as listed by us, may thus make, without correspondence, an immediate selection of any of the specimens comprising the collection, with a knowledge of the cost of each item. Selections may also be made from the Alphabetical Price List in Part III.

All but the smallest collections may be purchased in the catalogued parts or installments, without proportionately increasing the cost. This permits the gradual purchase of the more expensive collections, each part filling important gaps in the growing nucleus and not being merely a detached section. The "collection price" for each set is less than the sum of the individual values of the specimens comprising it. Our collections are prepared a number at a time, thus effecting a material saving in labor-cost.

All collections listed, except Nos. 1A, 1 and 3A, are ready for shipment immediately on receipt of order.

PLATE VIII. ELEMENTARY SCHOOL CRYSTAL SET IN CABINET. REDUCED TO ⅖ DIAMETERS.

PART II

Advanced Systematic Collections

Synopsis of

Dana's "System of Mineralogy"

PLATE IX. TEN-DRAWER CABINET, HOLDING ABOUT 400 HAND SIZE SPECIMENS.

Advanced Systematic Collections

These are arranged according to the generally accepted classification in Dana's "System of Mineralogy," or in the "Text-book of Mineralogy" by the same author. They can be rearranged to accord with other classifications, as the purchaser may desire. The specimens have attached, labels and numbers to correspond to numbered lists.

Despite our exceptional facilities for securing minerals through our travelers or numerous correspondents, and by the purchase of old collections replete with historic rarities, it requires several years to assemble a Complete Type Collection, such as is here catalogued. Hence we have always some of these advanced collections in course of preparation.

The descriptions in the list, made from collections in stock, are moderate in their indication of perfection, definiteness, luster and the characteristics which go to make up good crystallizations. No attempt is made to indicate the beauty or attractiveness of the specimens beyond the bare statement of form and color, etc. The average standard of crystallization and general excellence, in any collection delivered by us, will be as high as is here indicated.

It should be kept in mind that wide variation in types is encountered by all endeavoring to recognize the innumerable forms of the mineral kingdom. The student who has mastered a few hundred specimens is often warned that they represent but the commoner types, and in the field new and unknown varieties confuse and puzzle him at every turn.

Practice in the examination of widely varying types means a fuller acquaintance with minerals and increased power of observation. Advanced courses in mineralogy include constant drill in the identification of a large series of minerals by sight and by the quick tests applicable in the field. Prominent teachers who are regular and large buyers of minerals, credit their success largely to these practical methods.

Therefore as complete a collection as possible should be selected. The rarer specimens, even if not carefully studied, will prove invaluable for reference and comparison.

No. 1A. Complete Type Collection

Twenty-five hundred museum size specimens, averaging 12 x 9 cm. (4¾ x 3½ in.). Selected by us from the 2640 numbered and priced items in the list.

Intended for individuals or institutions desiring a collection, which for study or comparison, is fairly complete in the light of present knowledge. Over six hundred distinct species are represented, embracing the most important in Dana's "System," including the Supplement and two Appendixes.

The principal known varieties and types of common and rare species, the crystal forms described in the Complete Crystal List and the features of the Complete Physical Series, together with the specimens comprising the large Economic, Chemical and Rock-forming series catalogued elsewhere, all find a place in this complete general collection, duplication always being avoided.

The multiplication of local examples is avoided, unless a variation of type is thereby gained. The occurrence of the commercial minerals is especially considered worthy of illustration by as many examples as their variations demand.

Our last published catalog included a list completed to 1500 specimens. In its present enlarged form, reaching over 2500 specimens, there are comparatively few public or private collections which excel it in point of comprehensiveness and general value for reference purposes.

Prices of Parts, delivered to any address, with pasteboard trays, in cabinets. Without cabinets, 10 per cent. less.

Part I. Six hundred specimens, marked + or * in list, (University Collection No. 5A) totaling over $1000.00 Price with trays, in two 18-drawer cabinets $900.00

Part II. Nine hundred additional and generally rarer specimens, marked ⊙, totaling $2400.00. Price with trays, in three 18-drawer cabinets $2100.00

PART III. One thousand specimens selected from the remaining numbered items in list, including most of the very rarest species and varieties, totaling \$3400.00. With trays, in three 18-drawer cabinets . . \$3000.00

No. 1. Specialist's Complete Type Collection

Twenty-five hundred hand size specimens, averaging 10 x 7 cm. (4 x 2¾ in.). Like the preceding, but smaller in size.

PRICES OF PARTS, delivered to any address, with pasteboard trays, in mahogany 18-drawer cabinets. Without cabinets, 10 per cent. less.

PART I. Six hundred specimens, marked + or * (Specialist's University Collection No. 5), with trays, in 18-drawer cabinet . . \$450.00

PART II. Nine hundred additional specimens, marked ⊙, totaling \$1200.00. Price with trays, in two 18-drawer cabinets \$1050.00

PART III. One thousand remaining numbered specimens, totaling \$1700.00. With trays, in 18-drawer cabinet, part of the specimens going in one of the two cabinets delivered with Part II \$1500.00

No. 3A. Varietal Collection

Fifteen hundred museum size specimens, averaging 12 x 9 cm. (4¾ x 3½ in.). The list comprises the minerals marked with +, * or ⊙ in the Complete Type Collection List. In general the specimens omitted from this collection, but which appear in No. 1A, are exceedingly rare, or they exhibit minor variations. The collection as a whole has been very carefully planned to include the most important varieties of more than 500 distinct species.

PRICES OF PARTS, delivered to any address, with pasteboard trays, in mahogany 18-drawer cabinets. Without cabinets, 10 per cent. less.

PART I. Six hundred specimens, marked + or * (University Collection No. 5A), with trays, in two 18-drawer cabinets \$900.00

PART II. Nine hundred remaining specimens, marked ⊙, totaling \$2400.00. With trays, in three 18-drawer cabinets \$2100.00

No. 3. Specialist's Varietal Collection

Fifteen hundred hand size specimens, averaging 10 x 7 cm. (4 x 2¾ in.). Same list as the preceding, but in smaller specimens. This collection is in stock, ready for immediate delivery.

Price, including delivery to any address, with pasteboard trays, in three mahogany 18-drawer cabinets, $1500.00. Without cabinets, 10 per cent. less.

PURCHASE IN PARTS. Delivered to any address.

PART I. Six hundred specimens, marked + or * (Specialist's University Collection No. 5), totaling over $500.00. With trays, in 18-drawer cabinet..........$450.00

PART II. Nine hundred remaining specimens, marked ⊙, totaling $1200.00. With trays, in two 18-drawer cabinets..........$1050.00

No. 5A. University Collection

Six hundred museum size specimens, averaging 12 x 9 cm. (4¾ x 3½ in.).

The University List, comprising the names marked with + or *, aims to include such minerals as are taken up in most university work. The 300 or more distinct species emphasized by heavy type in Dana's "Text Book of Mineralogy," are all represented. Some of them are quite rare, but are chemically important and essential in the illustration of a comprehensive and thorough course in pure mineralogy. Examples are shown of most of the economic minerals which the student or expert may wish to recognize, because of their commercial value. Numerous well known varieties which are found with the ores are also worthy of representation, although not in themselves valuable.

Individual museum size specimens of most kinds may be purchased at double the hand size prices given after each type. The sum of such individual values, in the museum size, exceeds $1000.00. The "collection price," including delivery to any address, with trays and two 18-drawer cabinets, is $900.00. Without cabinets, 10 per cent. less.

Purchase in Parts. Free delivery, with pasteboard trays and cabinets. Without cabinets, 10 per cent. less.

Part I. Three hundred and sixty specimens marked + (Collection No. 9A), totaling over $560.00. With trays and 18-drawer cabinet.......................... $480.00

Part II. Two hundred and forty remaining specimens marked *, with trays and 18-drawer cabinet..........................$420.00

No. 5. Specialist's University Collection

Six hundred hand size specimens, averaging 10 x 7 cm. (4 x 2¾ in.). Same as the preceding, but smaller size.

Individual hand size specimens of most varieties are sold at the listed prices. These exceed $500.00. The "collection price" for all the specimens is $450.00, delivered to any address, with pasteboard trays and mahogany 18-drawer cabinet. Without cabinet, 10 per cent. less.

Purchase in Parts. Free delivery, with pasteboard trays and cabinet.

Part I. Three hundred and sixty specimens marked + (Specialist's College Collection No. 9), with trays and 18-drawer cabinet.....$261.00

Part II. Two hundred and forty remaining specimens marked *, with trays, but without cabinet..........................$189.00

No. 9A. College Collection

Three hundred and sixty museum size specimens, averaging 12 x 9 cm. (4¾ x 3½ in.).

In the list which follows, the names marked + comprise the College Collection. No effort is spared in the work of abridgment, to make this as useful an advanced collection as the limited number of specimens will permit. The College List includes the most important minerals in Dana's "Text-book of Mineralogy," as well as all of the minerals contained in the Mining List and High School List. About two-thirds of the specimens are distinct species. As in the larger collections, every care is exercised that the College Collection may be thoroughly illustrative, and serve as a useful adjunct to private study or class work. With its many pieces of striking form and beautiful color, it makes a most attractive exhibit in the lecture-hall or college museum.

Individual museum size specimens of most kinds may be purchased at double the hand size prices given after each name. The sum of such individual values, in the museum size, exceeds $550.00. The "collection price," including delivery to any address, with trays and mahogany 18-drawer cabinet, is $480.00. Without cabinet, 10 per cent. less.

PURCHASE IN PARTS. Free delivery, with pasteboard trays.

PART I. One hundred and eighty specimens (Collection No. 14A), with trays and 18-drawer cabinet.......................... $210.00
(Part I without cabinet, $162).

PART II. One hundred and eighty remaining specimens, with trays, but without cabinet. $270.00

No. 9. Specialist's College Collection

Three hundred and sixty hand size specimens, averaging 10 x 7 cm. (4 x 2¾ in.). Same as the preceding, but smaller size.

Individual hand size specimens of most varieties are sold at the listed prices. These exceed $275.00. The "collection price" for all the specimens is $240.00, delivered to any address, with pasteboard trays and mahogany 10-drawer cabinet. Without cabinet, 10 per cent. less.

PURCHASE IN PARTS. Free delivery.

PART I. One hundred and eighty specimens (Student's Normal or High School Collection No. 14), with trays and 10-drawer cabinet.................. $105.00
(Part I. Without cabinet, $81).

PART II. One hundred and eighty remaining specimens, with trays, but without cabinet. $135.00

Complete Type Collection

Embracing College, University and Varietal Collections

Remarks on the Synopsis of

"The System of Mineralogy"

Sixth Edition with Appendixes by Edward Salisbury Dana

In this synopsis are inserted in proper position, new species and distinct varieties or types mentioned in the "**Supplement**" and "**First Appendix**" to the "System" and likewise the new unpublished "**Second Appendix**" (1909), to the manuscript of which access was kindly given. These minerals are marked "S.," "I." or "II." in the Species No. column. Many of them, like some of the "related compounds" in the "System," are of doubtful position, owing to the incomplete knowledge concerning them.

THE FIRST SYNOPSIS of Dana's "*System of Mineralogy*," was published in the "*Naturalist's Agency Catalogue*," issued by Dr. A. E. Foote in 1876. The original "Table of Species," as it was called, gave in a condensed form, the physical and chemical characters of species, but did not mention varieties or subspecies. In its present form it is a combination of the last published "Synopsis," new matter from the Appendixes, and our "Complete Type Collection List."

THE NUMBERS OF THE COMPLETE TYPE COLLECTION LIST, 1 to 2640, are given in the first column.

COLLECTION LISTS are indicated in the second column by the following signs:—

Cross (+) indicates the commonest or most important minerals comprising the "College List" of 360 specimens.

Asterisk (*) indicates 240 additional common or important minerals, which with the preceding, comprise the "University List" of 600 specimens.

Circle (◦) indicates 900 rarer or less important minerals, largely varieties, which with the preceding, comprise the "Varietal List" of 1500 specimens.

Dana's Species Numbers, 1 to 824, are given in the third column in heavy type.

The Species Name of each mineral is given in heavy type.

The Chemical Composition is generally expressed by the dualistic formula, which in the case of complex compounds, often presents the chemical constitution more clearly than does the empirical formula.

The System of Crystallization follows.

The Crystal Forms are indicated in the commoner or the best defined cases with frequent references to the figures.

The Structure is mentioned where of importance.

The Color is generally referred to under each species.

Hardness is broadly indicated under each group heading by giving the range from the softest to the hardest species.

Varietal Names, in ordinary type, are indented.

Subspecies or "related compounds," also in ordinary type, are in alignment with the species names.

Alterations (pseudomorphs) are given only in the commoner types.

Crystal Forms are indicated by the letters used by Dana. Miller's symbols are shown in the Complete Crystal List. The figures, reproduced from the "System," are idealized to show the form clearly. In the majority of cases the actual crystals do not equal the figures in the matter of completeness nor symmetry; moreover the actual specimens generally consist of crystals on the matrix or grouped, unless marked "loose."

Size of Crystals is given in approximate terms, as follows: "Microscopic," usually under 1 mm. (about 1/25 in.); "minute," usually under 3 mm. (about 1/8 in.); "small," usually under 1 cm. (about 2/5 in.); "large," usually over 3 cm. (about 1 3/16 in.); "very large," usually over 9 cm. (about 3½ in.).

Size of Specimens listed at $0.20 to $2.50 each, is generally hand size, averaging 10 x 7 cm. (4 x 2¾ in.). Those priced higher are mostly of this size, but in very many instances they are smaller and even insignificant. They are, however, always of typical character.

NAMES OMITTED in this synopsis, but mentioned in Dana's "System," "Supplement" and two "Appendixes," are (1). Names rejected by Dana. (2). Names given to supposed minerals which have later proved to be rocks, mixtures or highly impure substances. (3). Some obscure varietal names not prominently mentioned by Dana. Generally these have only local significance. (4). Many names of unimportant compounds of such doubtful character, that their rank even as varieties, is questioned. (5). The less frequently used synonyms.

RELATIVE RARITY of good typical specimens of each kind, is indicated by the price following the description. Items not priced, are, as a class, rarely obtainable, although there are individual exceptions to the rule.

INDEX. The position of any mineral in the Synopsis, may be found by referring to the Index and Price-List in Part III.

Single Specimens

From the following list, comprising all the priced items, we have on hand (outside of prepared collections), most of those marked with +, * or ⊙, and can fill orders for individual specimens.

Of the priced items not so marked, many are not on hand in duplicate. They are generally quite rare and sometimes are historical rarities no longer found. Much of this "floating stock," comes to us in one or two specimens at a time, through the purchase of old collections. They are often immediately reserved for our large advanced collections, in course of preparation, or they are sent to clients who place advance orders.

YOUR DESIDERATA LIST should be filed with us if you want rare minerals. From time to time, we will submit for your inspection, specimens which may "fill in the gaps."

"**The System of Mineralogy**" of James Dwight Dana. Sixth Edition by Edward Salisbury Dana. Entirely rewritten and much enlarged. Illustrated with 1425 figures. Over 1200 pages with Appendix I. It may be purchased for $12.50 of the publishers, Messrs. John Wiley & Sons, New York, or of Foote Mineral Company, (or of Chapman & Hall, London, £2-12-6).

The General Classification
of the
Complete Type Collection Accords With The System of Mineralogy
of James Dwight Dana

Sixth Edition (See Note)

By Edward Salisbury Dana

I. Native Elements.

II. Sulphides, Selenides, Tellurides, Arsenides, Antimonides.

III. Sulpho-Salts—Sulpharsenites, Sulphantimonites, Sulphobismuthites.

IV. Haloids—Chlorides, Bromides, Iodides; Fluorides.

V. Oxides.

VI. Oxygen-Salts.

1. Carbonates.
2. Silicates, Titanates.
3. Niobates, Tantalates.
4. Phosphates, Arsenates, Vanadates; Antimonates. Nitrates.
5. Borates. Uranates.
6. Sulphates, Chromates, Tellurates.
7. Tungstates, Molybdates.
8. Iodates.

VII. Salts of Organic Acids—Oxalates, Mellates, Etc.

VIII. Hydrocarbon Compounds.

Note—New Minerals described in the Supplement, First Appendix and New Second Appendix to the System, are inserted in their proper position in the following arrangement.

I. Native Elements

I. Non-Metals

Type No. Species No. **1. Carbon Group.** Hardness 10 and 1-2

1. Diamond. C. Isometric, tetrahedral crystals small, bright and translucent:—

1+ striated octahedron (fig.), white, (in tube). Accompanied by specimen of peridotite or "blue earth." 2.50

2° cube. 3.00

3° dodecahedron, slightly rounded, gray 2.00

4 tetrahexahedron *f*, nearly spherical. 3.00

5 triangular, modified. 3.00

6 twins, tw. pl. octahedron *o*, (fig.). 6.00

7 octahedral cleavage or "splint." 1.00

8* Bort, rough, gray. 1.00

9° Carbonado, granular, black, small. 5.00

Cliftonite (meteoric). Minute cubes, black.

1. Diamond

10* **2. Graphite**, Plumbago, Black Lead. C. Rhombohedral, thin hexagonal tables, black. .30

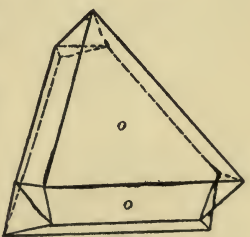
11 radio-foliate globular concretions. .75

12+ foliated mass. .40

13 fine granular. .40

14° earthy, impure. .30

Graphitoid, Schungite. C. Massive, combustible.



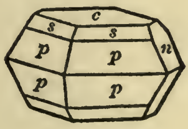
6. Diamond

2. Sulphur Group. Range of Hardness 1·5—2·5

3. Sulphur. S. Orthorhombic. Perfect crystals, translucent fine yellow:—

15+ pyramids *p*, *s*, brachydome *n* and base *c* (fig.), very brilliant. .75

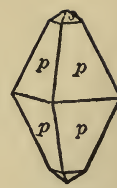
16 crystal, doubly terminated, sharp. .75



15. Sulphur

Type No. | Species No. — Sulphur—Continued

17⊙ acute pyramid *p*, prominent (fig.), bright. 1.25



17. Sulphur

18 obtuse pyramidal, well defined. 1.50

19⊙ tabular, base predominating, transparent, large. 2.00

20⊙ sphenoidal (fig.), distinct. 1.50

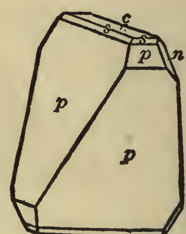
21 elongated in parallel growth, transparent, very brilliant, loose. 1.00

22 drusy crystalline. .50

23 dark brownish-yellow. .75

24 massive. .35

25* encrusting lava. .35



20. Sulphur

II. Arsensulfurite.

II. Quisqueite, chiefly C and S. Amorphous, black.

4. **Selensulphur.** S containing Se. Orthorhombic (?), crust, reddish.

II. Arsenschwefel. $As_3S_3+H_2O$. Tetragonal (?). Blue-gray.

5. **Selenium.** Occurrence in nature very doubtful.

II. Semi-Metals

3. Tellurium-Arsenic Group. Rhombohedral

Range of Hardness 2—3.5

6. **Selen-Tellurium.** Te containing Se. Massive, indistinctly columnar, blackish-gray.

7. **Tellurium.** Te. Rhombohedral, minute hexagonal prisms.

26 prismatic cleavage, tin-white. 1.00

27* granular, tin-white. 1.00

28 8. **Arsenic.** As. Rhombohedral, spherical aggregates of small rhombs. .75

29+ fine granular, tin-white, tarnishing. .75

30⊙ reniform. 1.00

Arsenolamprite. Nearly pure As. Cleavable, brilliant, lead-gray.

31* 9. **Allemontite.** As containing Sb. Rhombohedral, crystalline granular reniform, tin-white, tarnishing. 3.00

Antimonial arsenic. 17As+1Sb. Crystalline.

10. **Antimony.** Sb. Containing sometimes Ag, Fe or As. Rhombohedral, crystals.

Antimony—Continued

Type No.	Species No.	
32+		crystalline granular, tin-white. 2.50
33⊙		cleavage. 3.00
34		compactly fibrous. 2.50
35	11.	**Bismuth.** Bi with occasional traces of As, etc. Rhombohedral, twinned arborescent, tarnished. 5.00
36⊙		foliated cleavage reddish-silver-white, coated with molybdenite. 2.00
37+		crystalline disseminated. 1.00
38		crystalline granular. 1.00
	12.	**Zinc.** Zn. Rhombohedral. Existence in nature requires confirmation.

III. Metals

4. Gold Group. Isometric. Range of Hardness 2·5—3·5 (Lead 1·5)

39	13.	**Gold.** Au usually alloyed with Ag. Isometric, minute cubes, gold-yellow. 3.00
40⊙		octahedron *o*, minute, hollowed faces (fig.). 3.00
41		arborescent. 7.00
42⊙		dodecahedron *d*, microscopic. 2.50
43		trisoctahedron, minute. 6.00
44		filiform. 2.00
45		spongiform, crystalline. 3.00
46*		quartz, disseminated masses. 2.50
47⊙		quartz, disseminated plates. 2.00
48+		quartz, disseminated grains. 2.00
49+		nugget. 1.50
50+		flattened grains or "dust." 1.50
51+		Electrum (argentiferous), elongated crystals, pale gold-yellow. 2.00
52⊙		Electrum, "leaf gold," flattened parallel to octahedron *o*, with triangular markings. 2.00
53		Porpezite (palladium gold). 5.00
		Rhodite (rhodium gold), doubtful.
		Bismuth gold, "Black Gold" (tarnished).
		Gold Amalgam, 57 to 61 p.c.Hg.
54⊙	14.	**Silver.** Ag with some Au, Cu, etc. Isometric, small elongated octahedrons, silver-white, tarnishing. 2.00

40. Gold

Type No. | Species No. — Silver—Continued

55⊙ dodecahedrons, small. 3.00

56 arborescent grouping. 6.00

57 cruciform parallel grouping of elongated crystals, coated with smaltite. 7.00

58 filiform, wire silver, coarse. 2.00

59+ filiform, fine, matted. 1.50

60* disseminated grains. 1.00

61⊙ disseminated scales. 2.00

62+ leaf silver, plates. 1.50

63 filmy coating. 1.00

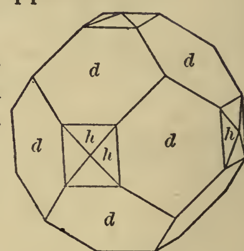
64 massive. 2.00

Küstelite (auriferous).

cupriferous, associated with native copper.

65⊙ antimonial with smaltite. 3.00

66 **15. Copper.** Cu often containing Ag Bi, etc. Isometric, dodecahedron prominent (fig.), small, copper-red. .75



66. Copper

67 tetrahexahedrons, small, distinct. 1.00

68⊙ complex twins. .75

69 parallel groupings. 1.00

70+ crystallized, arborescent (fig.). .50

71 elongated dodecahedron. 1.00

72 filiform (wire). .75

73⊙ plates or "leaf copper." .50

74+ massive. .75

75+ disseminated in conglomerate. .20

76⊙ disseminated in limpid calcite. 1.00

77⊙ altering to cuprite. 1.00

78+ **16. Mercury**, Quicksilver. Hg with sometimes a little Ag. Liquid, minute globules, brilliant tin-white, in shale. 1.00

70. Copper

79⊙ ditto, in cinnabar. 1.00

80* **17. Amalgam.** Ag containing Hg. Isometric, small dodecahedron, silver-white. 4.00

81 Arquerite, small octahedron. 9.00

82 Arquerite, massive. 3.00

Kongsbergite, crystallized.

Type No. Species No.

18. **Lead.** Nearly pure Pb. Isometric, minute crystals.
83+ plate, lead-gray. 1.00
filmy coating on polyadelphite.
dendritic.

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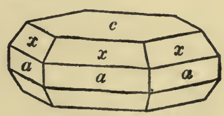
19. **Tin.** Nearly pure Sn. Crystalline grains, grayish-white.

5. Platinum-Iron Group. Range of Hardness 4—7

84+ 20. **Platinum.** Pt alloyed with Fe, Ir, etc. Isometric, Non-magnetic, minute grains and scales, steel-gray, with gold. 1.50
85 Magnetic, grains. 1.50
86⊙ Magnetic, showing polarity, nugget. 4.00
87 black, grains. 2.00
88 21. **Iridium.** Ir with Pt. Isometric, minute cubes, yellowish tin-white, loose. 2.50
89⊙ angular grains. 2.00
90 22. **Iridosmine.** Ir with Os. Rhombohedral. Nevyanskite. Over 40 p.c. Ir. Minute, hexagonal prisms *a* with pyramid *x* and base *c* (fig.). 3.00



90. Iridosmine

91+ irregular flattened grains, tin-white. 2.00
Siserskite. Not over 30 p.c. Ir. Steel-gray.
23. **Palladium.** Pd alloyed with Pt and Ir. Isometric, minute octahedrons, whitish steel-gray.
24. **Allopalladium.** Pd. Rhombohedral, minute six-sided tables, grayish silver-white.
25. **Iron.** Normally about 82—92 p.c. Fe with Ni, Co, etc. Isometric.
92+ I. Terrestrial, nearly pure, dark steel-gray, rusting. 1.00
93 Awaruite, nickeliferous, grains, steel-gray. 3.00
94* Josephinite, Fe_2Ni_5, massive pebbles, gray. 1.00
Siderazot, Fe_5N_2, coating on lava.
95 II. Meteoric, Siderite (iron), diamondiferous mass. 3.00
96+ Meteoric, Siderite (iron) crystalline, etched plate, showing Widmanstätten figures. 2.00
97⊙ Meteoric, Siderolite (iron and stone). 2.50
98⊙ Meteoric, Aerolite (stone), gray, with black crust. 1.50

Type No. Species No. Iron—Continued

99 Meteoric, altered to limonite-magnetite shale. 1.00

Iron Compounds from Meteoric Irons

Edmonsonite. Fe—Ni alloy.
Chalypite. Fe with 7 to 11 p.c. C.
Cohenite. $(Fe,Ni,Co)_3C$. Isometric (?), distorted crystals, tin-white becoming bronze-yellow.
100 Schreibersite. $(Fe,Ni)_3P$. Graphic steel-gray crystals, in meteoric iron, etched plate. 6.00
Rhabdite. Fe, Ni phosphide. Tetragonal, minute prisms.

II. Sulphides, Selenides, Tellurides, Arsenides, Antimonides

I Sulphides, Selenides, Tellurides of the Semi-Metals

1. Realgar Group. RS. Monoclinic. Hardness 1·5—2

101⊙ 26. **Realgar.** AsS. Monoclinic, small crystal, light red, on dolomite. .75
102 group of large prismatic crystals. 2.00
103⊙ drusy crystals in crystalline mass, dark red. 1.25
104 microscopic crystals incrusting lava. .75
105+ compact, light red. 1.00

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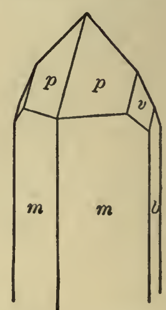
2. Stibnite Group. R_2S_3. Orthorhombic. Hardness 2 (Guanajuatite 2·5—3·5)

106 27. I. **Orpiment.** As_2S_3. Monoclinic, crystals, yellow. 3.00
107⊙ foliated cleavage, canary-yellow. 1.00
108+ crystalline mass, lemon-yellow. 1.00
109⊙ reniform, greenish-yellow. 1.25
110 globular, radiated structure, with realgar. 1.50
111⊙ 28. **Stibnite.** Antimony Glance. Sb_2S_3. Orthorhombic, large prism, deeply furrowed, splendent lead-gray. 2.00
112 slender prism, acutely terminated. .50
113* acicular crystals (fig.), radiating group. 1.00



113. Stibnite

Stibnite—Continued

Type No. Species No.

114 crystal, bent. .50
115 globular, radiated structure. .75
116+ crystalline, columnar bladed. .35
117° crystalline, granular. .35
118° partially oxidized crystals, yellow. 1.00
Metastibnite. Sb_2S_3. Amorphous, red.
119 29. **Bismuthinite.** Bismuth Glance. Bi_2S_3. Orthorhombic, acicular, lead-gray. 3.00
120° foliated cleavage. 1.00
121+ bladed cleavage. 1.00
S. seleniferous, $4Bi_2S_3.Bi_2Se_3$, prisms.
122+ 30. **Guanajuatite.** Bi_2Se_3. Orthorhombic, acicular prisms. 2.00
123 compact. 2.00

——————Range of Hardness 1·5–2

124* 31. **Tetradymite.** Bi and Te. Rhombohedral, foliated, pale steel-gray. 1.50
125° sulphurous, small acute rhombs, striated. 2.00
126 sulphurous, crystalline granular. 1.50
I. Grünlingite. Bi_4TeS_3. Rhombohedral (?), massive, gray, tarnishing.
32. **Joseïte.** Bi and Te with some S and Se. Laminated, perfect cleavage, grayish.
33. **Wehrlite.** Bi and Te with some S and Ag. Foliated, perfect cleavage, grayish-white.

3. Molybdenite Group. RS_2. Hardness 1—1·5

127 34. **Molybdenite.** MoS_2. Hexagonal, tapering prism, bluish-lead-gray. 1.00
128+ tabular hexagon. .40
129° hexagonal cleavages, loose. .40
130 large foliated cleavage. .75
131 disseminated scales. .40
132 leaves in prism of rock crystal. 1.00
133° granular. .40
II. Patronite. VS_4(?). Amorphous, black.

II. Sulphides, Selenides, Tellurides, Arsenides, Antimonides of the Metals

A. Basic Division. Dyscrasite Group.

Range of Hardness 3—4·5

Type No. | Species No.

134 **35. Dyscrasite.** Ag_3Sb. Orthorhombic, prisms (altering). 8.00
135+ crystalline, coarse foliated, silver-white, tarnishing. 2.50
crystalline, fine granular.

36. Horsfordite. Cu_6Sb.(?). Massive, silver-white, tarnishing.

136 **II. Keweenawite.** $(Cu,Ni,Co)_2As$. Massive, pale pinkish-brown. 5.00

37. Domeykite. Cu_3As. Reniform.
137+ compact, gray, tarnishing iridescent-bronze. 1.25
138⊙ argentiferous, granular. 2.50
II. Stibiodomeykite, contains some Sb.
Orileyite. $(Cu_2Fe)_3(AsSb)_2$(?). Massive, purplish steel-gray.

II. Ledouxite. Cu_4As. Massive, silver-white.

II. Mohawkite. $(Cu,Ni,Co)_3As$. Massive. 6.00

139⊙ **38. Algodonite.** Cu_6As. Massive granular, silver-white, tarnishing bronze. 3.00

140 **39. Whitneyite.** Cu_9As. Massive, reddish-white, tarnishing. 5.00

40. Chilenite. Perhaps Ag_6Bi. Amorphous, silver-white, tarnishing.

41. STÜTZITE. Perhaps Ag_4Te. Hexagonal (?), highly modified, reddish lead-gray.

B. Monosulphides, Selenides, Tellurides, Etc.

1. Galena Group. RS. Isometric, holohedral

Range of Hardness 2—3

141⊙ **42. Argentite,** Silver Glance. Ag_2S. Isometric, small distinct cube, blackish-lead-gray. 2.00
142 octahedron *o*. 2.50
143 dodecahedron *d*, small, well defined. 2.00
144 arborescent. 2.50
145* distorted crystal, small. 1.50
146⊙ massive. 2.00

Argentite—Continued

Type No. Species No.

147+ disseminated. 1.25

148 coating. 1.25

Jalpaite. $3Ag_2S.Cu_2S$.

149+ **43. Hessite.** Ag_2Te. Isometric, small highly modified crystal, dark gray. 2.50

150 massive. 2.50

151+ **44. Petzite.** $(Ag,Au)_2Te$. Massive, iron-gray, tarnishing. 3.00

152+ **45. Galena,** Galenite. PbS. Isometric, cube, large, well defined, lead-gray. .75

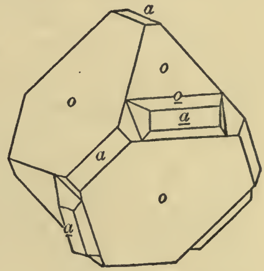
153° cubo-octahedrons, ideal symmetry. .75

154* octahedron, large, perfect. 1.00

155° dodecahedron *d* modifying octahedron *o* and cube *a*, large. 1.25

156° contact-twins. 1.25

157° penetration-twins (fig.), definite. 1.50



157. Galena

158 reticulated. 1.00

159 hollow crystals. 1.00

160° deeply eroded. .75

161° elongated crystals. .75

162 thin tabular crystals, minute. .50

163 minute cubes on lava. 1.00

164+ cleavage, broad. .40

165 fibrous. .75

166+ argentiferous, coarse granular. .75

167° fine granular. .40

168 cryptocrystalline. .60

169 Steinmannite, contains As and Sb, crystallized. 1.50

170 altered to cerussite. 1.00

171 altered to leadhillite. 1.50

Huascolite. Nearly PbS.1½ZnS. Granular.

172 Cuproplumbite. $Cu_2S.2PbS$. Massive. 2.50

173° **46. Altaite.** PbTe. Isometric, disseminated, yellowish tin-white, tarnishing. 2.00

174° **47. Clausthalite.** PbSe. Isometric, crystalline disseminated, lead-gray. 2.00

Tilkerodite (cobaltiferous).

175 **S. I. Aguilarite.** $Ag_2S.Ag_2Se$. Isometric, skeleton dodecahedrons, iron-black. 6.00

48. Naumannite. $(Ag_2Pb)Se$. Isometric, cubes.

Type No. | Species No. | Naumannite—Continued

176⊙ massive, iron-black. 4.00

177⊙ **49. Berzelianite.** Cu_2Se. Finely disseminated, silver-white, tarnishing. 1.50

S. Umangite. $CuSe.Cu_2Se$. Massive, tarnishes violet-blue.

178⊙ **50. Lehrbachite.** PbSe with HgSe. Massive granular, dark gray. 3.00

179 **51. Eucairite.** $Cu_2Se.Ag_2Se$. Isometric, massive, silvery lead-gray. 9.00

180⊙ **52. Zorgite.** Cu and Pb selenide (varying). Massive granular, lead-gray, tarnishing. 3.00

181⊙ **53. Crookesite.** $(Cu,Tl,Ag)_2Se$. Finely disseminated, lead-gray. 7.00

2. Chalcocite Group. RS. Orthorhombic.

Range of Hardness 1·5—3

182 **54. Chalcocite**, Copper Glance. Cu_2S. Orthorhombic, Redruthite, prismatic, blackish-lead-gray, tarnishing. 2.00

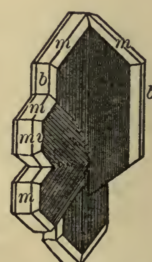
183⊙ Redruthite, twins, pseudo-hexagonal (fig.), perfect, sharp. 1.50

184 twins, cruciform. 3.00

185⊙ massive, granular. 1.00

186+ compact. 1.00

187 **II. Chalmersite.** $Cu_2S.Fe_4S_5$. Orthorhombic prisms, bronze-yellow. 6.00



183. Chalcocite

188 **55. Stromeyerite.** $(Ag,Cu)_2S$. Orthorhombic, crystallized. 8.00

189⊙ massive, dark steel-gray. 2.50

190⊙ **56. Sternbergite.** $AgFe_2S_3$. Orthorhombic, twins, thin tabular pseudo-hexagonal, dark brown. 3.00

Frieseite, $Ag_2Fe_5S_8$, twins, thick tabular.

Argentopyrite. Ag,Fe sulphide. Orthorhombic, pseudo-hexagonal prismatic twin, bronze-yellow, tarnished.

————————Hardness 2—2·5

191⊙ **57. Acanthite.** Ag_2S. Orthorhombic, acicular, iron-black. 2.00

Daleminzite. Ag_2S. Orthorhombic, short prisms (pseudomorphous after stephanite?).

II. Rickardite. Cu_4Te_3. Massive, purple.

3. **Sphalerite Group.** RS. Isometric, tetrahedral.

Range of Hardness 2·5—3·5

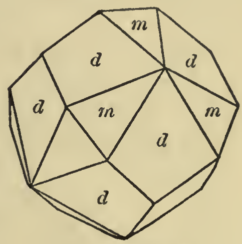
Type No. Species No.

192⊙ 58. **Sphalerite**, Zinc Blende. ZnS. Isometric, tetrahedron modified by cube (fig.). 1.50

192. Sphalerite

193⊙ bright cube with + and — tetrahedrons prominent, alternately splendent and dull black, sharp ideal symmetry. 1.00

194* trisoctahedron *m* and dodecahedron *d*, rounded into obtuse cone (fig.), transparent brown, brilliant. .50



194. Sphalerite

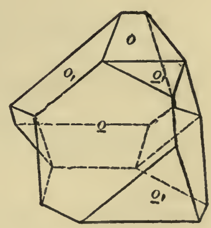
195⊙ brownish crystals on chert. .50

196+ Ruby Blende, bright transparent. ·75

197⊙ greenish-yellow penetration-twins, adamantine, transparent. 1.00

198+ distorted crystals, grouped, "Black Jack," glistening. .50

199⊙ hemitrope twins, contact || to octahedron *o* (fig.), splendent black, sharp. 1.00



199. Sphalerite

200 twins, contact ⊥ to octahedron *o*, clear brown. .75

201⊙ thin tabular transparent twin, on granular dolomite. 1.00

202 iridescent crystals. 1.25

203* cleavage dodecahedron, opaque. .75

204 ditto dodecahedron, clear greenish. 1.50

205 ditto, perfect, splendent clear yellowish. 1.50

206+ coarse granular, cleavable, resinous brown. .20

207 fine granular, gray. .50

208 fibrous. .40

209 Cleiophane, pure white. 1.00

210⊙ Schalenblende, compact, reniform, interstratified with galena, grayish. .60

211 Marmatite, 16 p.c. Fe, twins, splendent black. 1.50

Sphalerite—Continued

Type No. Species No.

212⊙ Christophite (18 p.c. Fe), mixture of fine to coarse granular, black. .40
213 cadmiferous, Pribramite. .75
mercurial.
stanniferous.
214 indiferous. 1.00
215 59. **Metacinnabarite.** HgS. Isometric, tetrahedral, small twins, tw. pl. octahedron *o*, iron-black. 2.50
216⊙ minute globular druses. 1.00
217⊙ massive disseminated. 1.00
Guadalcazarite, zinc-metacinnabarite. Rhombohedral(?).
218 60. **Tiemannite.** HgSe. Isometric, tetrahedral, small, highly modified crystals. 6.00
219⊙ massive, dark gray. 2.50
61. **Onofrite.** Hg(S,Se). Massive granular, blackish gray.
220 62. **Coloradoite.** HgTe. Massive granular, iron-black. 9.00
221 63. **Alabandite.** MnS. Isometric, tetrahedral, small crystals. 3.00
222+ cleavable-granular. 1.00
223⊙ massive, iron-black, tarnishing. 1.00

————————Hardness 4

64. **Oldhamite.** Meteoric. CaS. Isometric, small spherules, clear pale brown.
224+ 65. **Pentlandite.** (FeNi)S. Isometric, octahedral cleavage. light bronze-yellow. 2.00
I. Gunnarite. $Fe_3Ni_2S_8$(?). Yellowish tin-white tarnishing.

---

4. Cinnabar—Wurtzite—Millerite Group.

Rhombohedral or Hexagonal.

Cinnabar Series. Hardness 2

225 66. **Cinnabar.** HgS. Rhombohedral, trapezohedral, small rhombic, adamantine, fine red. 2.00
226⊙ tabular, bright. 1.50
227⊙ penetration-twins, complete ideal symmetry, small, loose. (6). .75
228 penetration-twins, tw. axis *c*, dull. 9.00
229+ acicular prisms. 1.25
230 radiating crystalline. 1.50

Cinnabar—Continued

Type No. Species No.

231 drusy incrustation. 1.00
232⊙ fine granular-massive. 2.50
233* coarse granular disseminated, cochineal-red. .75
234 earthy coating. .75
235⊙ hepatic (containing Idrialite), dark brown. 1.50
236⊙ 67. **Covellite**, Indigo Copper. CuS. Hexagonal, or rhombohedral, small deeply striated thin hexagonal tables, ideal symmetry, indigo-blue. 3.00
237 very thin flexible leaves, disseminated. 2.00
238+ foliated, crystalline, fine indigo-blue. 2.00
239 compact. 2.50
240⊙ platiniferous, enclosing sperrylite, porous. 2.00
241 coating. 1.00

Wurtzite Series. Range of Hardness 2—3

242⊙ 68. **Greenockite.** CdS. Hexagonal, hemimorphic, prism with several pyramids, minute, distinct, clear resinous yellow. 4.00
243+ coating on sphalerite. 1.50
244 coloring smithsonite. 1.50
245⊙ 69. **Wurtzite.** ZnS. Hexagonal, hemimorphic minute pyramidal. 2.00
246 Schalenblende, fibrous, brownish-black. 1.25
247+ Schalenblende, massive. 1.00
Erythrozincite. A manganese-wurtzite(?). Thin plates, translucent red, in lapis-lazuli.

Millerite Series. Range of Hardness 3.5—5.5

248⊙ 70. **Millerite.** NiS. Rhombohedral, acicular, brass to bronze-yellow. 2.00
249⊙ radiating capillary tufts. 1.50
250 capillary matted coating. 1.00
251 fine capillary, in clear calcite. 1.00
252+ fibrous plates, semi-globular. 1.00
253⊙ 71. **Niccolite**, Arsenical Nickel. NiAs. Hexagonal, prism and pyramids, reddish-gray, tarnishing. 3.00
254 reniform, columnar. 2.00
reticulated.

Type No. Species No. Niccolite—Continued

255+ massive. 1.00
256 Antimonial, massive. 1.00
257⊙ 72. **Breithauptite.** NiSb. Hexagonal, thin tabular. 2.50
258 arborescent, massive, violet copper-red. 1.50
259 73. **Troilite.** FeS (meteoric). Massive, brown. 1.50
260⊙ 74. **Pyrrhotite, Magnetic Pyrites.** $Fe_{11}S_{12}$, containing sometimes 5 p.c.Ni. Hexagonal, small tabular, sharp. 1.50
261 thick tabular. 1.50
acute pyramidal.
262⊙ compact, bronze-yellow, tarnishing. .20
263+ granular-massive, nickeliferous. .20

C. Intermediate Division

Group 1. Range of Hardness 3—4·5

264⊙ 75. **Polydymite.** Ni_4S_5(?). Isometric, imperfect cubic cleavage, steel-gray, tarnishing. 3.00
I. **Hauchecornite.** $(Ni,Co)_7(S,Bi,Sb)_8$. Tetragonal, bronze-yellow.
S. **Sychnodymite.** $(Co,Cu)_4S_5$. Isometric, octahedral, steel-gray.
76. **Beyrichite.** Ni_3S_4(?). Prismatic, lead-gray.
265 77. **Melonite.** Ni_2Te_3(?). Hexagonal, basal cleavages, disseminated, reddish-white. 9.00

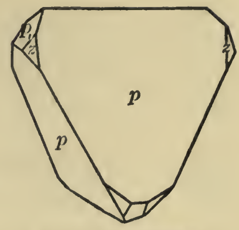
Group 2. Range of Hardness 3—5·5

266⊙ 78. II. **Bornite, Erubescite.** $5Cu_2S.Fe_2S_3$. Isometric, penetration-twins, rounded. 2.50
267+ fine granular, argentiferous, coppery bluish-brown, tarnishing. .75
268 compact, iridescent. .75

269+ 79. **Linnæite.** Co_3S_4. Isometric, octahedron *o*, small, ideal symmetry, splendent. 2.00
270⊙ massive, pale steel-gray, tarnishing. 1.50
271 Siegenite (niccoliferous), octahedral. 2.00
272 80. **Daubreelite.** $FeS.Cr_2S_3$. Massive, in meteoric iron, brilliant black. 8.00
273 81. **Cubanite.** $CuFe_2S_4$. Isometric, massive, bronze-yellow. 6.00
Chalcopyrrhotite. Fe_4CuS_6. Massive.
82. **Carrollite.** $CuS.Co_2S_3$. Isometric, steel-gray, faintly red.

Type No. | Species No.

274+ **83. Chalcopyrite,** Copper Pyrites. $CuFeS_2$ varying. Tetragonal, sphenoidal, small ideal sphenoids (fig.), brass-yellow, tarnishing, on pearl-spar. .50



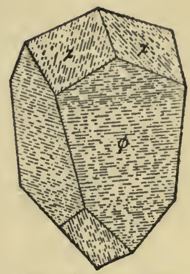
274. Chalcopyrite

275 ditto, iridescent, parallel grouping on sphalerite. 1.50

276 sphenoids, elongated. 1.00

277⊙ octahedroid, + and — sphenoids, complete. 2.00

278 scalenohedron and sphenoid (fig.). 1.00


278. Chalcopyrite

279* contact-twin || to sphenoid, perfect (fig.). 1.00

280⊙ penetration-twin. 1.50

281⊙ hollow sphenoids. 2.00

282+ compact. .35

283 fine granular. .35

284⊙ reniform. 1.25

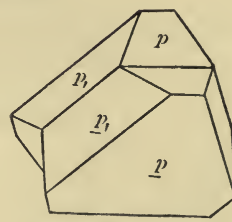
285⊙ **84. II. Stannite,** Tin Pyrites. $Cu_2S.FeS.SnS_2$. Scalenohedral, tetragonal symmetry, twins (pseudo-tetrahedral), brilliant, perfect, minute. 3.00

286 twins, complex, dull. 3.00

287+ massive, fine granular, olive-steel-gray, tarnishing. .75

288 massive, coarse, greenish-iron-black, tarnishing. .75

II. Teallite. $PbS.SnS_2$. Orthorhombic, foliated, blackish gray.


279. Chalcopyrite

D. Disulphides, Diarsenides, etc.

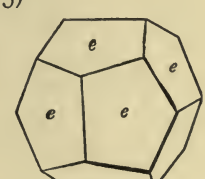
1. Pyrite Group. RS_2, RAs_2, RSb_2. Isometric, pyritohedral.

Range of Hardness 4—6·5 (Laurite 7·5)

85. Pyrite, Iron Pyrites. FeS_2. Isometric, pyritohedral, crystals of ideal symmetry, splendent pale brass-yellow:—

289+ pyritohedron (fig.), large, loose. .50

290+ cube *a*, striated. (fig.). .50



289. Pyrite

Type No. | Species No. | Pyrite—Continued

291 cube on coal shale. .50

292+ octahedron *o*, sharp. .50

293⊙ diploids, small. 1.00

294* pyritohedron *e* modifying octahedron *o* (fig.), large. 1.00

295⊙ cube modifying pyritohedron (fig.). .75

296 cube *a* modifying octahedron *o*. .50

297 octahedron *o* modifying pyritohedron *e* (fig.). 1.00

298⊙ octahedron modifying cube. .50

299⊙ diploid modifying cube. .75

300 diploid modifying octahedron, rounded. 1 50

301⊙ trapezohedron *n* modifying octahedron. 1.00

dodecahedron *d* modifying cube *a*.

302 highly modified, rounded, striated and pitted. 1.00

303● penetration-twins, pyritohedrons. tw.pl. normal to dodecahedron *d* (fig.), loose. (3). .75

304* oscillatory combination (striated) of cube and pyritohedron, group, metallic-adamantime. 1.00

305 elongated octahedron, loose. 5.00

306 acicular elongated cube small. 2.00

307● distorted, saddle-shaped cube, loose. .30

308⊙ flat disk, radiated crystallized. 1.00

309⊙ nodule of crystals. .30

310 globular. .50

311 stalactitic, radiated. .75

312 drusy, iridescent. .30

313 fine granular. .20

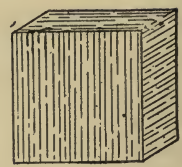
314+ compact. .20

315⊙ auriferous (2½ oz. Au. to ton) coarse. .50

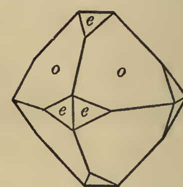
II. Bravoite, highly nickeliferous.

316+ altered to limonite, cube, large, dull brown, loose. .50

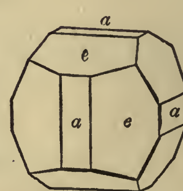
317 ditto, pyritohedron, complete. .50



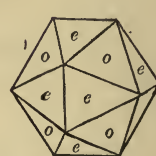
290. Pyrite



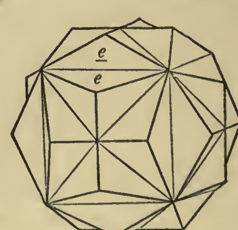
294. Pyrite



295. Pyrite



297. Pyrite



303. Pyrite

Pyrite—Continued

Type No. Species No.

318 diploid and octahedron, complete (2). .75

319⊙ 86. **Hauerite.** MnS_2. Isometric, octahedron, complete ideal symmetry, loose, brownish-black. 1.00

320* cubo-octahedron, loose. 1.00

321 globular drusy, in clay. 1.00

322⊙ 87. **Smaltite,** Arsenical Cobalt. $CoAs_2$. Isometric, cubo-octahedral, small, steel-gray, tarnishing. 1.50

323 twins, complex. 2.00

324⊙ reticulated. 2.50

325+ massive. 1.00

326 argentiferous. 2.00

NOTE.—Smaltite and Chloanthite graduate chemically into each other.

327 88. **Chloanthite.** $NiAs_2$. Isometric, small cubo-octahedrons, steel-gray. 2.50

328* massive. 1.25

89. **Cobaltite,** Cobalt Glance. $CoS_2.CoAs_2$. Isometric, complete, highly symmetrical bright, pale reddish-gray crystals loose:—

329* pyritohedron *e* (3). 1.00

330 cube *a*, perfect (3). 1.25

331⊙ octahedron *o*, sharp. 1.25

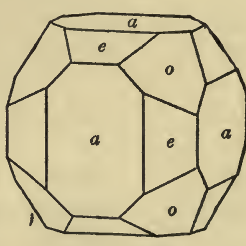
332⊙ pyritohedron *e* and octahedron *o* (fig.), modifying cube. 1.00

333 cubo-octahedron, sharp (3). 1.00

334+ crystalline, fine granular, altering to erythrite. .60

335 massive. .60

Ferrocobaltite (28 p.c. Fe), plumose.



332. Cobaltite

336 90. **Gersdorffite,** Nickel Glance. $NiS_2.NiAs_2$. Isometric, small, perfect cubo-octahedrons, bright steel-gray, tarnishing. 4.00

337+ massive, granular. 1.50

338 91. **Corynite.** Ni(As,Sb)S. Isometric, octahedron, silvery-gray. 9.00

339 92. **Ullmannite.** $NiS_2.NiSb_2$. Isometric, cube, steel-gray. 3.00

340⊙ massive granular, steel-gray. 1.00

341 I. **Willyamite.** $CoS_2.NiS_2.CoSb_4.NiSb_2$. Isometric, cubic cleavage, steel-gray. 8.00

S. **Kallilite.** $NiS_2.NiBi_2$. Massive, bluish-gray.

Type No. Species No.

342+ 93. **Sperrylite.** $PtAs_2$. Isometric, microscopic distinct cubes, brilliant tin-white, loose (lot). 3.00

94. **Laurite.** RuS_2. (and osmium 3.03 p. c.). Isometric, octahedrons, minute, dark iron-black.

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343 95. **Skutterudite.** $CoAs_3$. Isometric, modified octahedron, pale lead-gray. 8.00

Nickel-skutterudite, RAs_3 with R=Ni:Co:Fe=4:2:1, granular, gray.

I. Bismutosmaltite, contains Bi.

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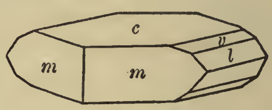
2. Marcasite Group. RS_2,RAs_2, Etc. Orthorhombic.

Range of Hardness 4·5—6·5

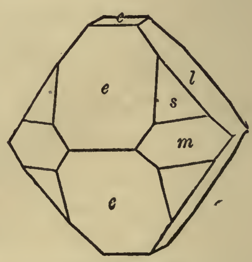
These species closely parallel those of the preceding Pyrite Group.

344° 96. **Marcasite.** FeS_2. Orthorhombic, prism *m* and base *c* predominating (fig.), pale bronze-yellow. 1.00



344. Marcasite

345* octahedroid, macro- and brachydomes *e* and *l* prominent (fig.), small, distinct. 1.00



345. Marcasite

346 radiated. 1.00

347+ Cockscomb Pyrites, (fig.), aggregations of flattened twins. .75

348° Spear Pyrites, twins, symmetrical. 1.00

349 capillary in calcite. .50

350° hepatic, massive, brown. .40

351 cellular by disappearance of incrusted minerals. .50

352° stalactitic, radial structure, exterior well crystallized. 1.00

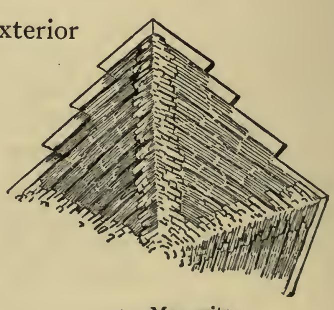
353 arborescent, crystallized. .75

354 globular. .50

355° 97. **Löllingite.** $FeAs_2$. Orthorhombic, small, sharply defined. 1.50

356 twins, cruciform. 1.00

357* massive, silver-gray. .35

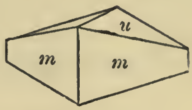


347. Marcasite

Löllingite—Continued

Type No. Species No.

358⊙ Leucopyrite, Fe_3As_4, massive. .35
Geyerite, 6·73 p.c. S.
359 Glaucopyrite, cobaltiferous. .75
Pacite. Fe sulph-arsenide. Massive.
360⊙ 98. **Arsenopyrite**, Arsenical Pyrites or Mispickel. FeAsS. Orthorhombic, unit prism *m* and brachydome *u*, well defined (fig.), silver-gray. 1.00
361⊙ penetration-twins, tw. pl. || to macrodome *e*, sharp. .75



360. Arsenopyrite

362* repeated-twins, brilliant. 1.25
cruciform-twins.
363+ granular massive, silver-gray. .25
364 compact. .35
Danaite (cobaltiferous), brilliant crystals.
nickeliferous.
99. **Safflorite.** $CoAs_2$. Orthorhombic, prism and macrodome.
365⊙ massive, tin-white, tarnishing. 2.00
II. Badenite. $(Co,Ni,Fe)_2(As,Bi)_3$. Massive, steel-gray.
100. **Rammelsbergite.** $NiAs_2$. Orthorhombic, crystals.
366⊙ massive, reddish tin-white. 1.00
367 101. **Glaucodot.** (CoFe)AsS. Orthorhombic, prism and two brachydomes, perfect, grayish-tin-white, loose. 1.25
368⊙ prism and brachydome, minute. 1.00
369* twins, loose, sharp, bright. 1.25
370 crystalline, disseminated. 1.00
371⊙ 102. **Alloclasite.** Co(As,Bi)S. Orthorhombic, columnar aggregates, steel-gray. 2.50
103. **Wolfachite.** Ni(As,Sb)S(?). Orthorhombic, prism and brachydome, minute, tin-white.

3. Sylvanite Group. Range of Hardness 1—2

372+ 104. I., II. **Sylvanite**, Goldschmidtite. Au_2AgTe_6. Monoclinic, small prisms, brilliant silver-white. 3.00
373 skeleton crystals, steel-gray. 2.50
374⊙ "Graphic Tellurium," arborescent twinning. 2.00
II. Von Diestite. Ag,Bi telluride. Massive.
375 105. I. **Krennerite.** $AuTe_2$. Orthorhombic, small prisms, brilliant pale brass-yellow. 5.00
376+ I. Calaverite. $AuTe_2$. Triclinic(?), pale bronze-yellow. 4.00

Type No. Species No.

377 **106. Nagyagite.** $Au_2Pb_{14}Sb_3Te_7S_{17}$. Orthorhombic, small tables, blackish-lead-gray. 4.00

378+ Foliated Tellurium, crystalline foliæ, embedded. 3.00

I. Kalgoorlite. $HgAu_2Ag_6Te_6$. Massive, iron-black.

Oxysulphides. Hardness 1—1·5 and 4—4·5

379 **107. Kermesite.** $2Sb_2S_3.Sb_2O_3$. Monoclinic, capillary tufts, cherry-red. 3.00

380⊙ radio-fibrous, crystalline. 2.50

108. Voltzite. 4ZnS.ZnO. Globules, curved lamellar structure.

Appendix to Sulphides, Etc.

Bolivianite. Antimonial Ag sulphide. Orthorhombic. acicular rhombic prisms, lead-gray.

Plumbostannite. Antimonial Sn,Pb,Fe sulphide. Granular, gray.

III. Sulpho-Salts

The metals chiefly present as bases are copper, silver and lead, also iron, zinc and mercury, rarely nickel, cobalt, etc.

I. Sulpharsenites, Sulphantimonites, Etc.

A. Acidic Division. Range of Hardness 2—3·5

109. Livingstonite. $HgS.2Sb_2S_3$. Prismatic crystals.

381⊙ columnar massive, blackish-lead-gray. 2.50

382 **110. Guejarite.** $Cu_2S.2Sb_2S_3$. Orthorhombic, prisms flattened parallel to brachypinacoid *b*, bluish-steel-gray.

111. Chiviatite. $2PbS.3Bi_2S_3$. Foliated massive, lead-gray.

112. Cuprobismutite. $3Cu_2S.4Bi_2S_3$. Slender prisms, bluish-black.

Dognacskaite. Bi,Cu sulphide. Cleavages, gray.

113. Rezbanyite. $4PbS.5Bi_2S_3$. Massive, lead-gray, darkening.

B. Meta Division

Zinkenite Group. $RS.(As,Sb,Bi)_2S_3$. Orthorhombic. Range of Hardness 2—4

114. Zinkenite. $PbS.Sb_2S_3$. Orthorhombic, crystals.

383 capillary, matted, steel-gray. 2.50

Zinkenite—Continued

Type No. | Species No.

384+ fibrous, massive. 2.00

385 I. **Andorite.** $2PbS.Ag_2S.3Sb_2S_3$. Orthorhombic, highly modified flat prisms, metallic-adamantine. 7.00

386⊙ massive, dark steel-gray. 4.00

387 115. **Sartorite.** $PbS.As_2S_3$. Orthorhombic, slender prisms, dark lead-gray. 5.00

388 II. **Hutchinsonite.** $(Tl,Ag,Cu)_2S.As_2S_3+PbS.As_2S_3(?)$. Orthorhombic, flattened prisms, adamantine, red. 9.00

389⊙116. **Emplectite.** $Cu_2S.Bi_2S_3$. Orthorhombic, thin prisms, grayish. 1.25

II. Histrixite. $7Bi_2S_3.2Sb_2S_3.5CuFeS_2$. Orthorhombic, prismatic, steel-gray.

390 117. I. **Chalcostibite.** $Cu_2S.Sb_2S_3$. Orthorhombic, small furrowed flat prism, perfect, iron-gray. 9.00

391⊙118. **Galenobismutite.** $PbS.Bi_2S_3$. Columnar crystalline, light lead-gray. 2.50

392 argentiferous, Alaskaite, compact. 3.00

seleniferous.

119. **Berthierite.** $FeS.Sb_2S_3$. Elongated prisms.

393+ fibrous massive, dark steel-gray. 1.00

granular massive.

II. **Trechmannite.** $Ag_2S.As_2S_3$. Rhombohedral, small prisms, bright red.

II. **Smithite.** $Ag_2S.As_2S_3$. Monoclinic, pyramidal, adamantine, light red.

120. **Matildite.** $Ag_2S.Bi_2S_3$. Slender prisms, gray.

Plenargyrite. $Ag_2S.Bi_2S_3(?)$. Crystalline, black.

394⊙ I. **Lorandite.** $Tl_2S.As_2S_3$. Monoclinic, highly modified prism, dark red, on realgar. 2.50

395 121. **Miargyrite.** $Ag_2S.Sb_2S_3$. Monoclinic, thick tabular, brilliant, dark steel-gray. 6.00

C. Intermediate Division. Hardness 2·5

396 122. **Plagionite.** $5PbS.4Sb_2S_3$ (?). Monoclinic, thick tabular, drusy. 3.00

397⊙ massive, fine granular, blackish lead-gray. 2.00

398 II. **Baumhauerite.** $4PbS.3As_2S_3$. Monoclinic, adamantine, lead-gray. 4.00

Type No. Species No.

II. Liveingite. $5PbS.4As_2S_3$. Monoclinic.

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123. I. Binnite. Formerly regarded as a distinct species. Now classed as a variety of tennantite, No. 149.
124. Klaprotholite. $3Cu_2S.2Bi_2S_3$. Orthorhombic, furrowed prisms, steel-gray, tarnishing.
125. Schirmerite. $3(Ag_2,Pb)S.2Bi_2S_3$. Massive, lead-gray.
126. Warrenite. $3PbS.2Sb_2S_3$. Acicular, matted, grayish-black.

Jamesonite Group. $2RS.(As,Sb,Bi)_2S_3$.

Range of Hardness 2—3·5

399⊙**127. II. Dufrenoysite.** $2PbS.As_2S_3$. Monoclinic, flat prism, blackish lead-gray. 2.00
400 **I. Rathite.** S 23·72, As 17·24, Sb 4·53, Pb 52·98. Orthorhombic, prismatic, black. 7.00
128. Cosalite. $2PbS.Bi_2S_3$. Orthorhombic, prismatic || macrodome *e*.
401⊙ crystalline radio-fibrous, steel-gray. 2.00
129. Schapbachite. $PbS.Ag_2S.Bi_2S_3$. Orthorhombic (?), minute needles, lead-gray.
massive, fine granular.
402 **130. Jamesonite.** $2PbS.Sb_2S_3$. Orthorhombic, acicular. 1.50
403⊙ capillary, matted. 1.25
404+ crystalline granular, steel-gray. 1.00
405 fibrous, lead-gray. 1.00
406⊙ plumose, "Feather Ore." 1.00
407 compact. 1.25

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408 **131. Kobellite.** $2PbS.(Bi,Sb)_2S_3$. Massive, steel-gray. 8.00
132. Brongniardite. $PbS.Ag_2S.Sb_2S_3$. Isometric, octahedron *o* truncated by dodecahedron *d*, grayish-black.

——————Hardness 2·5

409 **133. Semseyite.** $7PbS.3Sb_2S_3$(?). Monoclinic, small distinct tables in rosette-like aggregates, dark gray. 9.00

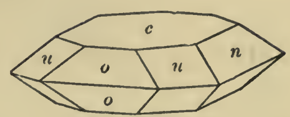
410⊙**134. Diaphorite.** $5(Pb,Ag_2)S.2Sb_2S_3$. Orthorhombic, small prisms, splendent dark steel-gray. 2.50
411*__135. Freieslebenite.__ $5(Pb,Ag_2)S.2Sb_2S_3$. Monoclinic, prismatic, blackish lead-gray. 2.50

D. Ortho Division

Bournonite Group. $3RS.(As,Sb,Bi)_2S_3$. Orthorhombic.

Range of Hardness 2·5—4

Type No. Species No.



412. Bournonite

412⊙136. **Bournonite.** $3(Pb,Cu_2)S.Sb_2S_3$. Orthorhombic, tabular (fig.), splendent blackish-gray. 2.00

413 prismatic, perfect. 1.50

414⊙ prismatic, parallel aggregate. 1.25

415+ repeated twins, "Wheel Ore" (fig.). 1.50

415. Bournonite

416 massive, fine granular. 1.25

II. Seligmannite. $Cu_2S.2PbS.As_2S_3$(?). Orthorhombic, small crystals, lead-gray.

137. Wittichenite. $3Cu_2S.Bi_2S_3$. Orthorhombic, crystals like bournonite.

417 massive disseminated, tin-white, tarnishing. .300

418⊙138. **Aikinite.** $3(Pb,Cu_2)S.Bi_2S_3$. Orthorhombic, acicular in quartz, blackish lead-gray, tarnishing reddish. 3.00

139. I. Boulangerite. $5PbS.2Sb_2S_3$. Orthorhombic, prisms.

419 crystalline plumose, lead-gray. 1.00

420+ compact, with stibnite. .75

140. Lillianite. $3PbS.Bi_2S_3$. Massive, crystalline, steel-gray.

141. Stylotypite. $3(Cu_2,Ag_2,Fe)S.Sb_2S_3$. Orthorhombic, columnar prisms, iron-black.

Dürfeldtite. Chiefly Pb,Ag,Mn sulphantimonite. Indistinctly fibrous, light gray.

S. Falkenhaynite. $3Cu_2S.Sb_2S_3$. Massive, gray-black.

421⊙142. **Guitermanite.** $10PbS.3As_2S_3$. Massive compact, bluish-gray. 1.00

422 II. Lengenbachite. $6PbS(Ag,Cu)_2S.2As_2S_3$(?). Triclinic(?), bladed, steel-gray. 4.00

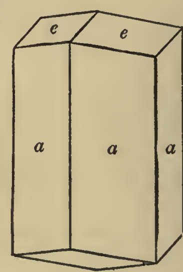
143. Tapalpite. $3Ag_2(S,Te).Bi_2(S,Te)_3$ (?). Massive granular, steel-gray, tarnishing.

Pyrargyrite Group. $3Ag_2S.(As,Sb)_2S_3$.

Rhombohedral, hemimorphic. Range of Hardness 2—2·5

Species No. Type No.

423⊙**144. Pyrargyrite**, Antimonial or Dark Ruby Silver. $3Ag_2S.Sb_2S_3$. Rhombohedral, six-sided prism (fig.), reddish-black, deep red by transmitted light. 2.00



423. Pyrargyrite

424⊙ rhombohedron prominent, perfect. 2.00

425 twins. 2.50

426+ compact massive. 1.00

427 disseminated. 1.00

428⊙**145. Proustite**, Arsenical or Light Ruby Silver. $3Ag_2S.As_2S_3$. Rhombohedral, small acute rhomb, splendent vermillion. 3.00

429 scalenohedron, translucent, small, but distinct. 2.50

430⊙ twins, perfect. 3.00

431+ massive, compact, dark red. 1.25

432 fine granular, disseminated. 1.25

S. Sanuginite. Ag sulpharsenite. Hexagonal, fine glittering scales, black, dark red by transmitted light.

---

433 **146. Pyrostilpnite.** $3Ag_2S.Sb_2S_3$. Monoclinic, minute prisms, hyacinth-red. 4.00

147. Rittingerite. As, Se, and 57·7 p.c. Ag. Monoclinic, minute tables, iron-black.

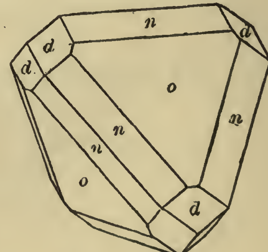
E. Basic Division

Tetrahedrite Group. $4RS.(Sb,As)_2S_3$. Isometric, tetrahedral.

Hardness 3—4·5

148. Tetrahedrite, Gray Copper or Fahlerz. $4Cu_2S.Sb_2S_3$. Isometric, small crystals of ideal symmetry, splendent iron-black:—

434+ tetrahedrons modified by trigonal tristetrahedron *n*, and dodecahedron *d* (fig.), on quartz crystals. 1.00



434. Tetrahedrite

Tetrahedrite—Continued

Type No. Species No.

435° tetrahedrons, on pyrite crystals. 2.00
436 tetrahedrons modified by cube *a*. 1.50
437° trigonal tristetrahedron prominent, dull. 1.25
438 twins, contact. 2.00
439° massive, compact, grayish iron-black. 1.00
440+ Freibergite, argentiferous, granular disseminated. 1.00
441 Schwatzite, mercurial, dark gray. 2.00
plumbiferous.

NOTE—Tetrahedrite and Tennantite graduate chemically into each other.

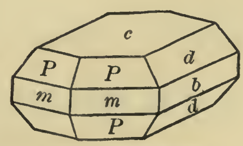
442*149. **Tennantite.** $4Cu_2S.As_2S_3$. Isometric, tetrahedral, small dodecahedrons, iron-black. 2.50
443 Sandbergerite, contains about 8 p.c. Zn. 3.00
Fredricite, contains Sn,Pb and Ag.
Rionite, contains 13 p.c. Bi.
Annivite, contains Sb and Bi.
444° I. Binnite. Formerly regarded as a distinct species (No. 123). Now classed as a variety of tennantite. Highly modified cubo-octahedrons. 3.00

——————Hardness 3 and 2·5

445°150. S. **Jordanite.** $4PbS.As_2S_3$. Monoclinic, tetrahedral, six-sided, base *c* predominating. 2.50
446°151. **Meneghinite.** $4PbS.Sb_2S_3$. Orthorhombic, tetrahedral, acicular, splendent blackish-lead-gray, loose. 1.00

——————Hardness 2·5

447°152. **Geocronite,** Kilbrickenite. $5PbS.Sb_2S_3$. Orthorhombic, tetrahedral, massive. 1.50
448°153. **Stephanite,** Brittle Silver. $5Ag_2S.Sb_2S_3$. Orthorhombic, tetrahedral, hemimorphic, small tables, base predominating (fig.). 3.00



448. Stephanite

449+ twins, hexagonal tables, splendent iron-black. 2.00
450 twins, hexagonal prismatic, bright. 2.50
451 massive, compact. 2.00
452° disseminated. 2.00

——————Hardness 2—3

154. II. **Kilbrickenite.** Formerly regarded as a distinct species. It is identical with geocronite, No. 152.

Type No. Species No.

155. **Beegerite.** $6PbS.Bi_2S_3$. Isometric(?), brilliant indistinct crystals, gray.

Richmondite. $6RS.Sb_2S_3$ with $R{=}Cu_2,Fe,Ag_2Zn$(?).

156 I. **Polybasite.** $9Ag_2S.Sb_2S_3$. Monoclinic, ideal pseudo-hexagonal crystals, splendent iron-black (in thin splinters, cherry-red) :—

453+ repeated twins, tabular, tw.pl. unit prism *m*. 2.00

454 ditto, prisms. 2.50

455⊙ massive, disseminated. 2.00

I. **Pearceite.** $9Ag_2S.As_2S_3$. Monoclinic, pseudo-rhombohedral tables, black.

——————————Hardness 2·5

157. **Polyargyrite.** $12Ag_2S.Sb_2S_3$. Isometric, distorted cubo-octahedrons, indistinct, iron-black.

II. Sulpharsenates, Sulphantimonates, Etc.

Enargite Group. Hardness 3 and 3·5

456⊙158. **Enargite.** $3Cu_2S.As_2S_5$. Orthorhombic, unit prism *m*, macropinacoid *a*, and base *c*, symmetrical. 2.00 twins, iron-black.

457⊙ bladed-columnar cleavage. 1.50

458+ granular-cleavable, grayish-black. 1.00

459 massive, grayish-black. 1.00

I. Lautite. CuAsS.

Clarite. $3Cu_2S.As_2S_5$. Monoclinic, dark lead-gray.

NOTE—Enargite and Famatinite graduate chemically toward each other.

159. **Famatinite.** $3Cu_2S.Sb_2S_5$. Orthorhombic, isomorphous with enargite, gray with tinge of copper-red.

460⊙ massive. 2.50

——————————Hardness 2

461⊙ II. **Sulvanite.** $3Cu_2S.V_2S_5$. Massive, bronze-yellow, tarnishing. 1.00

462 160. I. **Xanthoconite.** Ag_3AsS_3. Monoclinic, thin tabular, reddish-yellow. 2.50

reniform mass, granular structure.

463 161. **Epiboulangerite.** $3PbS.Sb_2S_5$. Orthorhombic (?), prismatic needles, bluish-black. 2.00

——————————Hardness 3·5

162. **Epigenite.** $4Cu_2S.3FeS.As_2S_5$(?). Orthorhombic, short prisms with macro- and brachydome, steel-gray.

Type No. Species No.

——————Hardness 2·5

I. **Canfieldite.** $4Ag_2S(SnGe)S_2$. Isometric, tetrahedral(?), octahedrons *o*, with dodecahedrons *d*, bluish-black.

Regnolite. $5CuS.FeS.ZnS.As_2S_5$. Isometric, tetrahedral.

464⊙ I. **Franckeite.** $5PbS.Sb_2S_3.2SnS_2$. Massive, imperfectly radio-foliate, blackish-gray. 1.50

465⊙ I. **Cylindrite**, Kylindrite. $6PbS.Sb_2S_3.6SnS_2$. Massive, cylindrical-foliated structure, blackish-lead-gray. 1.25

466 **163.** I. **Argyrodite.** $4Ag_2S.GeS_2$. Isometric, tetrahedral, dodecahedron *d* and tetrahedron *o*, loose. 9.00

467 penetration-twins, small distinct. 6.00

468⊙ drusy crystals, reniform grouping. 4.00

469* compact massive, dark steel-gray. 2.50

IV. Haloids.—Chlorides, Bromides, Iodides; Fluorides

I Anhydrous Chlorides, Bromides, Iodides; Fluorides.

Calomel Group. $\overset{I}{R}_2Cl_2$. Range of Hardness 1—2

470***164. Calomel.** Hg_2Cl_2. Tetragonal, highly complex. 4.00

471 twins, gray. 4.00

II. **Kleinite.** Hg,NH_4 chloride(?). Hexagonal, short prisms, orange-yellow.

Mercuric chloride, $HgCl_2$(?).

472⊙**165. Nantokite.** Cu_2Cl_2. Isometric, granular, white. 2.00

473 I. **Marshite.** Cu_2I_2. Isometric, tetrahedral, minute truncated tetrahedrons, ideal symmetry, adamantine, reddish-brown. 6.00

I. **Miersite.** Ag_2I_2. Isometric, tetrahedral, cubes with tetrahedral faces, adamantine, yellow.

Halite Group. $\overset{I}{R}Cl$, etc. Isometric.

Chlorides, etc., of sodium, potassium, ammonium and silver.

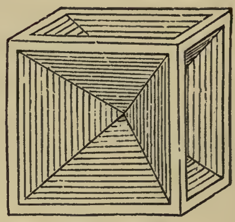
474⊙**166. Halite**, Rock Salt. NaCl. Isometric, cubes, perfect, white. .75

475 cubo-octahedrons, symmetrical. .50

476⊙ octahedrons, clear, loose, (3). .50

477+ elongated cubo-octahedrons, clear, loose (3). .50

Type No. | Species No. — Halite—Continued



478. Halite

478⊙ cavernous faces on cube (fig.). .75
479+ cubic cleavage, clear colorless. .20
480⊙ cleavage, cubic, clear blue. .75
481 banded cleavage, yellowish-brown. .75
482 banded granular, reddish. .40
483 fine columnar. .50
484* granular, gray. .20
485⊙ compact, on lava. .40
486 bubble moving in liquid inclusion. .75

Huantajayite. 20NaCl+AgCl(?). Cubic.

Hydrohalite. Hyd.Na chloride.

487 167. **Sylvite.** KCl. Isometric, cubes on 1906 lava. 1.00
488⊙ cubo-octahedrons, perfect, clear colorless. 1.00
489+ granular cleavable, reddish. .30
490 compact, white. .50

II. Chloromanganokalite. $4KCl.MnCl_2$(?). Rhombohedral, pale wine-yellow.

491*168. **Sal-ammoniac.** NH_4Cl. Isometric, dodecahedral with cavernous faces, milky, on 1886 lava. .75
492⊙ twins, clear yellowish, on 1906 lava. 1.00
globular masses.
493 incrusting lava. .75

494⊙169. **Cerargyrite**, Horn Silver. AgCl. Isometric, small cube. 3.00
495 compact, translucent. 2.50
496⊙ compact, dull grayish-green. 1.25
497 fine columnar. 2.50
498+ encrusting, grayish. 1.25

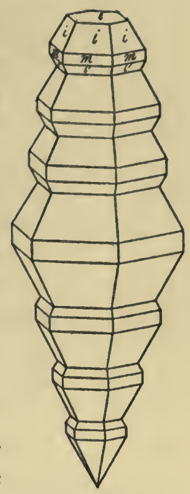
499⊙170. **Embolite.** Ag(Cl,Br). Isometric, small cubo-octahedrons, grayish-green. 2.00
500 dodecahedrons, small, brownish. 3.00
501⊙ crystalline, spongiform. 1.50
502+ massive, olive-green, darkening on exposure. 1.25
503 disseminated veins. 1.50

504 171. **Bromyrite.** AgBr. Isometric, small concretions, yellowish. 5.00

172. **Iodobromite.** 2AgCl.2AgBr.AgI. Isometric, cubo-octahedrons, sulphur-yellow.

Type No. Species No.

505 **173. Iodyrite.** AgI. Kraus and Cook, A.J.S. 27, 210, 1909. Only four of the ten small but distinctly formed types now in stock and described by these authors, are here cataloged. Hexagonal, hemimorphic, diametral prism *a* and base *c,c'* predominating, truncated by unit prism *m* and unit pyramid *u,u'*, apparently holohedral, minute, symmetrical, lemon-yellow, on psilomelane. 8.00

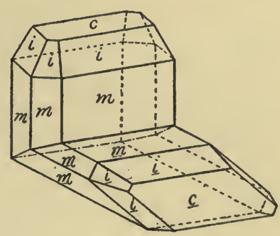


507. Iodyrite
Kraus and Cook

506 hemimorphic, unit prism *m*, base *c*, unit pyramid *i'* all prominent with several truncating unit pyramids, loose (12). 1.00

507* parallel grouping, barrel-shaped, of several similar individuals (*c,i,m,i*) (fig.), loose (12). 1.00

508⊙ contact-twins, tw.pl. pyramid *e* (fig.), loose (12). 1.00



508. Iodyrite
Kraus and Cook

509+ crystalline granular, sulphur-yellow. 2.00

510 thin plates with lamellar structure. 2.00

511 massive. 2.00

Tocornalite. Ag,Hg iodide. Granular, yellow.

I. Cuproiodargyrite. CuI.AgI. Incrustation, sulphur-yellow.

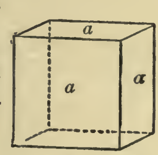
Fluorite Group. $\overset{\text{II}}{R}(Cl,F)_2$. Isometric.

Range of Hardness, Fluorite 4 Chloromagnesite series very soft, except Sellaite 5, Tysonite 4·5—5, Cryolite series 2·5—3·5

174. Hydrophilite. $CaCl_2$. Isometric, cubic, encrusting.

175. Fluorite, Fluor Spar. CaF_2. Isometric, bright crystals of sharp ideal symmetry, transparent to translucent:—

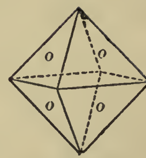
512+ cubic, blue (fig.). .50



512. Fluorite

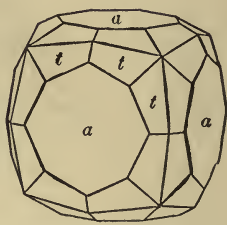
Type No. | Species No. — Fluorite—Continued

513⊙ cubic, large, yellow. 1.00
514 cubic, splendent iridescent, brown. 1.50
515⊙ cubic, dark green. .75
516 cubic, elongated, complete, opaque grayish-violet. 1.00
517* octahedron *o* (fig.), pale green. 1.00



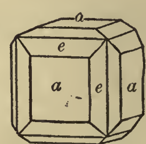
517. Fluorite

518 octahedron, rose-pink, loose. 1.50
519 octahedron, small, colorless, on lava. 1.00
520⊙ dodecahedron, small. 1.50
521⊙ hexoctahedron *t*, and cube *a* (fig.), dull translucent. 1.25
522⊙ octahedron modifying cube, splendent. .75
523* tetrahexahedron *e* modifying cube *a*, "fluoroid" (fig.), small. 1.00
524 dodecahedron *d* modifying cube *a*, splendent. 1.50



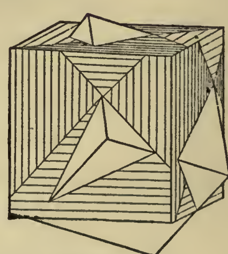
521. Fluorite

525 trigonal trisoctahedron modifying octahedron. 1.25
526* penetration-twins, tw.pl. octahedron *o* (fig.), vicinal striations. 1.00
527⊙ pseudo-octahedron, formed by parallel grouping of dodecahedrons, capped by dodecahedron. 1.00



523. Fluorite

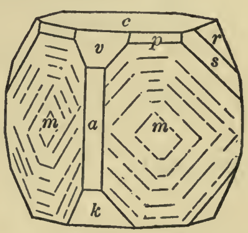
528 ditto, grouping of modified cubes capped by modified cube, on white altered barite, sea-green. 1.25
529 ditto, emerald-green on pink rhodochrosite. 2.00
530 capping of blue flat cube on green modified octahedron. 2.00
531+ cleavage octahedron, emerald-green. .50
532 cleavage, tetrahedral symmetry, pink. .50


526. Fluorite

533⊙ banded crystal, loose. 1.00
534 columnar-granular banded, polished, translucent "Blue-John." 1.00
535+ cleavable-granular, coarse, greenish-white. .20
536 crystalline granular, fine. .30

Type No. | Species No.

537 massive, compact. .50
Antozonite, odor attributed to free Fl.
538⊙ Chlorophane, fluorescent. 1.50
539⊙ encrusted with milky quartz. .75
540 scattered with splendent limpid quartz crystals. 1.00
541 Capped Fluor, primary growth (cube), secondary crust of quartz, with capping of fluor and siderite. 1.50
542⊙ altered to blue chalcedony. 1.25
176. Chloromagnesite. $MgCl_2$. A deliquescence on lava.
543 **177. Sellaite.** MgF_2. Tetragonal, prismatic, clear colorless. 6.00
178. Lawrencite. $FeCl_2$. Solid, on exposure exuding from iron as minute drops, finally oxidizing, brown. 2.00
179. Scacchite. $MnCl_2$. A deliquescent mass.
Chloralluminite. $AlCl_3+xH_2O$. In lava.
544⊙ **180. Cotunnite.** $PbCl_2$. Orthorhombic, acicular. 1.50
Pseudocotunnite. $PbCl_2.KCl$ (?). Acicular, yellow.
181. Molysite. $FeCl_3$. Incrusting.
182. Tysonite. $(Ce,La,Di)F_3$. Hexagonal, thick prisms.
545 massive, yellowish. 3.00
546⊙ **183. Cryolite.** $3NaF.AlF_3$. Monoclinic, short modified square prisms with cubic aspect (fig.), grouped parallel, transparent colorless, sharp. 1.50



546. Cryolite

547+ massive, translucent, white. .30
548 massive, brownish. .40
549 massive, with galena, chalcopyrite and siderite. 1.00
Elpasolite. K,Na,Al fluoride.
II. Cryolithionite. $3LiF.3NaF.2AlF_3$. Isometric, dodecahedrons, transparent colorless.
550 **184. Chiolite.** $5NaF.3AlF_3$. Tetragonal, pyramidal, white. 2.00
185. Hieratite. $2KF.SiF_4$. Isometric.
Hydrofluorite. HF. Gas (volcanic).
Cryptohalite. $2NH_4F.SiF_4$(?). Volcanic.
Proidonite. SiF_4. Volcanic.

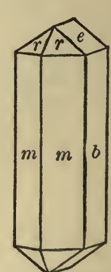
II. Oxychlorides, Oxyfluorides

A. Oxychlorides.

Range of Hardness 2·5—3·5

Type No. Species No.

551⊙186. **Matlockite.** $PbCl_2.PbO$. Tetragonal, tabular || to *c*. 2.00
552 rosette-like group, yellowish. 3.00
553⊙187. **Mendipite.** $PbCl_2.2PbO$. Orthorhombic, columnar mass, white. 3.00
554 188. **Schwartzembergite.** $Pb(I,Cl)_2,2PbO$(?). Rhombohedral, incrusting, yellow. 4.00
I. **Penfieldite.** $PbO.2PbCl_2$. Hexagonal, prismatic, white.
555 II. **Terlinguaite.** Hg_2ClO. Monoclinic, small crystals, adamantine sulphur-yellow. 9.00
556 II. **Egglestonite.** $Hg_2O.2HgCl$. Isometric, minute dodecahedrons, brownish-yellow. 8.00
557⊙189. **Laurionite.** $PbCl_2.Pb(OH_2)$. Orthorhombic, small flat prisms, adamantine, clear colorless. Formed by action of sea-water on ancient slag. 1.00
I., II. **Paralaurionite.** $PbCl_2.Pb(OH)_2$. Monoclinic, prisms, white.
190. **Daviesite.** Lead oxychloride. Orthorhombic, minute prisms, colorless.
191. I. **Fiedlerite.** Contains Pb and Cl. Monoclinic, minute tables, colorless, transparent.
558 192. I. **Percylite.** $Pb(OH)Cl.Cu(OH)Cl$. Isometric, cubes, minute, sky-blue. 4.00
559⊙S. I. Cumengéite. $Pb(OH)Cl.Cu(OH)Cl$. Tetragonal(?), small sharp octahedroids, indigo-blue, loose. 1.00
560*S. I. Boléite. $Pb(OH)Cl.Cu(OH)Cl.+\frac{1}{3}AgCl$. Isometric(?), cubic habit, ideal symmetry, indigo-blue, loose. .75
561+193. **Atacamite.** $CuCl_2.3Cu(OH)_2$. Orthorhombic, acicular, transparent emerald-green. 1.50
562⊙ short thick prisms (fig.), sharp, brilliant. 2.50
563 octahedroid, well defined, bright. 2.50
564 crystal aggregate, bright emerald-green. 2.00
565⊙ granular massive. 1.00
II. **Paratacamite.** $CuCl_2.3Cu(OH)_2$. Rhombohedral, bright green.



562. Atacamite

Type No. Species No.

Tallingite. $Cu_5(OH)_8Cl_2+4H_2O$. Thin crusts of minute globules, greenish-blue.

S. **Footeite.** $8Cu(OH)_2.CuCl_2+4H_2O$. Monoclinic, minute prisms, deep blue.

Melanothallite. $CuCl_2.CuO.2H_2O$ (?). Volcanic.

566 Erythrocalcite. $CuCl_2$(H_2O undetermined). 5.00

Atelite. $2CuO.CuCl_2.3H_2O$. An altered tenorite. Green, volcanic.

194. **Daubréeite.** $2Bi_2O_3.BiCl_3.3H_2O$ (?). Amorphous, whitish.

II. Koenenite. Al, Mg oxychloride. Rhombohedral, crusts, red.

B. Oxyfluorides. Hardness of Fluocerite 4

567◎195. **Nocerite.** $2(Ca,Mg)F_2.(Ca,Mg)O$(?). Hexagonal, acicular, white. 1.00

568◎196. **Fluocerite.** $R_2O_3.4RF_3$, where R=Ce metals chiefly. Massive, reddish-yellow. 1.50

III. Hydrous Chlorides, etc.

A. Hydrous Chlorides. Very Soft

569◎197. **Bischofite.** $MgCl_2+6H_2O$. Crystalline, clear colorless. .50

198. **Kremersite.** $KCl.NH_4Cl.FeCl_3+H_2O$. Isometric, octahedrons, ruby-red.

199. **Erythrosiderite.** $2KCl.FeCl_3.H_2O$. Orthorhombic, red.

200. **Douglasite.** $2KCl.FeCl_2.2H_2O$(?).

201. **Carnallite.** $KCl.MgCl_2+6H_2O$. Orthorhombic, pseudohexagonal pyramids.

570 massive granular, white. .30

571+ massive granular, reddish. .30

202. **Tachhydrite.** $CaCl_2.2MgCl_2+12H_2O$. Rhombohedral, cleavages.

572* massive, yellowish. .30

B. Hydrous Fluorides

203. **Fluellite.** AlF_3+H_2O. Orthorhombic, white.

573 204. **Prosopite.** $CaF_2.2Al(F,OH)_3$. Monoclinic (or triclinic), embedded crystals, whitish. 5.00

574◎205. **Pachnolite.** $NaF.CaF_2.AlF_3.H_2O$. Monoclinic, prism and acute pyramid, distinct, minute, clear colorless. 1.00

575◎206. **Thomsenolite.** $NaF.CaF_2.AlF_3.H_2O$. Monoclinic, prism and base, cubic symmetry. 1.50

Type No. Species No. — Thomsenolite—Continued

576 prismatic, transparent colorless. 1.50
577 massive, white. 1.00
578 Hagemannite. Impure thomsenolite?, jaspery, yellow. .50
579⊙ 207. **Gearksutite.** $CaF_2.Al(F,OH)_3H_2O$. White earthy masses of minute colorless needles. 1.00
580⊙ 208. **Ralstonite.** $(Na_2,Mg)F_2.3Al(F,OH)_32H_2O$. Isometric octahedrons, whitish. 2.50
209. **Yttrocerite.** $2(2RF_3.9CaF_2).+3H_2O$, with R=Ce(La,Di): Y(Er)=1:2. Massive, white, in quartz.
581⊙ violet-blue, in mica. .75

V. Oxides

I. Oxides of Silicon. Hardness 7 (Opal 5·5—6·5)

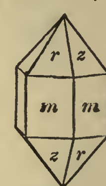
210. **Quartz.** SiO_2. Rhombohedral. Rare and unimportant types are omitted.

NOTE—The term "pyramid" (six-sided), is here used interchangeably with "two rhombohedrons *r* and *z*."

A. PHENOCRYSTALLINE OR VITREOUS VARIETIES

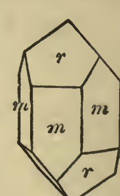
Crystals sharply defined, brilliant and transparent.
Rock Crystal, colorless forms and types follow:—

582+ prism *m* and pyramid (two rhombohedrons *r* and *z*), large, symmetrical, grouped. .50
583 ditto, very large, loose. .50
584+ ditto, but shorter (fig.), complete and quite limpid, (so-called "diamonds"), loose (6). .50



584. Quartz

585 ditto, on fine white marble. .75
586 ditto, acicular, group. 1.00
587⊙ one rhombohedron *r*, and prism (fig.), loose. .50
588 one pyramidal plane only developed (rhombehodron *r*) terminating very large slender prism, limpid. 1.00
589+ "quartzoid," double six-sided pyramid (fig.), symmetrical, on hematite. .75
590 ditto, loose (6). .50
591⊙ cuboid, *r* prominent (fig.), large, loose. 1.00
592 chisel-edge termination, opposite rhombohedrons abnormally developed. .50

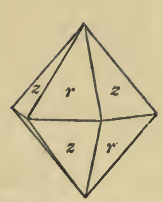


587. Quartz

Quartz—Continued

Type No. Species No.

593• trigonal pyramid *s*, modifying prism *m*, rhombohedrons *r* and *z* (fig.), loose. .50



589. Quartz

594 acute rhombohedron *M*, prism *m*, rhombohedrons *r* and *z* (fig.), tapering crystal. .75

595* trigonal trapezohedron *x*, pyramid *s*, prism *m*, rhombohedrons *r*, *z*, large "right-handed crystal" (fig.). 1.00

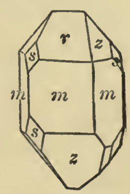
596⊙ ditto, large "left-handed crystal" (fig.). 1.00

591. Quartz

597 highly modified, triangular etching, (fig.), large. .75

598* penetration-twin, tw. axis *c* (tw.pl. *m*), both individuals right-handed (shown in fig. by *x*), irregular dull and bright areas adjacent on *r* loose, large. 1.50

599 penetration-twin, irregular, *Brazil law*, tw. pl. *a* (fig.). 3.00



593. Quartz

600⊙ contact-twin, tw.pl. ξ (1122), axes *c* crossing at 84°33′, a plane *m* coincident in both individuals (fig.), loose, large. 3.00

601 grouping simulating twin. 1.00

602⊙ distorted crystal (fig.), very large. .75

603 flattened || prism *m*, large. .75

604 bent crystal, large. .50

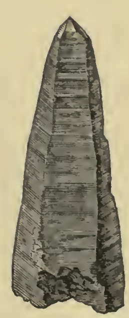
605⊙ cavernous, angular cavities in faces, large, loose. .50

606 capped, large. 1.25

607⊙ etching of trigonal pyramid *s* and only one rhombohedron, pyramidal planes being alternately bright and dull. .50

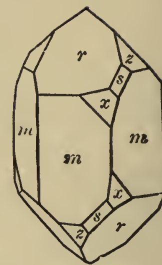
608* drusy, large geode (two halves). .50

609 drusy, three small unbroken geodes containing loose microscopic crystals. .50

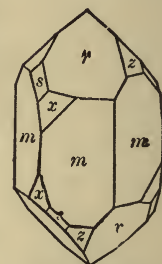

594. Quartz

Quartz—Continued

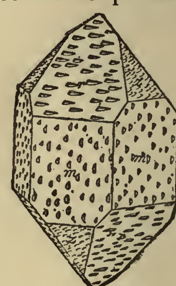
Type No.	Species No.	
610		cleavage || to rhombohedron. 1.00
611⊙		water-worn pebble, conchoidal fracture. .50
612		Radiated crystalline, translucent. .75
613		Fibrous crystalline, translucent. .75
614		Star-quartz (asteriated), cut "en cabochon," clear colorless. 1.00
615+		Amethyst, prisms, light violet. .50
616		pyramids in agate geode, dark purple precious. 3.00
617		pyramids, druse on petrified wood. 1.00
618⊙		pyramids with surficial ferruginous inclusions, surface red, translucent. 1.50
619		dark rhombic "phantom" in light prisms terminated by one rhombohedron. .75
620*		dark pyramids terminating both ends of colorless prisms, loose. .75
621⊙		parallel growth on smoky quartz. 1.00
622		"sceptre," purple quartzoid tipping stem-like prism of rock crystal, loose. 2.00
623⊙		crystalline, banded with milky quartz, translucent. .50
624		twinning shown by alternate rhombohedrons of amethyst and rock crystal in one large cross-section of prism, polished. 3.00
625+		Rose, translucent pink mass. .30
626		Rose, rich pink, iridescent internal reflections (fractures), polished. 1.50
627⊙		Rose, asteriated, transparent pink with purplish tinge, polished ball. 2.00
628*		Yellow, Citrine, loose (6). .50
629⊙		Smoky, light, Cairngorm Stone, loose, large. .50
630+		Smoky, dark translucent, very large, tapering (fig. 594). .25
631		Smoky, light, twisted flat parallel growth. 2.00

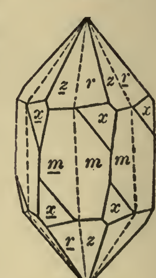


595. Quartz



596. Quartz

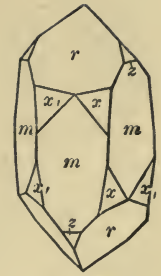

597. Quartz



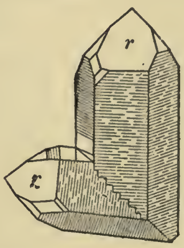
598. Quartz

Quartz—Continued

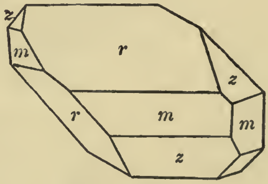
Type No.	Species No.	
632		Greasy, sub-transparent mass. .30
633+		Milky, prism and pyramids, ideal symmetry (fig.584), dull opaque, loose(3). .50
634		Milky, pyramids, translucent. .50
635⊙		Milky, translucent mass. .20
636		Siderite, Sapphire-quartz, translucent blue mass. .75
637*		Sagenitic (net-like), inclosing Rutile, acicular, "Flêches d'amour," polished. 2.50
638		Inclosing Rutile, capillary. 1.50
		Inclusions of other acicular or capillary minerals:—
639		Black Tourmaline, capillary, in smoky crystal, large. .50
640		ditto, with projecting "stem" or "core." 2.00
641*		ditto, polished cross-section. 1.25
642⊙		Göthite, acicular, "Onegite." 1.50
643		Stibnite, acicular, in crystal. 2.00
644⊙		Asbestus, capillary, in crystal. 1.00
645		Actinolite, acicular. 1.00
646		Black Hornblende, acicular. .75
		Epidote, acicular.
647⊙		Cat's-Eye, fibrous, gray, chatoyant. .50
		Tiger-Eye, see Crocidolite, altered.
648⊙		Aventurine, Sunstone, red. 1.00
649		Aventurine, Sunstone, green, polished. 1.25
		Impure from presence of other minerals densely distributed:—
650*		Ferruginous, dull terra-cotta-red, pyramids. .75
651		Ferruginous, splendent brick-red druse. 1.50
652⊙		Ferruginous, dull ochre-yellow, mass of crystals. .75
653*		Chloritic, "phantom" crystal. 1.00
654		Chloritic, mossy, crystal. .75
		Actinolitic.
		Micaceous.
		Arenaceous.
655		containing albite crystals, in "phantom" form. 1.00



599. Quartz



600. Quartz



602. Quartz

Quartz—Continued

Type No.	Species No.	
656		containing anthracite, rock crystal. .50
657*		containing water and moving bubble, prism. .75
658		ditto, with moving anthracite, limpid crystal. 3.00
		containing liquid CO_2 and moving bubble, which disappears on vaporizing liquid by warmth of hand, amethyst crystal.
		B. CRYPTOCRYSTALLINE VARIETIES
659		Chalcedony, mammillary translucent white. 1.00
660+		mammillary. .40
661		botryoidal, brownish. .75
662⊙		stalactitic, tendon-color. 1.00
663		gray, polished. .75
664		geode, drusy lining. .50
665⊙		Enhydros, translucent geode containing water. 1.50
666⊙		Carnelian, translucent red, cut. .50
667		Sard, subtranslucent brownish-red, cut. .50
668*		Chrysoprase, translucent apple-green, precious. 1.00
669		Chrysoprase, translucent bluish-green. 1.00
670⊙		Chrysoprase, translucent turquoise-blue, precious. 1.50
671⊙		Prase, translucent dull leek-green. .75
672		Plasma, subtranslucent leek-green. .35
673*		Blood-stone, Heliotrope, subtranslucent leek-green with red spots. .50
		Agate:—
674+		Banded-agate, gray and white, polished. .75
675⊙		Banded-agate, red, in limestone. .75
676		Fortification-agate, brownish, polished. 1.25
677⊙		Eye-agate, concentric, polished. 1.50
678		Clouded-agate, polished. .75
679		Artificially colored agate. Long banded strip, cut into six cross-pieces, each colored differently and after joining, polished. 4.00
680⊙		Moss-agate, leek-green sea moss, polished. .75
681		ditto, with patches of chalcedony outlined by carnelian. 1.25
682⊙		Moss-agate, Mocha-stone, large delicate branching, in clear chalcedony, cut. 1.50
683*		Dendritic-agate, black moss in gray ground. 1.00
684		Agatized-wood, brown, polished. 1.00
685		Onyx, straight banding, gray, polished. 1.50

Type No.	Species No.	
686⊙		Onyx, black and white, cut. .50
687⊙		Sardonyx, straight banding, red and white, cut. .50
688		Agate—Jasper with whitish clouding, polished. 1.00
689		Siliceous Sinter, irregularly cellular. 1.25
690+		Flint, nodule, smoky-gray with chalky exterior. .20
691		Flint, nodule, concentric structure, white. .40
692⊙		Hornstone (Chert), brecciated, gray, with sphalerite. .20
693		Hornstone (Chert), fossiliferous, white. .20
694⊙		Basanite (Touchstone), opaque black. .30
		JASPER (impure, opaque):—
695+		Brick-red. .30
696⊙		Yellow. .30
697⊙		Dark green. .50
		Grayish-blue.
698		Brownish-black. .50
699⊙		Riband Jasper, variegated stripes. 1.00
700		Egyptian Jasper, nodule zoned brown and yellow. .75
701		Variegated Jasper, polished. 1.00
		Jasponyx.
702+		Jasperized wood, red, yellow, etc. .30

C. OTHER VARIETIES

703*		Granular-quartz, white. .20
704⊙		Quartzose Sandstone, coarse, pink. .20
705		Quartzose Sandstone, argillaceous, banded. .40
706*		Quartz Conglomerate, cemented pebbles. .20
707⊙		Quartz Breccia, cemented fragments. .40
708+		Itacolumite, Flexible Sandstone. .20
709		Buhrstone, cellular, flinty. .20
		Pseudomorphous Quartz:—
710		Tabular quartz, intersecting plates. .50
		Haytorite (see Datolite, altered).
711⊙		Babel-quartz, cubic impressions of fluor on which it was originally deposited. .75
712		Silicified shells. .50
713⊙		Silicified wood. .30
714		Beekite, highly fossiliferous, cellular. .50
715⊙		altered to talc, sharp crystals. 1.00
716⊙	211.	**Tridymite.** SiO_2. Hexagonal (?), minute tables, clear. 1.00
717*		twins, minute, sharp, white. 1.00
718		trilling (fig.), definite. 1.50

Type No. Species No. Tridymite—Continued

719 polysynthetic twins in spherical rosettes, minute. 1.25

Cristobalite. SiO_2. Minute octahedrons, white.

720 Granuline. Identical with tridymite (?). Pulverulent, on lava, white. 1.00

721* Melanophlogite. Contains SiO_2,SO_3,H_2O. Pseudomorphous (?). Minute cubes. .75

Sulfuricin. Contains SiO_2,SO_3,S,H_2O. Porous.

212. **Opal.** $SiO_2.nH_2O$. Amorphous.

722+ Precious Opal (*i.e.* with play of colors), milky. 1.00

723⊙ in porphyry. 2.00

724⊙ in layers or zones. 1.00

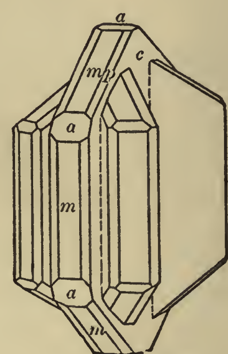
725 bluish. 1.50

726* greenish, in limonite. 1.50

727 reddish ground, "Harlequin opal." 2.00

728 in wood-opal. 1.00

729 replacing shell. 1.50



718. Tridymite

730+ Fire-opal, red, slightly irised. .75

731 Girasol, translucent bluish-white, reddish reflections. 1.00

Common Opal, in part translucent:—

732+ Milk-opal, translucent. .40

733 Resin-opal (Wax-opal), opaque yellowish. .60

734⊙ Green-opal, translucent olive. .75

735⊙ Brick-red, Semiopal, opaque. .75

736 Hydrophane, translucency increases in water, adheres to the tongue, whitish. 1.50

737 Forcherite, orange-yellow. 1.50

738⊙ Cacholong, opaque whitish, adheres to the tongue. 1.00

739⊙ Opal-agate, variegated bands. 1.50

740⊙ Menilite, opaque concretion, dull grayish. .40

741* Jasp-opal, opaque brownish-yellow. .40

742+ Wood-opal, petrified cellular, radial and concentric structure well marked, yellowish-brown. .40

743* Hyalite, clear glassy, botryoidal. .60

744 Hyalite, translucent, whitish. .75

Fiorite, Siliceous Sinter, includes:—

745⊙ Pearl-sinter, stalactitic, pearly white. 1.50

Michaelite, pearly, capillary.

Opal—Continued

Type No. Species No.

746⊙ Geyserite, porous concretions. .75
747 Geyserite, porous cauliflower-like. 1.25
748 Geyserite, massive. .75
749⊙ Float-stone, spongy structure, very light. 1.00
Tripolite includes:—
750+ Infusorial or Diatomaceous Earth (microscopic shells of Diatoms, etc.), fine chalky clay, snow-white. .30
751 ditto, gray. .30
Randannite, loose, mealy, white.
752 Tripoli Slate, laminated, impure. .30
Alumocalcite, very soft, milky.
753 Lussatite. Anhydrous (?) silica. Crystalline, translucent chalcedony-like globular crusts, whitish. 1.50
754 Tabasheer. Opaline silica deposited in joints of bamboo, milk-white. 2.00

II. Oxides of the Semi-Metals; also Mo and W

1. Arsenolite Group. R_2O_3. Isometric

Hardness 1·5 and 2·5

755 **213. Arsenolite.** As_2O_3. Isometric, octahedrons, white. 3.00
minute capillary, crusts.
756 **214. Senarmontite.** Sb_2O_3. Isometric, octahedrons, small, ideal symmetry, grayish. 2.50
757* ditto, complete, loose (12). .75
granular massive.

2. Valentinite Group. R_2O_3. Hardness 2·5

758 **215. Claudetite.** As_2O_3. Monoclinic, very thin tabular || to *b*, small, flexible, pearly white. 6.00
759 **216. Valentinite.** Sb_2O_3. Orthorhombic, minute prisms, stellated druse, gray. 3.00
760⊙ tabular || to *b*, small fan-shaped aggregate. 4.00
761⊙ crystalline stellated, yellow. 2.00
massive granular, white.

762⊙ **217. Bismite.** Bi_2O_3. Orthorhombic (not crystallized in nature), pulverulent, straw-yellow. 2.00
763 disseminated, greenish-yellow. 1.50

3. Tellurite Group

Type No. Species No. RO_2. Orthorhombic. Hardness, 2

764 218. **Tellurite.** TeO_2. Orthorhombic, tufts of slender prisms, yellowish. 6.00
spherical masses, radiated structure.

4. Molybdite Group. Soft

765 219. II. **Molybdite,** Molybdic Ocher. $Fe_2O_3.3MoO_3.\ 7\frac{1}{2}\ H_2O$. Orthorhombic, minute capillary tufts, yellow. 2.00
766* subfibrous disseminated, yellow. 1.00
767 pulverulent, yellowish-white. 1.00
768⊙ Ilsemannite. $MoO_2.4MoO_3$. Crypto-crystalline, blackish, blue on exposure. 2.00
220. **Tungstite.** WO_3. Orthorhombic, earthy, yellow.
769 Meymacite. $WO_3.2H_2O$. Lamellar, yellow. 4.00

———————— Hardness 4—5

221. **Cervantite.** Antimony Ocher. $Sb_2O_3.Sb_2O_5$. Orthorhombic, acicular.
770+ massive, yellowish-white. .40
771⊙ pulverulent, sulphur-yellow, with stibnite. .40
222. **Stibiconite.** $Sb_2O_4.H_2O(?)$. Massive.
Volgerite. $Sb_2O_5.4H_2O(?)$. Amorphous, white.
Rivotite. Sb,Cu oxide and carbonate. Amorphous, green.
Stibianite. $Sb_2O_5.H_2O$. Massive, reddish-yellow.
Stibioferrite. Chiefly Sb_2O_5. Amorphous, yellow.
772⊙ Partzite. Contains Sb_2O_3,Cu_2O,Ag_2O and H_2O. Massive, greenish-black. 2.00
Stetefeldtite. Chiefly Sb_2O_5,Ag,Cu and H_2O. Massive, brownish-black.

III. Oxides of the Metals

A. Anhydrous Oxides

I. Protoxides. R_2O and RO. Hardness 1·5 and 3·5

223. **Water.** H_2O. Exists in three states:—
1. Solid, Ice (hexagonal), massive.
Snow, delicate six-rayed stellate crystals of ideal symmetry and of very great variety and complexity.

Type No. Species No.

Water—Continued

Frost, arborescent and other crystalline to crystallized forms.

Hail, often crystalline, rarely in distinct quartzoids.

2. Liquid, Water.

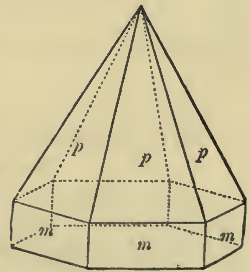
3. Gas, Steam and Aqueous Vapor.

773° 224. **Cuprite**, Ruby Copper. Cu_2O. Isometric, ideal cubes, small, translucent red. 2.50
774* octahedrons, minute, perfect. 2.00
775° dodecahedrons, minute, sharp. 2.00
776 dodecahedron and octahedron modifying cube, symmetrical, small. 3.00
777 highly modified, definite, small. 2.00
778+ Chalcotrichite, capillary (cubes elongated in the direction of octahedral axis), adamantine, ruby-red. .75
779 Tile Ore, earthy, impure. .50
780+ massive, fine granular, dark red. 1.50
781 compact massive. 1.50
782° altering to malachite, ideal dodecahedron, loose. 1.50
783 ditto, hollowed octahedron, loose, definite. 1.50
784 Hydrocuprite. Hydrated cuprite (?). Coating, yellow. .50

Periclase Group. RO. Isometric. Range of Hardness 5.5—6

225. **Periclase.** MgO. Isometric, minute cubes, clear colorless.
785° grains altering to brucite, disseminated in hausmannite, translucent gray. 1.25
786 grains in volcanic limestone, green. 2.00

226. **Manganosite.** MnO. Isometric, minute octahedrons.
787° disseminated cleavages, lustrous dark emerald green, dull black on exposure. 2.00



788. Zincite

227. **Bunsenite.** NiO. Isometric, minute octahedrons.

———————Hardness 4—4.5

788 228. **Zincite.** ZnO. Hexagonal, hemimorphic, minute hexagonal pyramid *p*, with short prism *m* and base *c*, (fig.), well defined, bright red. 9.00

Type No. Species No. Zincite—Continued

789⊙ foliated cleavage, deep red. 1.50
790 crystalline granular, large irregular nodules in calcite cleavage. 1.00
791+ crystalline, disseminated in franklinite, deep red. .75
792⊙ massive with willemite. 1.00
793 finely disseminated, orange-yellow. .75

—————Hardness 2

229. **Massicot**, Plumbic ocher. PbO. Massive, scaly crystalline.
794+ earthy, orpiment-yellow. 2.00
795 II. **Montroydite.** HgO. Orthorhombic, small slender prisms, clear orange-red. 8.00

—————Hardness 3—4

796⊙ 230. **Tenorite.** CuO. Monoclinic, minute very thin long flexible scales, glistening gray, on lava. 2.50
797+ Melaconite, massive compact, shining black. 1.00
798 Melaconite, pulverulent, dull black. 1.00
S. Paramelaconite. Essentially $CuO + Fe_2O_3$. Tetragonal, pyramidal, brilliant black.
Lime. CaO. In lava.
II. Melanochalcite. Chiefly CuO with some SiO_2, CO_2, H_2O. Massive, black.

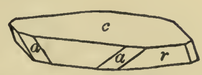
II. Sesquioxides. R_2O_3

Hematite Group. Rhombohedral. Range of Hardness 5—6·5 (Corundum 9)

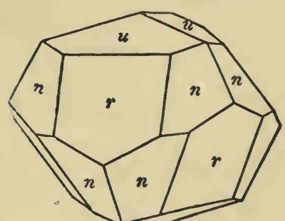
231. **Corundum.** Al_2O_3. Rhombohedral. Transparent varieties are precious.
799+ Sapphire, clear blue, bipyramidal, pyramids *n* and *V*, adamantine, loose (3). 1.00
800⊙ Sapphire, light blue, water-worn. .60
801⊙ Star Sapphire (asteriated), subtranslucent dark blue, water-worn, loose (6). .40
802 ditto, polished crystal. 1.50
803* Oriental Ruby, clear dark red, rolled grains. 1.00
804 Oriental Ruby, subtranslucent light red, prism and two pyramids, in graphitic limestone. 4.00
805 Oriental Ruby, light red, cleavage. 1.25

Corundum—Continued

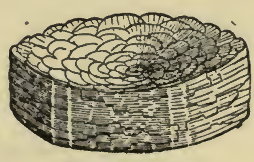
Type No.	Species No.	
806		Oriental Topaz, clear yellow. 2.00
807		Oriental Emerald, clear green. 3.00
808		Oriental Amethyst, clear purple. 3.00
809+		grayish prisms in feldspar. .50
810		ditto, barrel-shaped, very large, stout. 3.00
811⊙		ditto, large, slender, loose (3). .50
812		twins, polysynthetic. 2.50
813⊙		gray, cleavage. .50
814⊙		gray, parting. .75
815		crystalline, coarse granular. 1.00
816⊙		white, cleavage. 1.00
817+		Emery, granular, black. .20
818⊙		altered crystals, rough, loose (12). .50
	232. Hematite.	Fe_2O_3. Rhombohedral.
		1. Specular Iron (splendent black) types are sharp and perfect:—
819		cuboid rhombohedron *r*, modified by rhombohedron *e* and base *c*. 1.50
820		thin tabular (fig.), with rutile. 1.00
821+		thin tabular, small, with smoky quartzoids. .60
822+		curved rhombohedron *u*, rhombohedron *r*, pyramid *n* (fig.). .60
823		short prism *m*, base *c*, modified by rhombohedron *d*, loose. 1.00
824⊙		ditto, minute long prisms. 1.00
825⊙		modified tables, minute, in porous lava. .20
826		drusy on lava, microscopic, indigo-blue. .75
827⊙		Basanomelan, "Eisenrosen," rosette-like group (fig.). 1.50
828		twin, comp. face $\perp$ to base *c*, tabular. 1.50
829⊙		repeated twin, tw.pl. prism *m*. 2.00
830		parting $\parallel$ *r*, twinning striæ on *c*. .75
831⊙		parting $\parallel$ *c*, thick lamellar. .50
832		thin lamellar, bent. .40
833*		micaceous, foliated. .40



820. Hematite



822. Hematite


827. Hematite

Type No. Species No. Hematite—Continued

834 granular massive. .30

835+ compact massive, dark red. .20

836* 2. Compact columnar, Pencil Ore, fine long divergent. .60

837⊙ short fibrous reniform, "Kidney Ore." .60

838⊙ 3. Red Ocher, earthy. .30

839 Reddle (red chalk), clayey. .30

840⊙ 4. Clay Iron-stone, Argillaceous Hematite, impure, brownish. .20

841 Jaspery Clay Iron-stone, reddish. .20

842+ Lenticular Iron Ore, Fossil Ore, oölitic ocherous, red. .20

843⊙ Martite. Fe_2O_3. Isometric. Probably pseudomorph after either pyrite or magnetite, or both. Small sharp, octahedrons, loose (lot). .35

844 octahedrons, minute in chlorite. .35

845 octahedrons, bright, perfect. .75

846 dodecahedrons, symmetrical. 1.25

847+ dodecahedrons and octahedron. .75

Raphisiderite. Fe_2O_3. Orthorhombic(?), minute needles.

233. **Ilmenite**, Titaniferous Iron. Generally $FeTiO_3$. Rhombohedral, tetartohedral, iron-black:—Varieties follow in order of Ti p.c.

Kibdelophane. About 30 p.c. Ti.

848⊙ Crichtonite, about 30 p.c. Ti, small tables. .40

849⊙ Ilmenite, 26—30 p.c. Ti, loose crystal. .75

850* Ilmenite, lamellar massive. .25

851 Menaccanite, about 25 p.c. Ti. Large crystal. 3.00

852+ Menaccanite, granular massive. .25

853 Menaccanite, sand. .40

Hystatite, 15—20 p.c. Ti.

854 Washingtonite, 15—20 p.c. Ti, tabular. .75

Uddevallite, about 10 p.c. Ti.

Kragerö hematite. Less than 3 p.c. Ti.

Magnesian Menaccanite, Picrotitanite $(FeMg)TiO_3$.

S. **Pyrophanite**. $MnTiO_3$. Rhombohedral, scale-like crystals, deep blood-red.

I. **Senaite**. $(Fe,Pb)O.2(Ti,Mn)O_2$. Tri-rhombohedral, black.

855 Iserine. Titanic iron. Isometric or rhombohedral, minute octahedroids in sand. .40

III. Intermediate Oxides

Chemically considered, these species are properly aluminates, ferrates, manganates, etc. and in a strict classification would be placed in section 5 of the Oxygen-Salts.

Spinel Group. $\overset{II}{R}O.\overset{III}{R}_2O_3$. Isometric.

Range of Hardness 6·5—8

Type No. Species No.

234. **Spinel.** $MgO.Al_2O_3$. Isometric, symmetrical crystals:—

856 bluish-gray, rough indistinct cube. 1.50

857+ gray, octahedron. .75

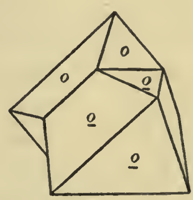
858 Ruby-Spinel, Magnesia Spinel, small octahedrons, clear deep red, brilliant, loose (12). 1.00

859⊙ ditto, hemitrope or "spinel twins," tw.pl. and comp. face octahedron *o* (fig.), loose, (3). 1.00

860+ ditto, clear octahedrons, slightly water-worn (lot). .40

Balas-Ruby, clear rose-red.

861 bluish-gray octahedron. 1.00



859. Spinel

862 Ceylonite, Pleonaste, Iron Magnesia Spinel, octahedron, large, black. 3.00

863⊙ ditto, sharp, minute, on lava. 1.00

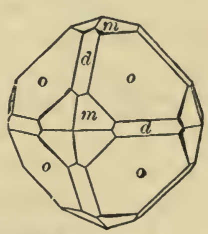
864 ditto, dodecahedron *d* modifying octahedron *o*, sharp splendent. 1.50

865⊙ ditto, trapezohedron *m* modifying octahedron *o* (fig.) large. 3.00

866* ditto, rolled pebbles (lot). .40

867⊙ Chlorospinel, Magnesia-Iron Spinel, grass-green (due to presence of Cu). 2.00

Picotite, Chrome-Spinel, brownish.



865. Spinel

868⊙ 235. **Hercynite.** $FeAl_2O_4$. Isometric, granular, black. .50

236. **Gahnite,** Zinc Spinel. $ZnAl_2O_4$. Isometric.

869 Automolite, octahedron in talcose schist, green. 1.50

870* ditto, sharp, splendent octahedrons with fowlerite. 2.50

871⊙ Dysluite. $(Zn,Fe,Mn)O.(Al,Fe)_2O_3$, octahedron, sharp, bright. 2.00

Kreittonnite. $(Zn,Fe, Mg)O.(Al,Fe)_2O_3$, granular.

Type No. | Species No.

237. Magnetite, Magnetic Iron Ore. $FeO.Fe_2O_3$. Isometric, crystals of ideal symmetry, iron-black:—

872 octahedrons, imperfect, loose (12). .40

873+ octahedrons in chlorite, small but sharp. .40

874⊙ octahedrons with adularia, splendent. 1.25

875⊙ octahedrons curved. .75

876* dodecahedrons, striated deeply (fig.), splendent. 1.00

877 dodecahedrons, dull. .75

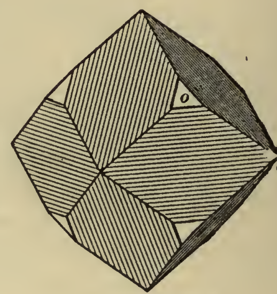
878⊙ trapezohedron *m* modifying octahedron *o*, loose, (3). 1.00

879⊙ twins, tw.pl. *o*, small, perfect. 1.25

880 twins, polysynthetic, splendent. 1.00

881⊙ parting, octahedral. .50

882+ granular massive, coarse. .20



876. Magnetite

883 granular massive, fine. .20

884 sand. .30

885+ Lodestone, with polarity, compact. .50

886 dendritic in muscovite. .20

magnesian. $(Fe,Mg)O.Fe_2O_3$.

nickeliferous, 1·76 p.c. NiO.

titaniferous.

Manganmagnetite, 3·80 to 6·27 p.c. Mn.

887 ocherous, earthy. .40

Nickel Oxide. $NiO.Ni_2O_3$(?). Sand.

888 **238. Magnesioferrite.** $MgO.Fe_2O_3$. Isometric, minute octahedrons in limestone, black. 2.00

889* **239. Franklinite.** $(Fe,Zn,Mn)O.(Fe,Mn)_2O_3$. Isometric, octahedron, well defined, bright. 1.25

890 octahedron, rounded, iron-black. .75

891⊙ octahedron *o* modified by dodecahedron *d*, distinct. 2.00

892 trapezohedron *m*, dodecahedron *d* modifying octahedron *o*, bright. 3.00

893+ disseminated grains with zincite in willemite. .40

894 massive granular, coarse. .40

895⊙ massive compact, iron-black. .40

896⊙ **240. Jacobsite.** $(Mn,Mg)O.(Fe,Mn)_2O_3$. Isometric, minute octahedrons, sharp and bright. 1.50

897 fine granular, deep black. 1.00

Type No. Species No.

898°241. **Chromite**, Chromic Iron. $FeO.Cr_2O_3$. Isometric, minute octahedrons, loose sand. .50

899+ massive granular, iron-black. .20

900 massive compact. .20

Mitchellite, $2MgAl_2O_4.MgCr_2O_4.FeCr_2O_4$.

Chrompicotite and Magnochromite are Mg chromites.

Plumboferrite. $2FeO.Fe_2O_3.PbO.Fe_2O_3$(?).

——————Hardness 8·5

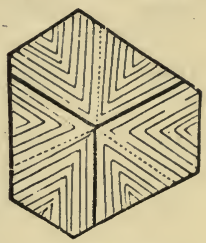
901 242. **Chrysoberyl.** $BeO.Al_2O_3$. Orthorhombic, prismatic, clear pale green, precious, loose. 3.00

902° ditto, water-worn (lot). 1.00

903 tabular, pale green, well-defined. 2.00

904+ repeated twin, pseudo-hexagonal (fig.), sharp. 1.00

905° Alexandrite, repeated twin, re-entrant angles (fig.), subtransparent emerald-green, columbine-red by artificial light. 2.50



904. Chrysoberyl

906 Cat's-Eye, chatoyant, greenish, cut. 5.00

——————Range of Hardness 4·5—6 (Minium 2—3)

907°243. **Hausmannite.** $MnO.Mn_2O_3$. Tetragonal, octahedroids, sharp, bright. 2.00

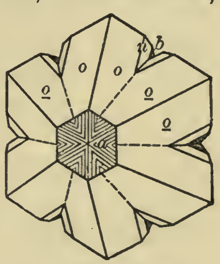
908 repeated twin (fiveling). 3.00

909+ massive granular, brownish-black. .75

II. Coronadite. $MnO_2.PbO.Mn_3O_4$. Massive, black.

910°244. **Minium.** $2PbO.PbO_2$. Earthy, red. 4.00

245. **Crednerite.** $3CuO.2Mn_2O_3$. Monoclinic, foliated, black.



905. Chrysoberyl

911°246. **Pseudobrookite.** $2Fe_2O_3.3TiO_2$(?). Orthorhombic, minute tables, sharp, adamantine, blackish. 2.00

912*247. **Braunite.** $3Mn_2O_3.MnSiO_3$. Tetragonal, octahedrons, bright, sharp. 1.50

913° massive, blackish. 1.00

914 I. **Bixbyite.** $FeO.MnO_2$. Isometric, cube *a* with trapezohedron *n*, black. 2.00

IV. Dioxides. RO_2.

Rutile Group. Tetragonal.

Hardness 6—6.5 (Plattnerite 5—5·5)

Type No. Species No.

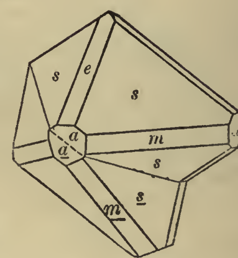
915⊙248. **Cassiterite**, Tin Stone. $Sn O_2$. Tetragonal, prism and pyramid, symmetrical, splendent brown. 1.50

916⊙ acicular, "needle ore," modified. 2.00

917⊙ twin, contact, tw.pl. diametral pyramid *e*, adamantine, sharp. 2.50

918⊙ ditto, penetration, bright black, loose. .75

919* repeated twin, well defined (fig.) 1.50



919. Cassiterite

920 reniform with fibrous structure. 2.00

921+ massive, fine granular, grayish. 1.00

922 massive, coarse granular, brownish. 1.25

923 massive, compact, yellowish. 1.50

924 disseminated finely in gray quartz. .30

925+ disseminated coarsely in greisen, brown. .30

926⊙ Wood Tin, concentric, radiated. 1.50

927+ Stream Tin, much rounded, fine sand. .50

928 Stream Tin, coarse angular grains. .50

929⊙ Stream Tin, rounded boulder. 1.00

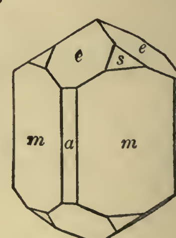
930 Stream Tin, ferruginously cemented (a variegated conglomerate). 1.50

931 Ainalite. A cassiterite containing 8·78 p.c. Ta_2O_5. Pyramidal, adamantine, blackish. 4.00

932 249. **Polianite.** MnO_2. Tetragonal, minute prisms *m* and *h*, pyramids *s* and *e*, composite parallel groupings. 2.00

933+ crystalline, radio-fibrous, iron-gray. 1.00

934+250. **Rutile.** TiO_2. Tetragonal, unit and diametral prisms *m* and *a*, diametral pyramid *e* (fig.), sharp and symmetrical, metallic-adamantine, red, loose. .50



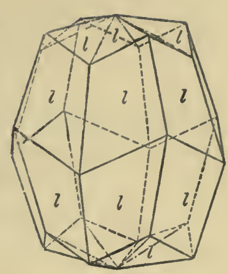
934. Rutile

935 ditto, with additional ditetragonal prism *l* and unit pyramid *s*. .50

936⊙ pseudo-rhombic modified, highly splendent, sharp. 2.00

Rutile—Continued

Type No.	Species No.	
937°		acicular, sharp, translucent red, loose (6). 1.00
938°		twin, tw.pl. diametral pyramid *e*, geniculated, perfect, loose. .75
939		twin, modified, splendent. 2.00
940*		repeated twin, tw.pl. *e*, deeply striated, brownish-red, loose. .75
941		twin reticulated. 1.25
		twinning lamellæ ‖ *e*.
942		capillary. .75
		capillary (enclosure), "Flêches d'amour." See quartz.
943		water-worn crystals, brownish, loose (lot). .50
944		pebbles reddish-black, grayish exterior (lot). .50
945°		cleavage, dark red. 1.00
946		disseminated, garnet-red. .50
947°		ferriferous, twin, tw.pl. *e*, eightling (similar to fig.), black, loose. .50
948+		ferriferous, crystallized aggregate. .50
		ferriferous, Ilmenorutile, black.
		chromiferous, grass-green.



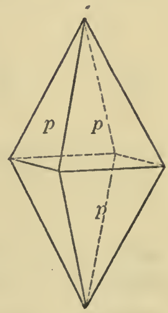
947. Rutile

Iserite. $FeTi_2O_5$. Brown grains.

II. Davidite. TiO_2 with Fe,U,V,Cr, and rare earths. Cuboids, black.

251. Plattnerite. PbO_2. Tetragonal, prisms, iron-black.

949 massive. 7.00

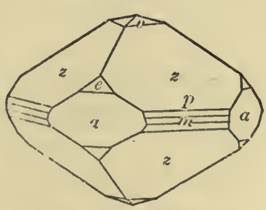


950. Octahedrite

Hardness 5·5—6

252. Octahedrite, Anatase. TiO_2. Tetragonal, small adamantine crystals of ideal symmetry:—

950+	acute octahedroid habit, unit pyramid *p*, (fig.), black. 1.50
951	ditto, yellowish-brown. 2.00
952	diametral prism *a*, unit pyramid *π*. 2.00
953°	diametral prism *a*, highly modified termination, translucent yellowish brown. 1.25
954	tabular, ‖ to base *c*, with unit pyramid *p* and diametral prism *a*, symmetrical, dull black, loose. .75



955. Octahedrite

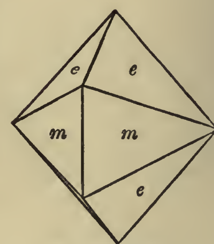
Type No. Species No. Octahedrite—Continued

955⊙ obtuse pyramid *z* and diametral prism *a*, modified by unit prism *m*, pyramids *p*, *v* and diametral pyramid *e* (fig.), transparent brown. 2.00

956 **253. Brookite.** TiO_2. Orthorhombic, small tabular with quartz and chalcopyrite. 4.00

957+ very thin tabular, highly modified, perfect, transparent hair-brown. 1.50

958+ Arkansite, unit prism *m*, and pyramid *e* truncated by pyramid *z*, small, sharp, symmetrical, splendent black (similar to fig.). .75



958. Brookite

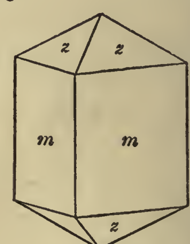
959 Arkansite, ditto, with brachydome *t*. 1.25

960* Arkansite, paramorphosed to rutile, unit prism *m*, unit pyramid *z* (fig.), symmetrical, dull black, loose. .50

961 ditto, *m* with pyramid *e*. .50

Hardness 2—2·5

962 **254. Pyrolusite.** MnO_2. Orthorhombic, pseudomorphous (?), small distinct prisms, bright iron-black. 1.00



960. Brookite

963 acicular. 1.00

964* thick tabular, small, perfect. 1.25

965⊙ columnar crystalline, bright. 1.00

966⊙ radio-fibrous crystalline. .50

967+ fine granular crystalline. .20

968 granular massive, dull. .20

969 reniform coating. .50

I. Baddeleyite, Brazilite. ZrO_2. Monoclinic, twins, tabular || *a*.

970⊙ reniform, concentric, greenish-gray. 4.00

B. Hydrous Oxides

Hardness of Turgite 5—6

971⊙**255. Turgite.** $2Fe_2O_3.H_2O$. Compact fibrous. .50

972 massive botryoidal, reddish-black. .50

973* earthy, red. .20

Diaspore Group. $R_2O_3.H_2O$.

Hardness 7, 5 and 4

Type No. Species No.

974+256. **Diaspore.** $Al_2O_3.H_2O$. Orthorhombic, rounded prisms flattened || *b*, brilliant clear violet, on emery. 2.00

975 ditto, acicular, grayish-white. 1.50

976 stout prisms, whitish, with margarite. 3.00

977⊙ foliated columnar, reddish-gray. 1.50

978⊙257. **Göthite.** $Fe_2O_3.H_2O$. Orthorhombic, very thin small tables, Rubinglimmer, red. 1.00

979 long thin tabular, blackish-brown. 1.25

980⊙ acicular, in radial aggregates. 1.00

981* Sammetblende, velvety globular crusts of minute radiating capillary crystals, yellowish-brown. 1.25

Onegite, acicular (enclosures). See quartz.

982 columnar, dark brown. 1.00

983+ fibrous, concentric radiated, reniform. 1.00

984 scaly-fibrous, Lepidocrocite. 2.00

compact massive, conchoidal fracture.

disseminated microscopic crystals afford some varieties of aventurine (feldspars etc.).

985⊙258. **Manganite.** $Mn_2O_3.H_2O$. Orthorhombic, small flat prisms terminated by base *c*, distinct, bright, iron-black. 1.50

986 long prisms terminated by rough zone of macropyramids *ρ,s,p* etc., large, splendent. 3.00

987 acicular prisms. 1.50

988+ fibro-columnar, radiated. 1.00

——————————Hardness 5—5·5

989⊙259. **Limonite**, Brown Iron Ore. $2Fe_2O_3.3H_2O$. Massive, compactly radio-fibrous, stalactitic, brownish. .40

990 stalactite, concentric structure. .40

991 compact, botryoidal. .50

992+ compact, subfibrous structure, mammillary, shining black surface. .30

993* compact, globular crust, iridescent bronze. .50

994 compact, globular crust, iridescent variegated. 1.00

995 ocherous, brown. .20

996+ ocherous, yellow. .20

997⊙ Bog Ore, porous, coherent. .20

Type No. Species No. — Limonite—Continued

998 Bog Ore, porous, loose, plant remains. .50
999+ Brown clay-ironstone, compact. .20
1000 ditto, concretionary. .40
1001⊙ ditto, "pipe ore," hollow tube. .50
1002 ditto, pisolitic. .40
1003⊙ ditto, oölitic. .30

II. Esmeraldaite. Hyd. Fe_2O_3. Massive, black.

——————Hardness 2·5 and Soft

1004⊙260. **Xanthosiderite.** $Fe_2O_3.2H_2O$. Long divergent fibro-columnar, concentric, brown. .75
1005+261. **Bauxite.** $Al_2O_3.2H_2O$. Oölitic, yellowish. .20
1006⊙ pisolitic, red. .20
1007 clay-like, Wocheinite, grayish. .35

Brucite Group. R(OH)$_2$.

Rhombohedral. Hardness 2.5

1008 262. **Brucite.** $MgO.H_2O$. Rhombohedral, broad tabular || base *c* with rhombohedron *r* and pyramid *p*, greenish-gray. 2.50
1009⊙ ditto, rosette-like aggregate. 1.50
1010+ broad cleavage, pearly white. 1.00
1011 foliated, in serpentine. 1.00
1012⊙ Nemalite, 4 to 5 p.c. FeO, fibrous. 1.25
1013 Manganbrucite, contains much Mn. 1.50

Eisenbrucite. An altered brucite.

1014 263. **Pyrochroite.** $MnO.H_2O$. Rhombohedral, rounded hexagons, white becoming bronze and finally black. 2.50
1015⊙ foliated crystalline. 1.50

——————Hardness 2·5—3·5 and Soft

1016 264. **Gibbsite.** $Al_2O_3.3H_2O$. Monoclinic, hexagonal aspect, (Hydrargillite) minute, pearly greenish. 2.00
1017+ drusy, minutely radio-lamellar incrustation. .40
1018⊙ stalactitic, smooth. .40

Richmondite. A hydrate containing 37 p.c. P_2O_5.
Zirlite. Al hydrate. Amorphous.

1019•265. **Sassolite.** $B_2O_3.3H_2O$. Triclinic, minute scales, pearly white, loose (lot). .75

Type No. Species No.

——————————Soft

1020 266. **Hydrotalcite.** $Al_2O_3.6MgO.15H_2O$(?). Hexagonal, translucent pearly white. .75

1021⊙ Houghite (altered from spinel). .50

1022⊙267. **Pyroaurite.** $Fe_2O_3.6MgO.15H_2O$(?). Hexagonal, minute six-sided tables, pearly pale yellow. 2.00

——————————Hardness 2·5 and 5·6

1023 268. **Chalcophanite.** $(MnZn)O.2MnO_2.2H_2O$. Rhombohedral, druses of minute tables, bluish-black. 2.50

1024⊙ small botryoidal, subfibrous. .75

1025+269. **Psilomelane.** H_4MnO_5(?). Massive, bluish-black. .20

1026 botryoidal, dull iron-black. .75

1027⊙ reniform, rough. .40

1028 stalactitic, smooth. 1.00

1029 Lithiophorite. 10—15 p.c. Al_2O_3, 1·2—1·4 p.c. Li_2O, 12·6—15·4 p.c. H_2O. Botryoidal, bluish-black. 1.00

1030+ Wad. (A) Bog Manganese. Impure hydrated Mn oxide, loose earthy, black. .20

1031⊙ ditto, dendritic on rhyolite. .40

1032 (B) Asbolite, Earthy Cobalt. Black. .50

1033⊙ (C) Lampadite, Cupreous Manganese. 4 to 18 p.c. CuO. Earthy, black. .50

Varvicite. An altered manganite.

1034 II. **Brostenite.** Manganite of Mn and Fe^{II}. Massive, black. 2.50

Appendix to Oxides

Delafossite. CuO 47·45, Fe_2O_3 47·99, Al_2O_3 3·52.
Heterogenite. Essentially $CoO.2Co_2O_3+6H_2O$.
Heubachite. $3(Co,Ni,Fe)_2O_3+4H_2O$(?). Massive.
Namaqualite. Nearly $Al(OH)_3$. $2Cu(OH)_2$. $2H_2O$.
Rabdionite. Near asbolite. Earthy, black.
Transvaalite. Co_2O_3 65·80, As_2O_5 5·79, H_2O etc.

VI. Oxygen-Salts

1. Carbonates

A. Anhydrous Carbonates

1. Calcite Group. RCO_3. Rhombohedral.

Hardness 3·5—4 (Calcite 3, Smithsonite 5).

Type No. Species No.

270. Calcite, Calc Spar. $CaCO_3$. Rhombohedral.

A. VARIETIES BASED ON CRYSTALLIZATION AND IMPURITIES:—

1. ORDINARY

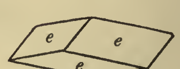
(a). Symmetrical well defined crystals, transparent to translucent, usually glassy colorless to white. Very great multiplicity of forms including highly complex combinations. Only the commoner are here described:—

1035 simple rhombohedron *r* (fig.). 1.50

1035. Calcite

1036+ ditto, modified by scalenohedron *v*. 1.00

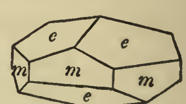
1037⊙ flat rhombohedron *e*, in quartz geode (fig.). .50



1037. Calcite

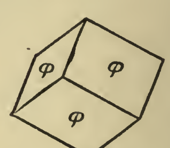
1038 ditto, parallel grouping, large. .50

1039⊙ ditto, with short prism *m*, "nail-head spar" (fig.). .50



1039. Calcite

1040⊙ cuboid rhombohedron *φ* (fig.). .50



1040. Calcite

1041 acute rhombohedron *M*. 1.00

1042⊙ ditto, with base *c*. 1.50

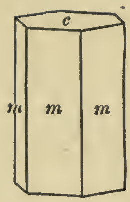
1043 positive and negative rhombohedrons. 1.25

1044* Papierspath, very thin hexagonal tables, rounded rhombohedrons prominent, flower-like aggregate, glistening icy aspect. .75

1045⊙ prism *m* and base *c* (fig.), ideal symmetry. 1.00

Calcite—Continued

Type No. Species No.



1045. Calcite

1046⊙ ditto, with diagonal prism *a*. 1.25

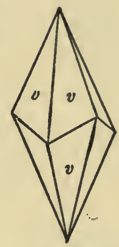
1047 prism *m*, acute rhombohedron *ρ* flat rhombohedron *e* and base *c*. 2.00

1048 tabular || base *c*, prism *m*, modified. 1.00

1049+ Dog-tooth Spar, scalenohedron *v* (fig.), ideal symmetry. 1.00

1050 scalenohedron *v* and base *c*. 1.50

1051+ scalenohedron *v*, terminated by rhombohedron *r* (fig.) amber-yellow, very large, loose. .50



1049. Calcite

1052 ditto, white with "phantom." .50

1053+ scalenohedron *v*, rhombohedron *r* and prism *m* (fig.), large. .75

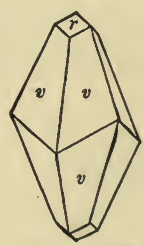
1054⊙ two scalenohedrons *B* and *v* with rhombohedrons *s* and *e*, ferruginous brick-red "phantom." .75

1055 scalenohedron *v* built up of small rhombohedrons, large. .75

1056 acute scalenohedron *y*, spire-shaped. 1.00

1057⊙ three scalenohedrons *v*, *y* and *M* with rhombohedron *r* (fig.). 1.00

1058⊙ complex highly modified crystal. 1.25



1051. Calcite

1059 twin, tw.pl. base *c*, the two rhombic individuals having the same vertical axis. 2.50

1060⊙ twin, ditto, but scalenohedral (fig.), large. 1.25

1061* twin, tw. pl. rhombohedron *e*, the scalenohedral individuals having vertical axes inclined 127° 29½′ and 52° 30½′ (fig.), large, loose. .75

1062 twin, tw.pl. *r*, individuals with vertical axes inclined at 90° 46′ and 89° 14′, "butterfly twin" (fig.), large, loose. 2.50

1053. Calcite

(b) cleavages, rhombohedral:—

1063⊙ Iceland Spar, doubly refracting, clear. 2.00

1064+ ditto, pale amber. 1.00

1065⊙ salmon-red cleavage. .30

1066 sky-blue cleavage. .50

1067 twin cleavage, tw.pl. *e*. .50

1068⊙ asteriated cleavage. .50

Type No.	Species No.	Calcite—Continued

"Star Calcite" or "Idiocyclophanous Calcite" is another term applied to this asteriated variety which, when held close to the eye, and viewing a light through it, shows the flame with six images circled about it. The phenomenon is due to minute hollow channels within (hohle canäle of Rose), which are connected with twinning lamellæ indicated by surface striæ.

1069 (c) drusy botryoidal, milky. .30

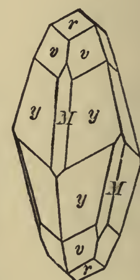
(d) Brunnerite, bluish, chalcedony-like.

(e) Reichite, $r\ \dot{r}$ 74° 40′, Gr. 2·67 (?).

1070* (f) Fontainebleau Limestone, 50—63 p.c. quartz sand, acute rhombohedron f (fig.), ideal symmetry, gray, loose. .50

1071 ditto, nodular aggregate. 1.50

1072⊙ ditto, acute hexagonal pyramid of second order γ, symmetrical and definite, but ends rounded, very large, loose. 1.00



1057. Calcite

1073 ditto, aggregate with quartz pebbles, very large. 1.00

(g) Hislopite, impure, grass-green.

II. Fibrous and Lamellar Kinds, white

1074⊙ Satin Spar, silky, finely fibrous. 1.00

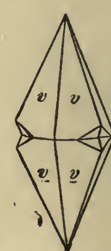
1075⊙ Argentine, curved lamellar, pearly. .40

1076 Aphrite, scaly foliated, pearly. .40

III. Granular Massive to Cryptocrystalline Kinds

1. Granular limestone. (Saccharoidal):—

1077 Statuary marble, Carrara, fine grained, white. .20



1060. Calcite

Architectural marbles follow:—

1078+ coarse grained, white. .20

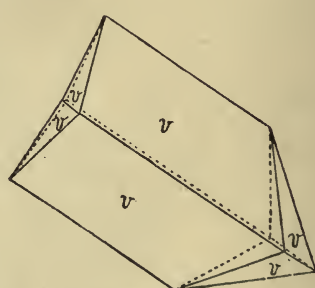
1079 Cipolin, white with greenish shadings. .75

1080 Giallo antico, yellowish with whitish spots. .75

1081⊙ Siena, light yellow, with reddish veins. .30

1082 Mandelato, light red with whitish spots. .75

1083 Bardiglio gray, clouded. .30



1061. Calcite

1084 Turquois-blue, veined with white. .40

1085⊙ Verd-Antique, clouded greenish, due to presence of serpentine. .30

Type No. Species No.

2. Hard compact limestone (marbles):—

1086 black. .30

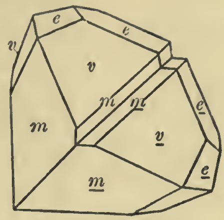
yellow.

red.

1087 fetid, black, Anthraconite, Stink-stone .40

1088⊙ Portor (Egyptian), black, veined yellow. .30

Panno-di-Morte, black with white shells.



1062. Calcite

Marble of Languedoc, red with white fossils.

Griotte, brown spotted red and white.

Sarencolin, deep red, gray and yellow.

1089 Bird's-eye, gray with whitish points. .30

1090 Shell-marble, fossiliferous. .30

1091⊙ Madreporic marble, coralline, polished. .75

1092+ Tennessee, encrinal, mottled reddish. .20

1093 Lumachelle, "fire marble," chatoyant. 1.00

1094⊙ Ruin Marble, brownish, polished. 1.00

1095⊙ Landscape Marble, gray, polished. 1.25

1096⊙ Breccia Marble, cemented fragments. .30

1097* Lithographic stone, smooth even-grained. .20

1098 Pudding-stone marble, cemented rounded pebbles. .30

1099+ Hydraulic Limestone, or "Cement Rock," contains Mg, Al and Si as impurities. .20

3. Soft compact limestone:—

1100+ Chalk, white. .20

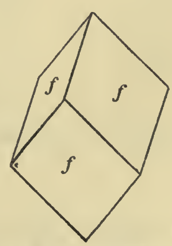
1101 Calcareous marl, loose, earthy impure. .20

4. Concretionary massive:—

1102* Oölite, minutely rounded granular. .20

Pisolite, see ktypeite.

5. Deposited by calcareous waters or in caverns:—



1070. Calcite

1103+ Stalactite, from roof of cavern, buff. .40

1104 Stalactite, translucent, white. .60

Stalactite, translucent, sea-green.

1105⊙ Stalagmite, from floor of cavern. .40

1106+ Mexican Onyx, irregularly banded, translucent white, pale green, etc., polished. .60

Type No. Species No.

Calcite—Continued

1107 Clouded Onyx, translucent, variegated. .60
1108 Brecciated Onyx, variegated, polished. 1.00
1109* Travertine, very coarse, irregularly and indistinctly banded, yellowish. .60
1110+ Calc Tufa, moss-like porous structure. .20
1111 Calc Tufa, perfect leaves, porous mass. .60
1112 Agaric mineral, Rock-milk, soft, crumbling. .40
1113° Rock-meal, cotton-like, loose. .40

B. VARIETIES BASED UPON COMPOSITION:—

1114 Dolomitic calcite, contains $MgCO_3$. .20
Baricalcite, contains some $BaCO_3$, rhombohedrons, grayish-white.
1115 Strontianocalcite, contains $SrCO_3$, minute acute rhombohedrons. 2.00
1116° ditto, opaque globular aggregates. 2.00
1117* Ferrocalcite, contains $FeCO_3$, acicular, brown. .50
1118 Ferrocalcite, globular, concentric structure. .50
Manganocalcite, see Agnolite.
Zincocalcite, containing $ZnCO_3$.
1119° Plumbocalcite, contains $PbCO_3$, rhombs. 1.25
1120° altered to dolomite. 1.00
1121 altered to siderite. 1.00
1122 altered to calamine. 1.25
1123° altered to smithsonite. .75
1124 altered to quartz crystals. 1.00
1125+ altered to chalcedony. 1.00
1126 altered to hyalite. 2.00
altered to copper.
1127° Thinolite. Pseudomorphous. $CaCO_3$. Acute tetragonal (?) pyramids, skeleton structure, forming tuffaceous aggregate, grayish. 1.00
1128° I. Ktypeite (formerly called Pisolite). $CaCO_3$. Specific gravity and optical properties differ from calcite and aragonite. Mass of cemented pea-like concretions, yellowish-white. .50

271. Dolomite. $CaCO_3.MgCO_3$. Rhombohedral, tetartohedral, well defined rhombohedrons:—

1. Structural Varieties:—

1129° rhombohedron *r*, ideal symmetry, transparent, vitreous. 2.50

Type No. Species No.

1130⊙ acute rhombohedron *m* with obtuse rhombohedron *r*, symmetrical, dull black, loose. .30

1131 twin symmetrical. 2.00

1132⊙ Pearl spar, rhombic, white. 1.00

1133+ ditto, saddle-shaped (fig.), cream. .30

1133. Dolomite

1134 ditto, in selenite. 1.00

1135 columnar crystalline. .50

1136⊙ globular drusy. .75

Miemite, pale asparagus-green.

1137 granular, fine, gray. .20

1138 granular, fine white marble. .20

1139+ granular, coarse, white. .20

1140* compact, buff. .20

Compact porcellanous, Gurhofite, conchoidal, sub-translucent, snow-white.

2. Varieties depending on Composition:—

Normal Dolomite. Ca:Mg=1:1. See crystals.

1141⊙ ferriferous, contains $FeCO_3$, massive. .30

manganiferous, contains $MnCO_3$.

cobaltiferous, reddish.

zinciferous.

1142 altered to steatite. 1.25

1143 271A. Ankerite. $CaCO_3.(Mg,Fe,Mn)CO_3$. Rhombohedral, rhombohedrons, pearly brown. 1.00

1144* ditto, yellowish. .75

1145⊙ crystalline granular. .30

1146 compact massive. .30

1147⊙ 272. **Magnesite.** $MgCO_3$. Rhombohedral, rough prism. 1.00

1148 Lamellar cleavable. .50

1149⊙ Fine granular. .30

1150+ Compact, like unglazed porcelain, snow-white. .20

1151 earthy. .40

1152⊙ Pinolite, cleavage. .30

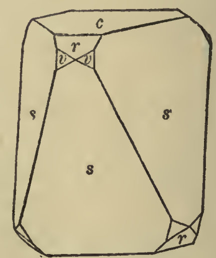
1153 ferriferous, Breunnerite, 5 to 10 p.c. FeO, distinct rhombohedrons. 1.00

1154 272A. Mesitite. $2MgCO_3.FeCO_3$. Rhombohedral, perfect rhombohedrons, transparent. 2.50

1155⊙ Pistomesite. $MgCO_3.FeCO_3$, granular. .50

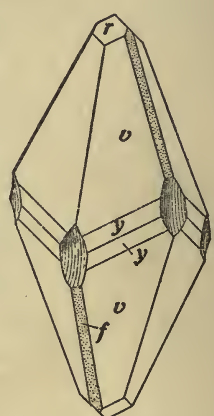
Type No. | Species No.

273. Siderite, Chalybite, Spathic Iron. $FeCO_3$. Rhombohedral.
1. Ordinary Varieties:—
(a) Crystallized, brown:—
1156+ obtuse rhombohedron *r*, perfect. .50
1157 acute rhombohedron *d*, perfect. .75
1158* ditto, with base *c*. 1.00
1159 ditto, curved and built of sub-individuals. .75
1160⊙ octahedroid, *s* $(05\bar{5}1)$ with *c* (similar to fig.), perfect, small. .75
1161 base *c* hexagonally banded, with rhombohedrons and prism. 3.00



1160. Siderite

1162⊙ II. new scalenohedron *y*, scalenohedron *v*, rhombohedrons *f* and *r* (fig.), minute, sharply defined, splendently iridescent. 1.00
1163 twin, tw.pl. *e*. 1.25
1164⊙ curved saddle-shaped crystals on fluor. .75
1165+ cleavage, rhombic. .20
1166⊙ (b) concretionary, Sphærosiderite, concentric globular, subfibrous, brown. .30
1167 granular crystalline, brown. .20
1168 compact massive. .20
oölitic.
1169⊙ earthy, clay iron-stone, impure. .20



1162. Siderite

2. Manganiferous, Oligonite.
1170 3. Magnesian, Sideroplesite. .60
4. Calciferous, Siderodot, green.
1171 altered to limonite. .50
II. Manganspherite, contains Mn.
Thomäite. $FeCO_3$. Orthorhombic (?).
1172*274. Rhodochrosite, Dialogite. $MnCO_3$. Rhombohedral, rhombohedron *r*, opaque pale pink. 1.50
1173 ditto, translucent rich pink. 4.00.
1174⊙ curved rhombs with fluor. 1.50
1175⊙ drusy crust, small columnar structure, fawn-color. .75
1176 fine granular, coated with glistening drusy quartz, delicate pink. 1.25

Rhodochrosite—Continued

Type No. Species No.

1177+ coarse cleavable granular, crystalline. .75

1178⊙ rhombohedral cleavage, translucent rich pink. 1.50

1179 globules scattered on milky quartz. 1.00

ferriferous.

1180 calciferous, Manganocalcite. 1.50

zinciferous.

1181*275. **Smithsonite.** $ZnCO_3$. Rhombohedral, minute rhombohedrons *r*, symmetrical, bright, brown. 1.00

1182⊙ cylindrical aggregates, small, pearly. 1.50

1183 crystalline incrustation, velvety. .75

1184+ botryoidal, compact, pearly gray. .40

1185⊙ reniform, compact, pearly sea-green. 1.00

1186 mammillary, compact, translucent pale blue. 1.50

1187 granular massive. .40

1188 compact massive. .40

1189⊙ earthy, impure, "dry-bone," grayish. .40

ferriferous, over 20 p.c. $FeCO_3$.

manganiferous, over 5 p.c. $MnCO_3$.

1190⊙ cupriferous, Herrerite, minute acute rhombohedrons, apple-green. 1.50

1191 cadmiferous, "turkey-fat ore," yellow. 1.50

1192 276. **Sphærocobaltite.** $CoCO_3$. Rhombohedral, minute spherical masses, rose-red. 4.00

2. Aragonite Group. RCO_3. Orthorhombic.

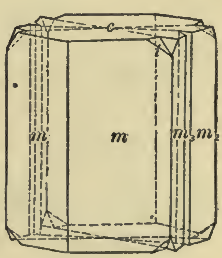
Range of Hardness 3·5—4

277. **Aragonite.** $CaCO_3$. Orthorhombic, sharply symmetrical crystals:—

prismatic.

1193⊙ contact-twins, tw.pl. *m*, the individuals showing unit prism *m*, brachypinacoid *b*, brachydome *k* and pyramids, transparent yellow. .30

1194+ repeated twins, tw.pl. prism *m*, prismatic, pseudohexagonal (fig.), brown, loose. .50



1194. Aragonite

1195 ditto, twinning striæ on base deeply marked, aggregate, brownish-red. 2.50

Type No. Species No. — Aragonite—Continued

1196⊙ ditto, individuals separated by re-entrant prismatic angles, forming on the base a serrated hexagonal outline, aggregate, brilliant, clear colorless. 1.50

1197 ditto, tabular, white, on lava. .50

1198⊙ contact-twin, pseudohexagonal spire-shaped, subtransparent gray loose (3). .50

1199* acicular, radiating groups, white. .75

1200* columnar, divergent. .20

1201 fibrous silky, light blue. .75

1202⊙ massive compact. .20
scaly massive, snow-white.

1203⊙ stalactitic, Sprudelstein, fibrous. .50

1204+ Flos-ferri, coralloidal, slender interlacing and twisted stems, snow-white. 1.00

1205 Flos-ferri, branching botryoidal. 1.00

1206 Tarnowitzite, contains $PbCO_3$. 1.50

1207 Mossottite, nearly 7 p.c. $SrCO_3$ and trace of Cu, columnar radiated. 1.50

1208⊙ altered to calcite, large symmetrical pseudohexagonal tables, loose (3). .50

1209 altered to drusy calcite, cellular structure outlining twinned character of the original hexagon. 1.00

II. Zeyringite, colored greenish-blue by Ni.

1210⊙278. **Bromlite**, Alstonite. $BaCO_3.CaCO_3$. Orthorhombic, complex twins forming sharp dihexahedral pyramids, translucent whitish. 2.00

1211⊙279. **Witherite**. $BaCO_3$. Orthorhombic, repeated twins, tw.pl. prism *m*, symmetrical pseudohexagonal pyramids, acute. 2.00

1212 ditto, very obtuse, grayish. 2.00
tuberose.

1213+ granular crystalline, whitish. .20

1214⊙280. **Strontianite**. $SrCO_3$. Orthorhombic, contact-twins, tw. pl. prism *m*, acute pyramids and brachydomes forming very acute well defined pseudohexagonal pyramids, translucent. .75

1215 contact-twins, tw.pl. prism *m*, individuals marked by serrated pseudohexagonal basal outline, translucent flesh-red. 2.00

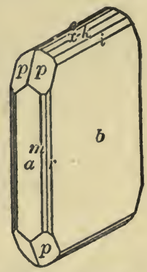
1216+ columnar crystalline, yellowish-white. .20

1217 Calciostrontianite. $CaCO_3$ 13·14 p.c. .75

Type No. | Species No.

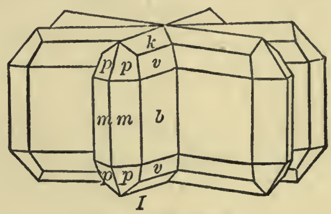
281. **Cerussite.** $PbCO_3$. Orthorhombic, crystals well defined, translucent, adamantine:—

1218⊙ thin tabular || *b*, modified (fig.), clear. .75



1218. Cerussite

1219 prismatic, white. 1.00
1220⊙ pyramidal, gray. 1.00
1221 penetration-twins, tw.pl. prism *m*. 1.50
1222* contact-twins, tw.pl. *m*. .75
1223 repeated twins, six-rayed stellate (fig.). 2.00
1224⊙ repeated twins, pyramidal (fig.). 1.50
1225⊙ reticulated twinned aggregate. 2.00
1226+ aggregate of interlacing slender prisms, twinned, satiny white. 1.25
1227 aggregate of long fluted columns, stellate twins. 2.00
1228 aggregate, sheaf-like. .75
1229+ fine granular, brownish. .50
1230 loose granular, blackish. .75
1231⊙ compact, gray. .50
1232 fibrous, satiny. 2.00



1223. Cerussite

3. Barytocalcite Group. Monoclinic. Hardness 4

1233*282. **Barytocalcite.** $BaCO_3.CaCO_3$. Monoclinic, prismatic by extension of pyramids. 1.50
1234 massive. 1.00

——————————Hardness 3—3·5

283. **Bismutosphärite.** $Bi_2(CO_3)_3.2Bi_2O_3$. Spherical, concentric radio-fibrous.

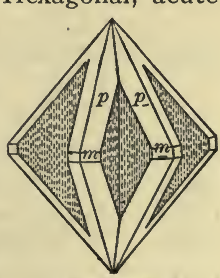
4. Parisite Group. Hexagonal. Hardness 4·5

284. I. **Parisite.** $[(Ce,La,Di)F]_2Ca(CO_3)_2$. Hexagonal, acute double hexagonal pyramids *o*, and base *c*, brownish-yellow.

1235 pyramid *r*, with *o*, *s* and *a*, sharp. 6.00

1236 II. **Cordylite.** $(BaF)(CeF)Ce(CO_3)_3$. Hexagonal, minute prisms, yellowish. 5.00

Kischtimite. Ce metals fluocarbonate. Massive, dark brownish-yellow.



1224. Cerussite

Type No. Species No.

II. Synchisite. $CeFCa(CO_3)_2$. Rhombohedral, rhombic habit, wax-yellow.

1237◎285. **Bastnäsite.** $(Ce,La,Di)_2C_3O_9(Ce,La,Di)F_3$. Massive, brown. 4.00

Weibyeïte. Ce metals fluocarbonate. Orthorhombic, minute pyramids.

II. Ancylite. $4Ce(OH)CO_3.3SrCO_3.3H_2O$. Orthorhombic, small pyramids, curved faces, orange-yellow.

5. Phosgenite Group. Chlorocarbonates. Hardness 3

1238+286. **Phosgenite.** $PbCO_3.PbCl_2$. Tetragonal, prismatic, adamantine, translucent, perfect. 1.25

1239 tabular || *c*, transparent, sharp. 2.00

1240◎ minute highly modified prisms with laurionite, in ancient slag, limpid, sharp. .75

1241 cleavage, transparent. .75

1242◎ crystalline mass. 1.25

1243◎ I. **Northupite.** $MgCO_3.Na_2CO_3.NaCl$. Isometric, ideal octahedron *o*, gray. .75

1244 ditto, translucent pale-yellow. 1.00

II. **Tychite.** $2MgCO_3.2Na_2CO_3.Na_2SO_4$. Isometric, octahedron, colorless.

B. Acid, Basic and Hydrous Carbonates

Hardness 1·5

287. **Teschemacherite.** $(NH_4)_2CO_3.H_2CO_3$. Orthorhombic.

——————Hardness, Malachite, Azurite 3·5—4, others 2—3

Kalicine. Potassium bicarbonate.

1245◎288. **Malachite.** $2CuO.CO_2.H_2O$. Monoclinic, acicular prisms, adamantine, bright green. 1.50

1246+ capillary tufts. .75

1247 velvety crust. 2.00

1248 radiated in chrysocolla, polished. 3.00

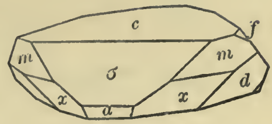
1249+ massive. 1.25

1250◎ tuberose, smooth, radiated fibrous. 2.00

1251 concentric banded, polished. 2.00

Type No. Species No.

1252+289. **Azurite**, Chessylite. $3CuO.2CO_2.H_2O$. Monoclinic, tabular || *c*, highly modified (fig.), perfect, adamantine, prussian-blue. 1.00



1252. Azurite

1253⊙ prismatic || axis *b*, modified, sharp. 1.50

1254⊙ rhombic aspect, symmetrical. 1.50

1255⊙ ball of crystals. 2.00

1256 drusy incrustation. .75

1257 tuberose, concentric radiated, azure-blue. 1.25

1258+ massive. .75

1259 massive with chrysocolla, polished. 3.00

1260 banded with malachite, polished. 4.00

1261* altered to malachite. 1.00

1262 altered to copper, loose. .75

Zinkazurite. Zn sulphate, Cu carbonate and H_2O. Small blue crystals.

1263 290. **Aurichalcite**. $2(Zn,Cu)\,CO_3.3(Zn,Cu)(OH)_2$. Monoclinic (?), tufts of minute very thin flat prisms, bright turquois-blue. 1.50

1264+ velvety druse of minute needles, turquois-blue. .75

1265⊙ globular on smithsonite, verdigris-green. .75

1266 fine laminated, sky-blue. 1.00

II. Rosasite. $2CuO.3CuCO_3.5ZnCO_3$. Fibrous, greenish-blue.

1267 291. **Hydrozincite**. $3ZnO.CO_2.2H_2O$(?). Massive, reniform fibrous crust in detachable concentric layers. 1.50

1268⊙ compact. 1.00

II. Otavite. Basic Cd carbonate. Rhombohedral, minute crystals, whitish.

1269⊙292. **Hydrocerussite**. $3PbO.2CO_2.H_2O$(?). Minute scaly hexagonal planes pearly coating on lead. 2.00

1270 filmy coatings on galena. 3.00

1271⊙293. **Dawsonite**. $Na_2O.Al_2O_3.2CO_2.2H_2O$. Monoclinic (?), tufts of minute radiating needles. 1.00

thin crusts of radiating blades.

——————Hardness Hydro-magnesite 3·5, others 1·5—2·5

1272 294. **Thermonatrite**. $Na_2CO_3 + H_2O$. Orthorhombic, a whitish incrustation. 1.50

I. Hydrocalcite. $CaCO_3.2H_2O$.

Type No. Species No.

295. **Nesquehonite.** $MgCO_3 + 3H_2O$. Orthorhombic, prisms, whitish.

296. **Natron.** $Na_2CO_3 + 10H_2O$. Monoclinic. Occurs in nature only in solution.

1273 I. **Pirssonite.** $CaCO_3.Na_2CO_3.2H_2O$. Orthorhombic, hemimorphic, small prisms, perfect, clear, loose. 2.00

I. II. Dundasite. $PbO.Al_2O_3.2CO_2.4H_2O$. Small spherical aggregates, radio-fibrous, silky whitish.

297. **Gay-lussite.** $CaCO_3.Na_2CO_3 + 5H_2O$. Monoclinic, elongated || *a*.

1274* flat wedge-shaped, perfect. 1.00

1275⊙298. **Lanthanite.** $La_2(CO_3)_3 + 9H_2O$. Orthorhombic, minute thin four-sided plates || base *c*, whitish. 2.50

Hydroconite. $CaCO_3 + 5H_2O$. Rhombohedral. Recent.

299. **Trona.** $Na_2CO_3.HNaCO_3 + 2H_2O$. Monoclinic, tabular, well defined.

1276* efflorescence, whitish, on lava. .40

1277*300. **Hydromagnesite.** $3MgCO_3.Mg(OH)_2 + 3H_2O$. Monoclinic (?), minute thin clear blades, forming drusy surface of finely foliated crust, silky white. 2.00

1278 amorphous chalky. 1.25

301. **Hydrogiobertite.** $MgCO_3.Mg(OH)_2 + 2H_2O$. Spherical.

II. **Artinite.** $MgCO_3.Mg(OH)_2.3H_2O$. Orthorhombic, radio-fibrous, white.

II. Giorgissite. $4MgCO_3.Mg(OH)_2.4H_2O$. Crusts, white.

302. **Lansfordite.** $3MgCO_3.Mg(OH)_2 + 21H_2O$. Triclinic, white.

1279 Hydrodolomite. Hydrated Ca and Mg carbonate. A mixture? Globular, whitish. 2.00

1280 minute globules (Pennite), incrusting chromite. .75

1281+303. **Zaratite.** $3NiO.CO_2.6H_2O$. Massive, minute mammillary, vitreous, translucent emerald-green, incrusting chromite. .60

1282 ditto, compact massive. .60

304. **Remingtonite.** Hydrous Co carbonate. Earthy incrustation, rose-colored.

1283 305. **Tengerite.** An yttrium carbonate (?). Pulverulent, thin white coating on gadolinite. 2.50

1284⊙306. **Bismutite.** $Bi_2O_3.CO_2.H_2O$(?). Earthy amorphous, opaque straw-yellow. 1.00

Walthérite. Hyd. Bi carbonate. Thin longish crystals, translucent.

Type No. Species No.

307. **Uranothallite.** $2CaCO_3.U(CO_3)_2 10H_2O$. Orthorhombic, minute, siskin-green.

308. **Liebigite.** $CaCO_3.(UO_2)CO_3.20H_2O$. Concretions or coatings, transparent apple-green.

1285 309. **Voglite.** Hydrous U, Ca and Cu carbonate. Rhomboidal scales, pearly green. 4.00

Schröckinergite. U hyd. oxycarbonate (?). Orthorhombic(?), six-sided tables, greenish-yellow.

Randite. U and Ca hyd. carbonate. Incrustation of microscopic needles, canary-yellow.

2. Silicates

A. Anhydrous Silicates

The classification here adopted for the anhydrous silicates cannot be carried through strictly, since there are many species which do not conform to any one of the groups named, and often the true interpretation of the composition is doubtful. Furthermore, within a single group there may be a wide variation in the proportion of the acidic element.

I. Disilicates. Salts of Disilicic Acid. RSi_2O_5.

Polysilicates. Salts of Polysilicic Acid. $R_2Si_3O_8$.

Petalite Group. Hardness 6

1286⊙310. **Petalite.** $Li_2O.Al_2O_3.8SiO_2$. Monoclinic, tabular || *b*, transparent, Castorite, loose. .75

1287+ massive. .50

Hydrocastorite. Altered castorite. Al,Ca silicate. Mealy mass of fine needles.

1288⊙311. **Milarite.** $H_2O.K_2O.4CaO.2Al_2O_3.24SiO_2$. Hexagonal, hexagonal prism, perfect, glassy colorless. 3.00

1289⊙312. **Eudidymite.** $H_2O.Na_2O.2BeO.6SiO_2$. Monoclinic, twins, tabular || *c*, well defined, loose (3). .50

1290⊙ I. **Epididymite.** $HNaBeSi_3O_8$. Orthorhombic, tabular || *c*, elongated || brachydome, colorless. 1.00

II. **Leucosphenite.** $2Na_2O.BaO.2TiO_2.10SiO_2$. Monoclinic, minute crystals, white.

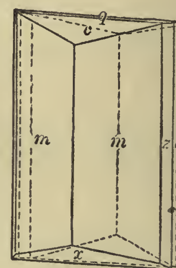
Feldspar Group. Hardness 6—6.5

Silicates of Al, with either K, Na or Ca, rarely Ba. Besides the distinct species there are intermediate compounds connected by insensible gradations, this close relationship showing in angle, habit, twinning and the various physical and optical characters.

Type No. Species No.

A. MONOCLINIC SECTION

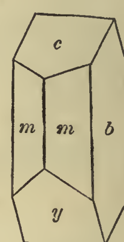
313. Orthoclase, Potash Feldspar. $K_2O.Al_2O_3.6SiO_2$. Monoclinic, sharply defined perfect crystals:—



1291. Orthoclase

1291+ 1. Adularia, unit prism *m*, prism *z*, clinopinacoid *b*, with orthodome *x* and base *c* united in oscillatory combination, rounded summit (fig.), transparent, large, glassy. .75

1292 Adularia, *Baveno* twins, tw.pl. *n*, vicinal, coated with chlorite, large, loose. 1.50



1297. Orthoclase

1293⊙ Adularia, Moonstone, parting || steep pearly hemiorthodome, transparent. .50

1294⊙ Adularia, Valencianite, curved crystals, pearly white, aggregate. 1.00

1295+ 2. Sanidine, glassy feldspar, 3 to 6 p.c. Na_2O, twins, thin tabular || *b*, small. transparent, in lava. .50

1296 Rhyacolite, tabular || *b*, small glassy. 1.00

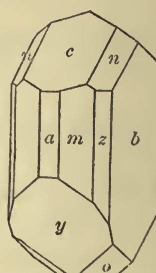
3. Ordinary varieties and forms:—

1297+ unit prism *m*, clinopinacoid *b*, orthodome *y* and base *c* (fig.), symmetrical, gray. .50

1298 ditto, with prism *z*, loose squarish prisms (3). .50

1299⊙ ditto, with pyramid *o*, very perfect, yellowish. 1.00

1300 ditto, lustrous, milky, with tourmaline. 1.00



1301. Orthoclase

1301⊙ *m*, *z*, *b*, *c*, *y*, *o* with pyramid *n* and orthopinacoid *a* (fig.), very large, roughly symmetrical, red-brown. 1.25

1302* *Carlsbad* penetration-twin, tw. axis *c* (fig.), large, rough, gray. .50

Orthoclase—Continued

Type No. Species No.

1303 ditto, very perfect, yellowish, loose. .40

1304⊙ *Carlsbad* contact-twin, tw.pl. orthopinacoid *a*. .50

1305* *Baveno* contact-twin, tw.pl. *n* (fig.), large squarish prism, loose. .50

1306⊙ *Manebach* contact-twin, tw.pl. base *c* (fig.). .75

1307 columnar divergent, reddish. .40

1308+ coarsely cleavable. .20

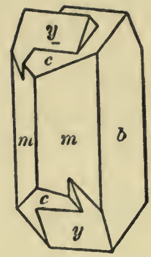
1309⊙ granular. .20

1310⊙ compact, jaspery, red. .20

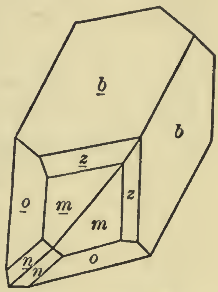
1311 Loxoclase, 7.56 p.c. Na_2O, *m*, *z*, *a*, *b*, *y*, *n* and *c*, bluish opalescent, gray. .75

1312 Necronite, fetid. .75
Lazurfeldspar, with lazurite.
Murchisonite, yellow reflections, red.
Weissigite, small twins in amygdaloid.

1313 altered to cassiterite, *Carlsbad* twin, loose. 1.25



1302. Orthoclase



1305. Orthoclase

1314⊙ Perthite. An interlamination of albite and orthoclase, cleavage, Aventurine, flesh-red. .25

1315 Perthite, Cryptoperthite, gray chatoyant. 1.00

1316 **314. Hyalophane.** $K_2O.BaO.2Al_2O_3.8SiO_2$. Monoclinic, unit prism *m*, clinopinacoid *b*, orthodome *x* and base *c*, sharply defined, clear colorless. 1.50

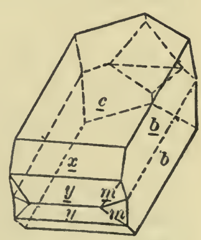
B. Triclinic Section

315. Microcline. $K_2O.Al_2O_3.6SiO_2$. Triclinic, large well developed crystals:—

1317* 1. Ordinary, unit prisms *M* and *m*, brachypinacoid *b*, macrodome *x* and base *c*, pale yellowish-gray, with albite. .50

1318 ditto with additional prisms *z* and *f* and macrodome *y*. .50

1319+ squarish perfect cleavage, cream-yellow. .20



1306. Orthoclase

Type No. Species No. Microcline—Continued

1320+ Amazonstone, Amazonite, unit prisms *M* and *m*, prisms *z* and *f*, brachypinacoid *b*, macrodome *x*, pyramid *o* and base *c*, bright verdigris-green. .50

1321 Amazonstone, ditto, capped with white albite on macrodome *x*. 1.50

1322 Amazonstone *M*, *m*, *z*, *b*, *o*, *c* and macrodome *y*, with polyadelphite. .75

1323° Amazonstone, *Baveno* contact-twin, tw.pl. *n*, loose squarish prism, greenish. 1.00

1324° Amazonstone, *Manebach* contact-twin, tw.pl. *c*, bright verdigris-green, loose. 2.00

1325 Amazonstone, broad perfect cleavage, bright and translucent, mottled verdigris-green. 1.00

1326 Amazonstone, massive, precious. 2.00

1327° Chesterlite, rough crystal. .75

1328 315A. ANORTHOCLASE. $(NaK)AlSi_3O_8$. Triclinic, twins, *Manebach law*, tabular || *c*, glassy, perfectly developed but microscopic, in obsidian lithophyses. .75

1329° Anorthoclase cleavage, near 90°, bluish opalescent, gray. 1.00

Albite—Anorthite Series

NOTE—Between the isomorphous species Albite, $NaAlSi_3O_8$ (Ab) and Anorthite, $CaAl_2Si_2O_8$ (An), are several subspecies, regarded as isomorphous mixtures of these molecules (Ab_nAn_m), and defined according to the ratio in which they enter.

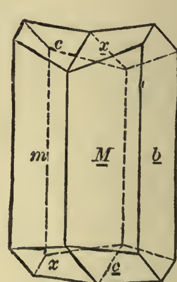
1330°316. **Albite,** Soda Feldspar. $Na_2O.Al_2O_3.6SiO_2$. Triclinic, unit prisms *M* and *m*, macrodome *x* in oscillatory combination with base *c*, on rock-crystal. .50

1331° twin, tw.pl. *b*, *albite law*, (fig.), perfect, small, translucent. .50

1332 parallel grouping, curved. .40

1333* cleavage, well marked polysynthetic twinning striæ, *albite law*. .20

1334 massive granular. .20



1331. Albite

Albite—Continued

Type No. Species No.

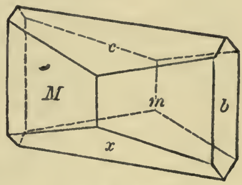
1335⊙ Peristerite, contact-twin, *Carlsbad law*, tw. axis *c*, small, perfect, clear faintly iridescent. 1.00

Aventurine, Sunstone.

1336 Moonstone, cleavage, flesh-colored. .50

1337 Moonstone, cleavage, well marked polysynthetic twinning striæ, *albite law*, pearly-gray. 1.00

1338+ Pericline, unit prism *M* and *m*, brachypinacoid *b*, macrodome *x* and base *c* (fig.), ideal development, opaque milky. 1.00



1338. Albite

1339⊙ Pericline, contact-twin, tw. axis *b*, *pericline law*, perfect. .75

Hyposclerite, contains 5 p.c. pyroxene, blackish-green.

1340+ Cleavelandite, lamellar, curved divergent, white. .20

Olafite and Tschermakite are oligoclase-albite.

317. Oligoclase. Al, Na and Ca polysilicate (intermediate between albite and anorthite, Ab_3An_1). Triclinic, crystallized.

1341* cleavage, grayish-white. .40

1342⊙ massive, subtransparent, whitish. .75

1343 Aventurine, Sunstone, squarish perfect cleavage, pale greenish-gray. .75

1344 ditto, cleavable-granular, reddish-gray. .40

1345+ ditto, cleavage, well marked polysynthetic twinning striæ, translucent brownish-red, striking golden fiery reflections of included microscopic crystals (hematite or göthite?), precious. .75

1346 318. Andesine, Andesite, Al, Na and Ca polysilicate (intermediate and between albite and anorthite, Ab_3An_2 to Ab_1An_1). Triclinic, highly modified, loose. .75

1347* porphyritic phenocrysts, well defined, whitish. .30

1348 319. Labradorite. Al, Na and Ca polysilicate (intermediate between albite and anorthite, Ab_1An_1 to Ab_1An_3). Triclinic, twin, very thin tabular. 2.00

1349+ cleavage, well marked polysynthetic twinning striæ, *albite law*, blue and green chatoyancy, gray, precious. .30

1350 ditto, with also yellow, red and bronze in the play of colors, polished. 1.25

1351⊙ compact massive. .30

Type No. Species No.

Maskelynite (Meteoric). Al_2O_3 25·7 p.c., CaO 11·6 p.c., Na_2O 5·1 p.c., K_2O 1·3 p.c., SiO_2 56·3 p.c.=100. Isometric, distorted cubic (?) grains, transparent colorless.

1352+320. **Anorthite.** $CaO.Al_2O_3.2SiO_2$. Triclinic, small, highly modified, clear glassy, in lava. 1.00

1353⊙ penetration-twin, *Carlsbad law*, tw. axis *c*, rough, gray, loose. .75

1354 Indianite, granular. 1.00

Amphodelite and Latrobite are reddish.

1355⊙ Cyclopite, minute, thin tabular || *b*, transparent, in lava. 1.00

Tankite, cleavable, grayish.

I. **Celsian.** $BaAl_2Si_2O_8$. Triclinic, massive, colorless.

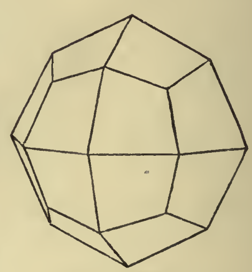
II. Paracelsian.

Barsowite. $CaO.Al_2O_3.2SiO_2$(?). Orthorhombic (or monoclinic). Partly altered anorthite (?). Pearly white.

II. Metasilicates. Salts of Metasilicic Acid. $RSiO_3$.

1. Leucite Group. Isometric. Hardness 6 and 6.5

1356*321. **Leucite.** $K_2O.Al_2O_3.4SiO_2$. Isometric at 500° C., pseudo-isometric ordinarily, form near trapezohedron *n*, ideal symmetry (fig.), slightly altered, gray, loose. .30



1356. Leucite

1357⊙ ditto, unaltered in lava. .75

1358+ ditto, small, subtransparent, loose (24). .30

1359 ditto, opaque snow-white. 1.00

1360 altered to feldspar. .50

1361⊙ altered to nephelite-feldspar mixture, Pseudoleucite. .75

1362 altered to kaolin. .50

1363 322. **Pollucite.** $H_2O.(Cs,Na)_2O.Al_2O_3.5SiO_2$. Isometric, cube *a* and trapezohedron *n*, loose. 5.00

1364⊙ massive, translucent, vitreous. 3.00

2. Pyroxene Group. $RSiO_3$.

The orthorhombic, monoclinic and triclinic species of this group are closely related in optical and physical properties and in angles. All have a fundamental squarish prism with an angle of 93° and 87°, with cleavage parallel to this prism. The metasilicates of Ca, Mg and Fe III are prominent.

These species are closely related to a parallel chemical series formed by the corresponding orthorhombic, monoclinic and triclinic members of the Amphibole Group. In several cases the same chemical compound appears in both groups.

The chief external distinctions between pyroxene and amphibole proper are: prismatic angle of pyroxene 87° and 93°; amphibole 56° and 124°, with more perfect prismatic cleavage. Pyroxene prisms usually short and often complex, massive forms mostly lamellar or granular. Amphibole prisms generally long and simple, columnar and fibrous types predominating.

A. ORTHORHOMBIC SECTION.

Hardness 5.5

Type No. Species No.

323. Enstatite. $MgO.SiO_2$. Orthorhombic.
1. Iron-free, prismatic.
1365 massive, in meteorite. 8.00
1366⊙ 2. Ferriferous, Bronzite, cleavage, metalloidal, brownish. .75
1367 ditto, lamellar, greenish-brown. .30
1368+ ditto, sublamellar, gray. .30
1369 ditto, fine fibrous, gray. .75
1370⊙ altered to steatite, sharply developed large prism *m*, pinacoids *a* and *b*, but roughly terminated. .50
1371 **324. Hypersthene.** $(Fe,Mg)O.SiO_2$. Orthorhombic, small prisms. 3.00
1372* cleavage, metalloidal schiller, brownish-black. 1.50
1373⊙ granular-cleavable, black. 1.00
Amblystegite.
Szaboite, tabular || *b*, slightly altered.
Alteration-products of enstatite-hypersthene:—Diaclasite, Bastite (Schiller Spar), Phästine.

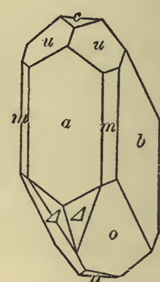
B. MONOCLINIC SECTION

Range of Hardness 5·5—6·5 (Wollastonite and Pectolite 5)

Type No. Species No.

325. Pyroxene. Mainly $RSiO_3$ (see leading varieties). Monoclinic and hemihedral forms described under the chemically classified varieties:—

I. VARIETIES CONTAINING LITTLE OR NO ALUMINIUM



1374. Diopside

1374⊙ Diopside. $CaMg(SiO_3)_2$. Unit prism *m*, orthopinacoid *a*, clinopinacoid *b*, pyramid *u* and base *c* (similar to fig.), perfect, transparent pale green, loose. .75

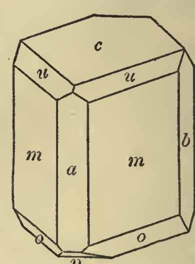
1375⊙ *m*, *a*, *b*, *c*, orthodome *p*, pyramids *u*, *s* and *λ* (similar to fig.), large, well developed, subtranslucent. 1.00

1376 slender prisms, transparent pale green, with cinnamon garnet. 1.50

1377 rough prisms, subtransparent, dark green, loose (12). .50

1378 columnar crystalline, buff. .75

1379+ granular, olive-green. .50



1375. Diopside

The following belong here:—

Chrome-diopside, some Cr, bright green.

1380* Malacolite, large rough prisms, yellowish-white, loose (6). .30

1381 Alalite, squarish prisms, pale greenish. 2.00

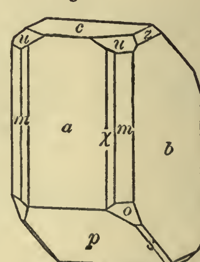
1382⊙ Mussite, long flat implanted prisms, pale greenish-gray. 1.00

1383 Traversellite, long prisms, pale greenish. 1.50

Canaanite, massive, whitish.

Lavrovite, contains V, granular, emerald-green.

1384* Hedenbergite. $CaFe(SiO_3)_2$. Prisms *m* and *χ*, orthopinacoid *a*, clinopinacoid *b*, orthodome *p* and pyramids *u* and *o* (fig.), sharply developed, perfect, brilliant blackish. 1.50



1384. Hedenbergite

Pyroxene—Continued

Type No. Species No.

1385⊙ Hedenbergite, cleavage, blackish-green. .50

1386 Manganhedenbergite, 6·47 p.c. Mn., lamellar, grayish-green. 1.50

VARIETIES GRADUATING BETWEEN DIOPSIDE AND HEDENBERGITE. Conforming to $Ca(MgFe)Si_2O_6$. They darken with the increase of Fe:—

1387+ Salite, cleavage, blackish., .50

1388 Salite, granular, olive-green. .50

Baikalite, dark dull green.

Protheite (near fassaite), sombre-green crystals.

Funkite. More Fe than Mg (a coccolite), dark olive-green.

Lotalite, near hedenbergite, lamellar, black.

1389⊙ Violan, massive, dark violet. 1.50

Asteroite, stellated, silky whitish, bronzing on exposure.

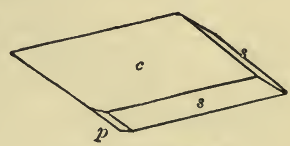
1390+ Coccolite, granular crystalline, green. .50

1391+ Diallage, lamellar, pearly parting || *a*, pale grayish-green. .30

1392 Diallage, lamellar, metalloidal parting || *a*, greenish-gray. .75

1393⊙ Omphacite, granular, green. .30

1394⊙ SCHEFFERITE. $6CaMgSi_2O_6.MgFeSi_2O_6.Mn_2Si_2O_6$. Tabular || *c* (similar to fig.), embedded, brown. 1.00



1394. Schefferite

1395 Schefferite, fine granular, reddish-brown. .75

1396⊙ Jeffersonite. 10·15 p.c. ZnO. 10·20 p.c. MnO. Unit prism *m*, orthopinacoid *a*, clinopinacoid *b*, unit pyramid *s* and base *c*, roughly corroded, greenish-black altering to brown, large. 1.50

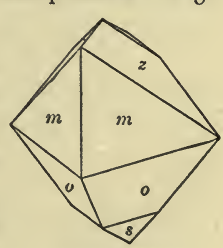
1397 S. Anomalite, Mn-Ni-Co-Pyroxene, light like pumice. 1.50

II. ALUMINOUS VARIETIES

AUGITE. Chiefly $CaMgSi_2O_6$ with $(Mg,Fe)(Al,Fe)_2Si_2O_6$ and occasionally alkalies:—

(a) Leucaugite. Contains Al, Ca, Mg, whitish.

1398⊙ (b) Fassaite, pyramidal (fig.), pale green. 1.00



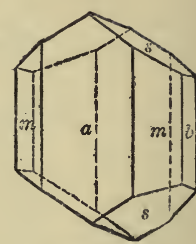
1398. Fassaite

Type No. Species No.

Pyroxene—Continued

1399⊙ (c) Augite, minute pyramidal, bright, perfect, translucent green, in lava. .40

1400+ Augite, unit prism *m*, orthopinacoid *a*, clinopinacoid *b* and pyramid *s* (fig.), highly symmetrical, sharp, black, in volcanic tuff. .50



1400. Augite

1401 ditto, with base *c*. .50

1402* Augite, contact-twin, tw.pl. *a* (fig.), sharply developed, loose. .30

1403 Augite, penetration-twin. .75

1404 Titaniferous Augite, 0·5—4·5 p.c. TiO_2. .75

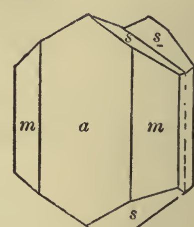
1405 Alkali-augite. 1 to 10 p.c. Na_2O. .75

1406 Fassaite altered to talc. 1.00

1407⊙ Augite altered to cimolite, symmetrical, complete, loose. .30

1408 Augite altered to serpentine. .75

Alteration-products of Pyroxene:—Hectorite, Monradite, Pitkärantite, Hydrous diallage, Pyrallolite, Strakonitzite.



1402. Augite

1409 Picrophyll, lamellar, shiny grayish-green. .75

Uralite. See amphibole.

1410+326. **Acmite.** $Na_2O.Fe_2O_3.4SiO_2$. Monoclinic, acutely terminated large slender prism, vertically channeled, black. 50

1411⊙ Ægirite, prismatic||axis *c*, unit prism *m* and orthopinacoid *a* prominent, sharply symmetrical, loose, large. 1.00

I. **Urbanite.** $(Ca,Mg)SiO_3 + 2NaFe^{III}(SiO_3)_2$. Monoclinic, pyramidal.

1412⊙327. **Spodumene.** $Li_2O.Al_2O_3.4SiO_2$. Monoclinic.

1. Ordinary. Flat rough prisms, highly modified, loose, large. 1.25

1413⊙ cleavage, clear pale yellowish-green, precious. 1.00

1414+ cleavage, perfect, opaque white. .20

1415 2. Hiddenite, slender prisms, deeply etched, transparent emerald-green, precious, loose. 2.50

1416 II. 3. Kunzite, adamantine, clear lilac, precious. Phosphoresces under Ra- and ultra-violet rays. 2.00

Type No. Species No.

Alteration-products of spodumene:—

1st stage, β spodumene, Na replacing ½ of original Li, compact subfibrous, whitish.

1417 2d stage, Cymatolite or Aglaite, subfibrous, silky whitish. .75

Killinite, compact, cryptocrystalline, greenish.

1418+328. **Jadeite.** $Na_2O.Al_2O_3.4SiO_2$. Monoclinic (or triclinic), splintery compact, translucent leek-green, precious. 2.50

1419 ditto, greenish-gray. 1.50

1420⊙ ditto, white spotted with green, cut. 3.00

Chloromelanite. 6·06—10·59 p.c. Fe_2O_3, blackish.

JADE is a popular term for jadeite, as well as the commoner nephrite, etc.

1421 329. **Wollastonite.** $CaO.SiO_2$. Monoclinic, tabular || *c*, rough, large. 2.00

1422⊙ slender prisms, translucent, in lava. 1.00

1423+ radio-fibrous, whitish. .75

1424⊙330. **Pectolite.** $H_2O.Na_2O.4CaO.6SiO_2$. Monoclinic, acicular, aggregated, strongly triboluminescent. 1.50

1425⊙ capillary, aggregated, white. 1.00

1426 long fibrous, radiated. .50

1427+ mammillary, radio-fibrous, white. .50

Osmelite, columnar radiated.

Walkerite, 5·12 p.c. MgO.

compact jade-like, pale green.

1428 Manganpectolite. 4·25 p.c. MnO, cleavage, gray. 1.00

1429 altered to quartz. .75

1430 331. **Rosenbuschite.** $6CaSiO_3.2Na_2ZrO_2F_2.(TiSiO_3TiO_3)$. Monoclinic, crystalline, light orange-gray. 2.50

1431 332. **Låvenite.** $(Na_4,Ca_2,Mn_2,Zr)([Si,Zr]O_3)_2$. Monoclinic, prismatic, yellowish. 4.00

1432⊙333. **Wöhlerite.** $12R(Si,Zr)O_3.RNb_2O_6$, with $R{=}Ca{:}Na_2{=}4{:}1$. Monoclinic, tabular || *a*, resin-yellow. 1.00

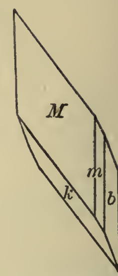
I. **Hainite.** Contains Ti,Zr,Na,Ca. Triclinic, slender needles.

C. Triclinic Section. Hardness 5·5—6

1433 334. **Hiortdahlite.** Nearly corresponds to $4Ca(SiZr)O_3.Na_2ZrO_2F_2$. Triclinic, tabular || *a*, light yellow. 3.00

Type No. Species No.

335. **Rhodonite.** MnO.SiO_2. Triclinic. 1. Ordinary:—



1434. Rhodonite

1434* Paisbergite, prisms *M* and *m*, brachypinacoid *b*, pyramid *k* (fig.), sharp, pink. 1.00

1435⊙ granular massive, deep rose-pink. .50

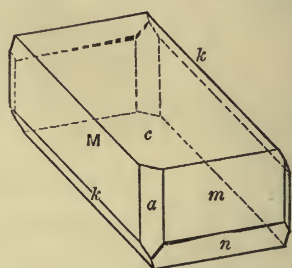
1436 ditto, translucent slab, polished. 1.50

1437+ compact, pale rose-red. .35

2. Ferriferous.

1438 3. Calciferous, Bustamite, 9 to 20 p.c. CaO, grayish-red. 2.00

1439⊙ 4. Zinciferous, Fowlerite, 5 to 7 p.c. ZnO, prisms *M* and *m*, macropinacoid *a*, brachypinacoid *b*, pyramids *k* and *n* and base *c* (fig.), rough tabular || *c*, large, dull pink. 2.00



1439. Rhodonite

1440 ditto, pyramids *q* and *r* additional, translucent bright cherry-red, in white calcite. 3.00

1441⊙ ditto, imperfect rounded, opaque, rose-pink. .75

1442 ditto, rounded squarish prism, large, pale salmon-red. 1.50

1443+ ditto, cleavage, rose-pink. .35

Alteration-products of rhodonite:—Marceline, Dyssnite, Stratopeite, Allagite and Photicite.

Hydrorhodonite. A hydrated rhodonite?

1444⊙336. **Babingtonite.** (Ca,Fe,Mn)SiO_3 with $Fe_2(SiO_3)_3$. Triclinic, small well defined tables, bright, black. 5.00

II. **Schizolite.** $HNa(Ca,Mn)_2(SiO_3)_3$. Triclinic, prismatic, light red.

3. Amphibole Group. Range of Hardness 5—6 (Crocidolite 4)

Composition $RSiO_3$ with R=Ca,Mg,Fe chiefly, also Mn,Na_2(K_2), H_2. Further often containing aluminium and ferric iron, in part as $NaAl(SiO_3)_2$ or $NaFe(SiO_3)_2$; perhaps also as $R^{II}R^{III}_2SiO_6$.

The orthorhombic, monoclinic and triclinic members of this group are closely related optically, chemically and in form, and have a common prismatic cleavage of 54° to 56°. See Pyroxene Group. (Species No. 325).

A. Orthorhombic Section.

Type No. Species No.

1445 337. **Anthophyllite.** $(Mg,Fe)SiO_3$. Orthorhombic, lamellar-fibrous, grayish-green. .60

1446 radio-fibrous, stellate, gray. .40

1447+ long fibres, asbestiform, brownish. .60

Kupfferite.

1448⊙ aluminous, Gedrite, bladed-granular, blackish. .60

Thalackerite, metalloidal.

I. Valléite. $RSiO_3$ with $R = Mg, Ca, Fe, Mn$. Orthorhombic, prisms, reddish.

B. Monoclinic Section

338. **Amphibole.** Composition in general analagous to the pyroxenes. See leading varieties. Monoclinic.

I. CONTAINING LITTLE OR NO ALUMINIUM

1449⊙ TREMOLITE. $CaMg_3(SiO_3)_4$. Unit prism *m*, clinopinacoid *b* and clinodome *r* (fig.), grayish-white. 1.00

1450 prismatic, transparent, pale asparagus-green. 1.50

1451 prismatic long-bladed. .75

1452⊙ thin columnar, pale gray. .75

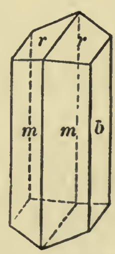
1453+ cleavage, prismatic, greenish-gray. .40

1454 fibrous, gray. .75

1455⊙ radio-fibrous, stellated, white. .75

1456+ Hexagonite, 1·37—2·39 p.c. MnO, sublamellar, luminesces red with sharp friction, lavender. .75

1457+ ACTINOLITE. $Ca(Mg,Fe)_3(SiO_3)_4$. Prismatic, long bright blades, dark green, in talc. .40



1449. Amphibole

1458* columnar bladed, light green. .30

1459⊙ fibrous, blackish-green. .50

1460 radio-fibrous, greenish. .75

1461 granular massive, green. .40

1462+ Nephrite, Jade (see also jadeite), splintery compact, translucent whitish (tremolite). .75

1463 ditto, dark green (actinolite), precious. 1.25

1464⊙ Asbestus (see also chrysotile, a variety of serpentine), fine loose silky threads, white, Amianthus. .40

1465+ fibrous, grayish. .20

Amphibole—Continued

Type No. Species No.

1466 long cohering fibres, brownish. .30

1467 long cohering fibres, greenish. .30

1468* Mountain leather, flexible sheets, grayish. .50

1469⊙ Mountain cork, floats easily, yellowish. .75

1470⊙ Mountain wood, compactly fibrous, brownish. .50

1471 Byssolite, matted capillary, green, with epidote etc. 1.50

1472⊙ Byssolite, ditto, in calcite cleavage. .40

1473 Byssolite, ditto, felt-like mass. .20

1474 SMARAGDITE, thin-foliated, light grass-green. .50

1475⊙ URALITE, an altered pyroxene, sharply defined squarish prisms, green. 1.50

1476⊙ CUMMINGTONITE. $(Fe,Mg)SiO_3$. Radiated fibro-lamellar, grayish-brown. .50

DANNEMORITE. $(Fe,Mn,Mg)SiO_3$. Here belong Asbeferrite (asbestiform), Silfbergite, Hillängsite (like anthophyllite).

GRÜNERITE. $FeSiO_3$. Fibro-lamellar, silky.

1477⊙ RICHTERITE. $([K,Na]_2MgCaMn)SiO_3$, long crystals. 1.00

1478⊙ Breislakite, wool-like, dark-brown, on lava. 1.00

1479 S. ASTOCHITE. $(Mg,Mn,Ca)SiO_3$ combined with $(Na,K,H)SiO_3$. Short columnar aggregates. 1.25

MARMAIROLITE, fine needles, pale yellow.

II. ALUMINOUS VARIETIES

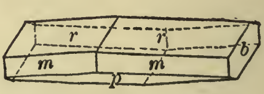
Chiefly $Ca(Mg,Fe)_3Si_4O_{12}$ with $Na_2Al_2Si_4O_{12}$ and $(Mg,Fe)_2(Al,Fe)_4Si_2O_{12}$ (color darkens with the increase of Fe):—

1480* EDENITE, Al-Mg-Ca-amphibole, cleavage, pale green. .30

1481 fibro-lamellar, grayish. .50

1482⊙ PARGASITE, crystalline, green. .75

1483⊙ COMMON HORNBLENDE, unit prism *m*, clinopinacoid *b* and clinodome *r*, sharply symmetrical, (fig 1449.), large, black, with brown apatite. 1.50



1485. Hornblende

1484+ *m*, *b*, *r* and orthodome *p*, black, loose. .30

1485 ditto, tabular (fig.), in calcite. 1.50

1486⊙ terminated blades, bright, black in lava. .75

1487 non-terminated blades, bright black, large. 1.50

1488+ cleavable granular, black. .20

1489 cleavage, greenish-black. .50

1490 granular, black. .50

Noralite, contains only 2·25 p.c. MgO.

Gamsigradite, contains 6 p.c. MnO.

Bergamaskite, contains only 0·93 p.c. MgO.

Kaersutite, 6·75 p.c. TiO_2, prismatic, black.

II. Soretite, short prisms.

II. Szichenyite, greenish.

I. Hastingsite, grains in nephelite-syenite.

I. Xiphonite, minute light honey-yellow crystals in lava.

1491⊙ Tremolite altered to talc, fibrous, pearly white. .75

1492 Tremolite altered to talc, bladed, grayish-green. .75

Altered amphiboles:—Kirwanite, Loganite, Paligorskite, Phäactinite, Waldheimite.

1493⊙339. **Glaucophane.** Essentially $NaAl(SiO_3)_2.(Fe,Mg)SiO_3$. Monoclinic, indistinct prisms, embedded, bluish-black. .60

1494+ fine columnar-granular, bluish-gray. .60

I. Rhodusite. Fe_2O_3 replaces Al_2O_3.

I. Crossite. Chiefly Fe, Mg, Na, Ca and Al metasilicate, monoclinic, lath-shaped crystals, blue.

1495*340. **Riebeckite.** $2NaFe^{III}(SiO_3)_2.FeSiO_3$. Monoclinic, embedded prisms, black. .75

1496⊙341. **Crocidolite.** $NaFe^{III}(SiO_3)_2.FeSiO_3$. Asbestiform, long fibrous, silky lavender-blue. .25

1497+ altered to quartz, Tiger-eye, chatoyant golden-brown. .40

1498 ditto, blue. .40

1499 ditto, golden-brown and blue, polished. 1.00.

1500*342. **Arfvedsonite.** $4Na_2O.3CaO.14FeO.(Al,Fe)_2O_3.21SiO_2$. Monoclinic, long prism, loose. 1.25

I. Cataphorite. An alkali-iron amphibole.

342A. Barkevikite. Ratio of $SiO_2 : (Al,Fe)_2O_3 : (Fe,Mn,Ca,Mg)O : (NaK)_2O = 0·707 : 0·148 : 0·498 : 0·113$. Large rough prisms, deep velvet-black.

C. Triclinic Section

1501⊙343. **Ænigmatite.** Nearly $2Na_2O.\ 9FeO.AlFeO_3.12(Si,Ti)O_2$. Triclinic, prisms, black. 2.50

Cossyrite, minute embedded crystals.

II. Rhönite. $(Ca,Na_2K_2)_3Mg_4Fe_2^{II}Fe_3^{III}Al_4(Si,Ti)_6O_{30}$. Triclinic.

4. Beryl Group.

Hexagonal. Hardness 7·5—8

Type No. | Species No.

344. Beryl. $3BeO.Al_2O_3.6SiO_2$. Hexagonal. Transparent varieties are precious.

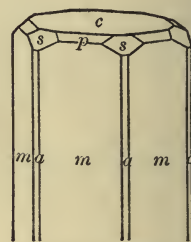
1502 1. Emerald, colored by Cr_2O_3, large symmetrical unit prism *m* and base *c*, translucent emerald-green, loose. 2.50

1503+ ditto, embedded prisms. 1.00

1504 ditto, transparent prism, bright. 9.00

2. Ordinary varieties:—

1505° (a) colorless transparent, unit prism *m*, unit pyramid *p*, diagonal pyramid *s* and base *c* (similar to fig.), small, sharply developed, with tourmaline, etc. 1.50

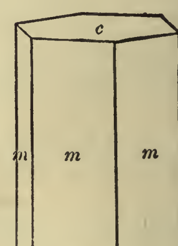


1505. Beryl

1506 (b) bluish-green transparent, Aquamarine, slender prism *m*, highly modified termination. 5.00

1507* ditto, massive. 1.25

1508° (c) apple-green, subtranslucent, unit prism *m* and base *c* (fig.), symmetrical, large, loose. .75



1508. Beryl

1509° ditto, long prism parted into cross-sections, the interstices being filled with quartz (fig.). 1.25

1510+ ditto, massive. .35

1511 (d) honey-yellow, golden beryl, transparent prism. 2.50

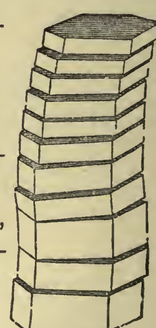
(e) pale yellowish-green.

(f) clear sapphire-blue.

1512 (g) pale sky-blue, Blue Aquamarine, transparent, massive. 2.00

1513° (h) pale rose-red, transparent prism, small, sharply developed, with tourmaline, etc. 1.50

1514 ditto, tabular || base *c*, modified, larger. 7.00


1509. Beryl

1515° (i) brownish-yellow, waxy, semi-opaque, massive. .35

Beryl—Continued

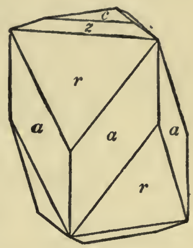
Type No. | Species No.

1516 3. Caesium Beryl, contains Cs, unit prism *m*, diagonal pyramid *s*, translucent pale pink, large. 4.00

Altered beryl, Rosterite, Pseudosmaragd.

5. Eudialyte Group. Range of Hardness 5—6

1517*345. **Eudialyte.** $Na_{13}(Ca,Fe)_6Cl(Si,Zr)_{20}O_{52}$. Rhombohedral, optically positive, diagonal prism *a*, rhombohedrons *r* and *z* and base *c* (fig.), brownish-red. 1.25



1517. Eudialyte

1518⊙ Eucolite. Optically negative. Rhombohedron *e* prominent, rose-red. 1.25

1519⊙346. **Catapleiite.** $H_2(Na_2,Ca)(Zr(OH)_2)(SiO_3)_3$. Hexagonal at 1400 C°., ordinarily pseudohexagonal and monoclinic, thin tabular hexagonal prisms with replaced edges, yellow. 1.00

Natron-catapleiite, without Ca, bluish-gray.

1520 I. **Elpidite.** Essentially $Na_2O.ZrO_2.6SiO_2.3H_2O$. Orthorhombic, small prisms, whitish. 2.50

6. Melanocerite Group. Range of Hardness 5—6

347. **Cappelenite.** $3BaSiO_3.2Y_2(SiO_3)_3.5YBO_3$. Hexagonal, thick prisms.

348. **Melanocerite.** Hypothetically $12(H_2Ca)SiO_3.3(Y,Ce)BO_3.2H_2(Th,Ce)O_2F_2.8(Ce,La,Di)OF$. Rhombohedral, tabular.

1521 349. **Caryocerite.** $6(H_2Ca)SiO_3.2(Ce,Di,Y)BO_3.3H_2(Ce,Th)O_2F_2.2LaOF$. Rhombohedral, tabular rhombohedrons. 5.00

1522 Steenstrupine. Essentially a metasilicate of Th, Ce metals, Fe and Na, with some Al, Mn and Ca. Rhombohedral, tabular rhombohedrons, sharply developed, brownish-black. 3.00

350. **Tritomite.** $2(H_2Na_2Ca)SiO_3.(Ce,La,Di,Y)BO_3.H_2(Ce,Th,Zr)O_2F_2$. Rhombohedral, acute triangular pyramidal.

1523 massive, disseminated, resinous dark-brown. 5.00

II. Intermediate Silicates

1 Leucophanite Group.

Range of Hardness 4—5

Type No. Species No.

1524 **351. Leucophanite.** Na(BeF)Ca$(SiO_3)_2$. Orthorhombic, tabular || base *c*. 3.00

1525⊙ cleavage, greenish-white. 1.50

352. Meliphanite. $NaCa_2Be_2FSi_3O_{10}$. Tetragonal, tetartohedral, obtuse pyramid *p* prominent.

1526⊙ crystalline lamellæ, honey-yellow. 1.00

II. **Taramellite.** $4BaO.FeO.2Fe_2O_3.10SiO_2$. Orthorhombic (?), fibrous, reddish-brown.

II. Weinbergerite. $NaAlSiO_4+3FeSiO_3$(?). Spherical aggregates in meteoric iron.

2. Iolite Group. Hardness 7—7·5

1527 **353. Iolite,** Cordierite. $H_2O.4(Mg,Fe)O.4Al_2O_3.10SiO_2$. Orthorhombic, twins, short pseudohexagonal prisms, dark smoky-blue. 2.00

1528⊙ massive, translucent dark blue. .75

1529+ coarse granular, pale blue, with pale greenish chlorophyllite. .50

Cerasite, contains regularly arranged inclusions.

Alteration-products of iolite:—(See mica group for the alkaline kinds), Bonsdorfite, Auralite, Pyrargillite, Esmarkite, Praseolite, Raumite, Peplolite, Aspasiolite, Polychroilite. also:—

1530 Fahlunite, dark brown. .75

1531 Chlorophyllite, greenish-gray. .50

3. Barysilite Group. Hardness 3 (except Hyalotekite 5—5·5)

1532⊙ **354. Barysilite.** $3PbO.2SiO_2$. Hexagonal, curved lamellar, pearly white, tarnishing. 1.50

355. Ganomalite. $3PbO.2(Ca,Mn)O.3SiO_2$. Tetragonal, prismatic.

1533⊙ granular massive, resinous grayish, with manganophyllite. 1.50

Type No. Species No.

1534 I. **Hardystonite.** $2CaO.ZnO.2SiO_2$. Tetragonal, rough indistinct crystal. 3.00

1535⊙ compact massive, white, with franklinite and willemite. 1.00

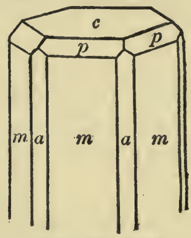
1536* granular massive, pale yellow, with polyadelphite. .50

356. **Hyalotekite.** Approximately $Ca_3Ba_3Pb_3B_2(SiO_3)_{12}$. Massive, coarsely crystalline.

III. Orthosilicates. Salts of Orthosilicic Acid. R_2SiO_4.

1. Nephelite Group. Hexagonal. Hardness 6

1537⊙357. **Nephelite.** $3Na_2O.K_2O.4Al_2O_3.9SiO_2$. Hexagonal, unit prism *m*, diagonal prism *a*, unit pyramid *p* and base *c* (fig.), small but sharply defined, glassy colorless, in lava. 1.50



1537. Nephelite

1538⊙ unit prism *m* and base *c*, minute, ideal symmetry, glassy pale gray, with melilite. 1.00

1539 Elæolite, coarse crystals. 1.00

1540 Elæolite, massive, greasy brown. .40

1541+ Elæolite, massive, greasy pale grayish, in "litchfieldite" (nephelite-syenite). .40

Alteration-products of nephelite:—See Pinite, Gieseckite, Dysyntribite, Liebenerite Lythrodes.

358. **Eucryptite.** $Li_2O.Al_2O_3.2SiO_2$. Hexagonal, embedded microscopic crystals, clear colorless.

359. **Kaliophilite.** $K_2O.Al_2O_3.2SiO_2$. Hexagonal, slender acicular and cobweb-like threads, silky colorless.

360. **Cancrinite.** $3H_2O.4Na_2O.CaO.4Al_2O_3.9SiO_2.2CO_2$. Hexagonal, unit prism *m* and unit obtuse pyramid *p*.

1542+ massive, orange-yellow, in "litchfieldite" (nephelite-syenite). .75

1543 massive, blue. 1.50

Kalk-cancrinite. SiO_2 39·82, Al_2O_3 33·54, CaO 17·63, Na_2O 0·76, $CaCO_3$ 9·09=100·84. Granular, in lava.

1544⊙361. **Microsommite.** $4(NaK)CaAl_3(SiO_4)_3.4(NaK)Cl.(NaK)SO_4(?)$. Hexagonal, minute prism *m*, clear colorless, in leucitic lava. 4.00

Type No. Species No.

1545⊙ I. **Nasonite.** $(Ca,Pb)_{10}Cl_2Si_6O_{21}$. Monoclinic(?), massive, greasy white. 2.00

1546⊙ Davyne. SiO_2 38·76, Al_2O_3 28·10, CaO 9·32, Na_2O 15·72, K_2O 1·10, CO_2 5·63, H_2O 1·96, Cl trace =100.59. Hexagonal, stout perfect prisms like nephelite, pearly colorless, in lava. 2.50

2. Sodalite Group. Isometric. Hardness 5·5

The Sodalite and Helvite Groups may rightly be included in a broad grouping with the Garnet Group.

1547⊙362. **Sodalite.** $Na_4(AlCl)Al_2Si_3O_{12}$. Isometric, cube *a*, octahedron *o* and dodecahedron *d*, small, sharply symmetrical, subtransparent grayish-green. 1.50

1548 minute dodecahedrons *d*, glassy colorless, perfect, with neochrysolite on lava. 2.50

1549+ massive, cleavable-granular, azure-blue. .75
concentric nodule, chalcedony-like.

1550⊙363. **Haüynite,** Haüyne. $Na_2Ca(NaSO_4.Al)Al_2Si_3O_{12}$. Isometric, dodecahedron *d*, small but sharply defined, glassy blue, in lava. 2.00

1551+ massive granular, green, in lava. .75

1552 grains, blue, embedded in lava. .75

1553 364. **Noselite,** Nosean. $Na_4(NaSO_4.Al)Al_2Si_3O_{12}$. Isometric dodecahedron *d*. 3.00

1554⊙ granular massive. 1.25

365. **Lazurite,** Lapis-Lazuli. Essentially $Na_4(NaS_3.Al)Al_2Si_3O_{12}$. Isometric, dodecahedron *d*, microscopic.

1555 fine granular in lava, blue. 1.00

1556⊙ compact, ultramarine-blue, with pyrite, precious, polished. 3.00

1557+ compact, fine azure-blue, in white feldspar. .75

II. **Hackmanite.** $Na_4[Al(NaS)]Al_2(SiO_4)_3$. Isometric, reddish-violet.

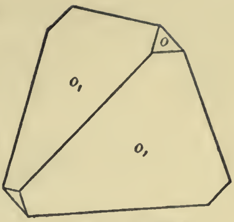
3. Helvite Group. Range of Hardness 4·5—7

366. **Helvite.** $3(Be,Mn,Fe)_2SiO_4.(Mn,Fe)S$. Isometric, tetrahedral, tetrahedron o_1 prominent with tetrahedron *o*.

1558* tetrahedron o_1 (similar to fig.), small, ideal symmetry, resinous-yellow. 1.50

Helvite—Continued

Type No.	Species No.	
1559		ditto, minute, sulphur-yellow, on rhodochrosite. 1.00
		Achtaragdite. Hydrated Al,Fe,Ca, Mg silicate. Pseudomorphous. Isometric, tetrahedral, hemi-trisoctahedron *n*, minute.
	367.	**Danalite.** (Fe,Zn,Mn)$_2$((Zn,Fe)$_2$S)Be$_3$Si$_3$O$_{12}$. Isometric, octahedrons.
1560⊙		disseminated masses, reddish. 4.00
1561⊙	368.	**Eulytite.** 2Bi$_2$O$_3$.3SiO$_2$. Isometric, tetrahedral, minute hemi-trapezohedron *n*, sharply defined, adamantine, brownish. 2.00
1562		twins, axes ||, minute. 3.00
1563⊙	369.	**Zunyite.** (Al(OH,F,Cl)$_2$)$_6$Al$_2$Si$_3$O$_{12}$. Isometric, tetrahedral, tetrahedron *o* prominent with tetrahedron o_1, sharply symmetrical, minute, whitish. 1.00



1558. Helvite

4. Garnet Group. 3RO.R$_2$O$_3$.3SiO$_2$. Isometric, holohedral.

Range of Hardness 6·5—7·5

Type No.	Species No.	
	370.	**Garnet.** Ca,Mg,Fe$_2$O$_3$,Mn,Al,FeO or Cr orthosilicate. (See varieties). Isometric, highly symmetrical and sharply defined forms. Transparent varieties are precious:—

I. ALUMINIUM GARNET

Type No.	Species No.	
		A. Grossularite. 3CaO.Al$_2$O$_3$.3SiO$_2$. The following types are classed according to color:—
1564		(a) white, dodecahedron *d* truncated by trapezohedron *n* (fig. 1578). 1.25
1565		(b) olive-green, dodecahedron *d*. .75
1566*		olive-green, Wiluite, trapezohedron *n*, truncated by dodecahedron *d* (fig. 1580), loose. .50
1567⊙		(c) amber-yellow, octahedron *o* truncated by dodecahedron *d*. 3.00
1568+		(d) cinnamon-brown, Cinnamon Stone or Essonite, dodecahedron *d*, truncated by trapezohedron *n* (fig. 1578), brilliant. .60

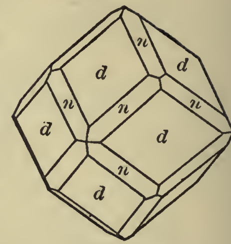
Type No. Species No.

Garnet—Continued

1569 (e) brownish-red, same form, with penninite. 2.00

1570⊙ (f) pale rose-red, dodecahedron *d*. 1.00

(g) emerald-green, containing Cr.

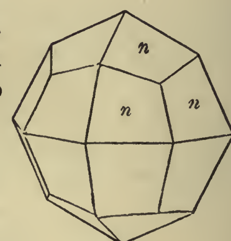


1578. Garnet

1571 B. PYROPE. $3MgO.Al_2O_3.3SiO_2$. Rounded grains in serpentine. .40

1572+ loose pebbles, clear deep red. .40

1573+ C. ALMANDITE. $3FeO.Al_2O_3.3SiO_2$. Dodecahedron *d*, coated with chlorite, very large, loose. .30



1579. Garnet

1574 ditto, squarish elongated. .60

1575 ditto, flattened. .60

1576⊙ dodecahedron *d*, smooth ideal symmetry, red, large. .30

1577 ditto, small, in schist. .30

1578⊙ dodecahedron *d*, truncated by trapezohedron *n* (fig.), large, ideal symmetry, bright, translucent deep red, in schist. 1.25

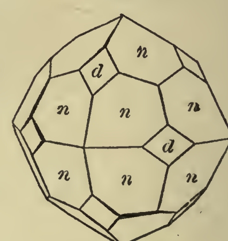
1579 trapezohedron *n* (fig.), deep red, large. 2.00

1580* trapezohedron *n*, truncated by dodecahedron *d* (fig.), ideal symmetry, bright, deep red, loose. .30

1581⊙ brownish-black, Common Garnet, trapezohedron *n*. .30

1582 D. SPESSARTITE. $3MnO.Al_2O_3.3SiO_2$. Transparent pale hyacinth-red semi-precious, loose. .75

1583⊙ trapezohedron *n*, with dodecahedron *d*, bright, brownish-red, in rhyolite. .75



1580. Garnet

1584 dark hyacinth-red. .75

II. IRON GARNET

E. ANDRADITE. $3CaO.Fe_2O_3.3SiO_2$. Sub-varieties:—

1. Calcium-iron Garnet.

1585* (a) Topazolite, minute dodecahedron *d*, clear topaz-yellow. 1.50

1586 ditto, pale olive-green. 1.00

1587 Demantoid, massive, clear emerald-green. 3.00

Garnet—Continued

Type No. Species No.

1588⊙ (b) Colophonite, granular, resinous-brownish. .75

1589⊙ (c) Melanite, trapezohedron *n* and dodecahedron *d*, lustrous black, in lava. .50

1590 ditto, loose (3). .50

(d) Dark green, Jelletite.

1591 Calderite, compact, dark brownish. 1.00

2. Manganesian Calcium-iron Garnet.

1592⊙ (a) Rothoffite, Allochroite, compact, reddish-brown. 1.00

1593 ditto, greenish. 1.00

1594⊙ (d) Polyadelphite, dodecahedron *d*, large, brownish-yellow. 1.50

1595+ Polyadelphite, lamello-granular. .40

1596 (e) Aplome, dodecahedron *d*, faces striated || short diagonal, brownish. 1.00

1597⊙ 3. Titaniferous Calcium-iron Garnet. $3CaO.(Fe,Ti,Al)_2O_3.3(Si,Ti)O_2$. Massive, black. .75

1598 4. Yttriferous Calcium-iron Garnet, Yttergarnet, massive, brownish. 2.00

III. CHROMIUM GARNET

1599 F. Uvarovite, Ouvarovite. $3CaO.Cr_2O_3.3SiO_2$. Dodecahedron *d*, minute, bright emerald-green. 3.00

1600* ditto, massive, dull. 1.00

1601⊙ garnet altered to Chlorite. 1.00

1602⊙371. **Schorlomite.** $3CaO.(Fe,Ti)_2O_3.3(Si,Ti)O_2$. Isometric, massive, black. 1.00

Monoclinic Species Related to the Foregoing

372. **Partschinite.** $(Mn,Fe)_3Al_2Si_3O_{12}$. Monoclinic, minute dull yellowish-red crystals in sand.

1603 373. **Agricolite.** $Bi_4Si_3O_{12}$. Monoclinic, globular fibrous, yellowish-brown. 5.00

5. Chrysolite Group. R_2SiO_4. Orthorhombic.

Range of Hardness 5·5—6·5

1604*374. **Monticellite.** $CaO.MgO.SiO_2$. Orthorhombic, brachyprism *s*, brachypinacoid *b*, unit pyramid *e*, brachydome *k* and macrodome *d* (fig.), translucent yellowish, in calcite. 2.00

Type No. Species No. Monticellite—Continued

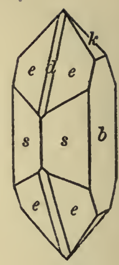
1605 ditto, imperfect, rounded. .50

1606⊙ rounded crystals in lava. 2.00

1607 Batrachite, massive, with ceylonite. 1.50

1608 I. **Glaucochroite.** $CaMnSiO_4$. Orthorhombic, embedded prisms, pale bluish-green (reddish by artificial light). 9.00

375. **Forsterite.** $2MgO.SiO_2$. Orthorhombic, white crystals in lava.



1604. Monticellite

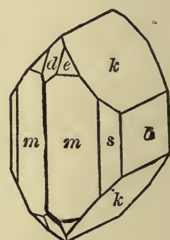
1609* Boltonite, embedded grains, yellowish. .50

376. **Chrysolite**, Peridot. $2(MgFe)O.SiO_2$. Orthorhombic.

1610* 1. Precious, clear pale yellowish-green pebbles. .75

1611 2. Common, pale greenish-yellow, dull, rounded, in lava. 1.50

1612⊙ greenish-brown, prisms *m* and *s* (metalloidal), brachypinacoid *b*, brachydome *k*, clinodome *d* (fig.), sharply symmetrical, loose. .75



1612. Chrysolite

1613+ Olivine, olive-green, granular. .30

1614⊙ ditto, grains in basalt. .30

1615 ditto, grains in kimberlite. 1.00

1616 ditto, grains in meteorite. 6.00

1617⊙ 3. Hyalosiderite, 30 p.c. FeO, granular, reddish-brown. 1.00

1618 altered to serpentine, *a,m,s,d,e,f*, distinct, greenish-yellow. 1.00

Villarsite. An altered chrysolite.

Matricite. SiO_2 33·99, MgO 37·96, CaO 5·64, H_2O 17·81. Concentric fibrous, pearly.

Ferrite. An alteration-product of chrysolite. SiO_2 13·02, Al_2O_3 13·16, Fe_2O_3 53·47, FeO 4·51, MgO 6·63, H_2O 8·39. Dark reddish-brown.

1619 376A. HORTONOLITE. $(Fe,Mg)_2SiO_4$. Orthorhombic, flattened || *b*, yellowish changing to dull black. 6.00

1620⊙376B. TITAN-OLIVINE. A chrysolite containing 6·10 p.c. TiO_2. Massive, dark reddish-brown. 3.00

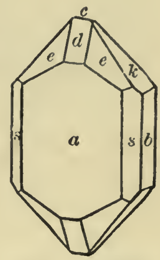
I. Iddingsite. A chrysolite alteration-product(?). Fe,Ca,Mg silicate. Lamellar, brown.

Type No. Species No.

1621⊙377. **Fayalite.** $2FeO.SiO_2$. Orthorhombic, modified, tabular ‖ *a* (fig.), microscopic but distinct, bright metalloidal iridescence, with glassy anorthoclase in obsidian lithophyses. 1.00

1622⊙ cleavage mass, blackish-green. 2.00

1623⊙ I. Neochrysolite. A variety of fayalite. Slender prisms, dull black, with sodalite on lava. 2.50



1621. Fayalite

1624⊙378. **Knebelite.** $2(Fe,Mn,Mg)O.SiO_2$. Orthorhombic, crystalline mass. 1.25

1625 Igelströmite. About 10 p.c. more FeO, replacing MnO. 2.00

1626 379. **Tephroite.** $2MnO.SiO_2$. Orthorhombic, prismatic, grayish-brown. 2.00

1627⊙ massive, grayish, with franklinite, etc. 1.25

Hydrotephroite. $(Mn,Mg)_2.SiO_4 + \frac{2}{3}H_2O$. Reddish.

Epigenite. $(Mn,Mg).SiO_4.H_2O$. Small bladed masses in tephroite, brownish-red.

1628 379A. ROEPPERITE. $(Fe,Mn,Zn,Mg)_2SiO_4$. Orthorhombic, large coarse crystal, yellow altering to black. 4.00

1629⊙ massive crystalline. 1.50

6. Phenacite Group. R_2SiO_4. Rhombohedral.

Hardness 6—7

380. **Trimerite.** $(Mn,Ca)_2SiO_4.Be_2SiO_4$. Triclinic, thick pseudohexagonal tabular prisms, clear reddish.

———————Hardness 5·5 and 7·5—8

1630⊙381. **Willemite.** $2ZnO.SiO_2$. Rhombohedral, unit prism *m*, pyramid *p*, minute, bright, translucent brownish, drusy. 1.50

1631 ditto, flesh-red. 1.50

1632 slender hexagonal prisms, bright, clear grayish. 2.50

1633⊙ massive, very bright subtranslucent apple-green, fluoresces under Ra- and ultra-violet rays, with franklinite in calcite. 1.50

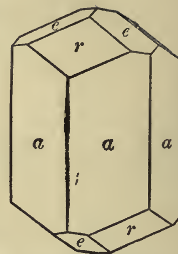
1634+ massive, subtranslucent brownish-apple-green, with franklinite, etc. .60

1635 ditto, reddish-brown. 1.00

1636⊙ grains embedded in zincite, etc. .60

Type No. Species No. Willemite—Continued

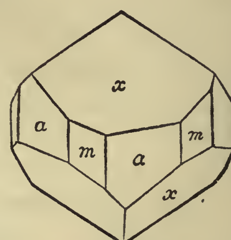
1637* Troostite, contains much Mn, diagonal prism *a*, rhombohedrons *r* and *e* (fig.), large, pale flesh-red, in calcite. 1.50



1637. Willemite

1638 ditto, brownish, very large, rough, loose. 1.50

1639+382. **Phenacite.** $2BeO.SiO_2$. Rhombohedral, unit and second order prisms *m* and *a* with third order rhombohedron *x* predominating (fig.), bright, sharp, transparent, loose (3). 1.00



1639. Phenacite

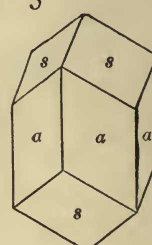
1640 unit prism *a*, rhombohedron *r*, transparent, precious, faces uneven, loose. 2.00

1641 large rough dull prism, semi-translucent. 4.00

1642⊙ ditto, fragmentary. 1.00

Range of Hardness 4·5—5

1643+383. **Dioptase.** $H_2O.CuO.SiO_2$. Rhombohedral, tetartohedral, diagonal prism *a*, rhombohedron *s* (fig.), sharply symmetrical, bright translucent emerald-green, small, loose. 1.00



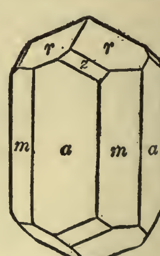
1643. Dioptase

1644 ditto, crystal aggregate. 5.00

1645⊙384. **Friedelite.** $H_7(MnCl)Mn_4(SiO_4)_4$. Rhombohedral, minute sharp hexagonal prism *m*, tabular || base *c*, translucent pale rose-red. 3.00

1646⊙385. **Pyrosmalite.** $H_7[(Fe,Mn)Cl](Fe,Mn)_4(SiO_4)_4$. Rhombohedral, thick six-sided prism *m* and base *c*, pearly, sharp ideal symmetry, liver-brown. 2.50

1647 ditto, brownish-olive-green. 2.50



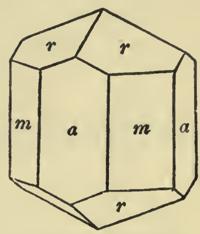
1648. Meionite

7. Scapolite Group. Tetragonal. Hardness 6

Type No. Species No.

1648*386. **Meionite.** $4CaO.3Al_2O_3.6SiO_2$. Tetragonal, diametral prism *a*, truncated by unit prism *m*, unit pyramid *r* (fig.), transparent glassy colorless, on lava. 1.50

1649*387. **Wernerite**, Scapolite. Al,Ca, and Na chloro-silicate. SiO_2 46—54 p.c., Al_2O_3 31—24, CaO 17—10, Na_2O 3—11, Cl 1—3. Tetragonal, pyramidal hemihedrism, unit and diametral prisms *m* and *a*, pyramid *r* (fig.), large and finely developed, brownish. 1.00



1649. Wernerite

1650⊙ ditto, with base *c*, gray. 1.00

1651 highly modified, large, rough, whitish. 1.00

1652+ massive, coarse cleavable-granular, pink. .20

1653 massive, Glaucolite, bluish. 2.00

1654⊙ massive, yellow. 1.00

1655 388. **Mizzonite.** Al, Na and Ca chloro-silicate. SiO_2 54—60 p.c., Al_2O_3 24—20, CaO 10—6, Na_2O 3—11, Cl 0—3. Tetragonal, minute prisms *m* and *a*, base *c*, clear whitish, on lava. 2.00

1656⊙ Dipyre, slender square prisms, embedded. .75 Prehnitoid, resembling prehnite.

1657 389. **Marialite.** $Na_4Al_3Si_9O_{24}Cl$. Tetragonal, minute squarish prisms, clear whitish, in lava. 5.00

Altered Scapolites:—Atheriastite, Stroganovite, Algerite, Terenite, Gabbronite, Pseudo-Scapolite, Paralogite.

1658⊙ Wilsonite. Square cleavage prisms, pearly lavender. .50

1659⊙390. **Sarcolite.** $3RO.Al_2O_3.3SiO_2$, with $R=Ca : Na_2=9 : 1$. Tetragonal, pyramidal hemihedrism, aspect cubo-octahedral, highly modified, glassy, in lava. 2.50

8. Melilite Group. Tetragonal. Hardness 5 and 5·5

1660*391. **Melilite.** $Na_2(Ca,Mg)_{11}(Al,Fe)_4Si_9O_{36}$(?). Tetragonal, short square prisms, minute but distinct, brown, with nephelite on lava. .75

1661 Humboldtilite, octagonal prisms (unit and diametral *m*, *a*) glassy, sharply defined, in lava. 4.00

Type No. | Species No. — Melilite—Continued

1662⊙ ditto, with calcareous coating. 2.00

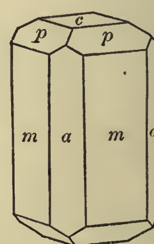
1663 I. **Fuggerite.** SiO_2 34·04, Al_2O_3 17·97, Fe_2O_3 3·49. CaO 37·65, MgO 4·89, Na_2O 2·04. Tetragonal(?), tabular, apple-green. 2.00

1664⊙ 392. **Gehlenite.** $3CaO.Al_2O_3.2SiO_2$. Tetragonal, short square prisms. .75

1665 Cacoclasite. Pseudomorphous. SiO_2 32·67, Al_2O_3 19·63, CaO 36·38, P_2O_5 3·36, CO_2 4·25. Tetragonal(?), large square prisms, cubo-octahedral aspect. .75

9. Vesuvianite Group. Tetragonal. Hardness 6·5

1666 393. **Vesuvianite,** Idocrase. $H(OH)_3Ca_{12}(Al,Fe)_6(SiO_4)_{10}$ (?). Tetragonal, unit and diametral prisms *m* and *a* and base *c*, sharply symmetrical, vitreous greenish. 1.00



1667. Vesuvianite

1667⊙ ditto, with unit pyramid *p* (fig.), ideal symmetry, loose, large. 2.00

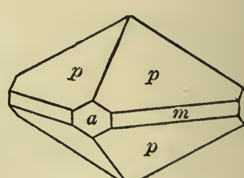
1668 ditto, with ditetragonal prism *f*, brown, loose. 1.00

1669* *m*, *a*, *c*, pyramids *p* and *ϑ*, distinct, bright, dark olive-green. 1.00

1670 prisms *m* deeply furrowed, terminated by six brilliant pyramids and base *c*, translucent asparagus-green. 1.50

1671⊙ pyramid *p*, sharp, yellowish. 1.50

1672 pyramid *p*, truncated by prisms *m* and *a* (fig.), ideal form but quite rough faces, very large, yellowish. 8.00



1672. Vesuvianite

1673⊙ highly modified, adamantine, translucent brownish, in lava. 1.00

1674+ columnar radiated, brownish. .40

1675 granular massive. .40

1676 Mangan-vesuvianite, 12·49 p.c. MnO, reddish. 2.00

1677⊙ Cyprine, with trace of Cu, columnar, bluish-green. 1.00

10. Zircon Group. $\overset{\mathrm{IV}}{\mathrm{R}}SiO_4$. Tetragonal.

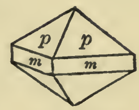
Hardness 7·5 and 5

Type No. Species No.

1678*394. **Zircon.** $ZrO_2.SiO_2$. Tetragonal, unit pyramid *p*, ideal symmetry, reddish-brown, loose. .60

1679 ditto with base *c*. 4.00

1680⊙ unit pyramid *p* truncated by unit prism *m* (fig.), sharply symmetrical, bright, dark brown. .40



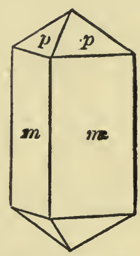
1680. Zircon

1681+ unit prism *m*, terminated by unit pyramid *p* (fig.), ideal symmetry, bright, grayish-brown, loose (6). .40

1682⊙ ditto, with extra unit pyramid *u* (fig.), ideal symmetry, adamantine, sub-translucent reddish-brown, loose. .40

1683⊙ *m*, *a*, *p* and ditetragonal pyramid, or zirconoid, *x* (similar to fig. 1687), minute, perfect, transparent (3). .40

1684 diametral prism *a* and unit pyramid *p* equally developed, resembling sharp rhombic dodecahedron, adamantine, sub-translucent reddish-brown, in feldspar. 1.00



1681. Zircon

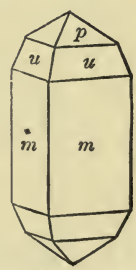
1685 highly modified, adamantine, small. 1.50

1686⊙ contact-twins, tw.pl. *e*, geniculated (fig.), adamantine, brownish-red. 1.50

1687 Precious, Hyacinth, zirconoid (ditetragonal pyramid) *x*, unit pyramid *p* and diametral prism *a* (fig.), adamantine, transparent red, small, loose. .75

1688+ ditto, much water-worn, lot. .40

1689 Precious, Jargon, clear yellowish, water-worn. 1.00



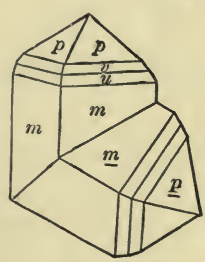
1682. Zircon

Beccarite, olive-green.

1690 II. Naëgite, contains $UO_3,ThO_2,Cb_2O_5,Ta_2O_5,Y_2O_3$. 5.00

Altered Zircon:—Tachyaphaltite, Œrstedite, Auerbachite.

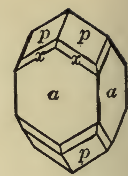
1691⊙ Malacon, unit and diametral prisms *m* and *a*, unit pyramid *p* (fig.), bright, sharp, grayish, loose. .40



1686. Zircon

Type No. Species No.

1692⊙ Cyrtolite. SiO_2 27·66, ZrO_2 41·78, Er_2O_3,Y_2O_3 8·49, Ce_2O_3 3·98, CaO 5·06, MgO 1·10, H_2O 12·07=100·14. Tetragonal, diametral pyramid *e*, strongly curved, brown. 1.00



1687. Zircon

1693 Alvite. Essentially SiO_2 20·33, ThO_2(?) 15·33, ZrO_2 3·92, Y_2O_3 22·01, Al_2O_3,BeO 14·11, Fe_2O_3 9·66, H_2O 9·32. Tetragonal. 1.50

1694⊙395. **Thorite.** $ThO_2.SiO_2$. Highly radio-active. Tetragonal, unit prism *m*, terminated by unit pyramid *p* (fig.), brownish, loose. 2.50

1695 unit pyramid *p*, truncated by unit prism *m*, blackish, complete, loose. 4.00

1691. Zircon

1696+ compact massive, resinous brownish-black. 2.50

1697 Orangite, unit prism *m*, unit pyramid *p*, resinous orange-yellow. 6.00

1698* Orangite, compact massive, resinous-yellow. 4.00

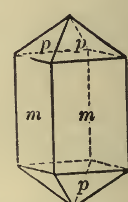
Uranothorite, resinous, dark red-brown.

Calciothorite. $5ThSiO_4.2Ca_2SiO_4 + 10H_2O$. Massive, translucent garnet-red.

Eucrasite. Essentially Th,Y,Ce silicate.

Freyalite. Essentially Th,Ce silicate. Resinous.

Auerlite. $ThO_2.(SiO_2.\frac{1}{3}P_2O_5) + 2H_2O$(?). Tetragonal, square prism with pyramid, resinous.



1694. Thorite

11. Danburite—Topaz Group. $(\overset{III}{RO})R_3SiO_4$. Orthorhombic.

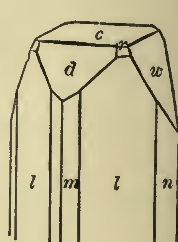
Range of Hardness 7—8

1699⊙396. **Danburite.** $CaO.B_2O_3.2SiO_2$. Orthorhombic, large squarish prism (fig.), opaque pale yellow. 3.00

1700 large highly modified prism, brilliantly terminated, transparent, loose. 8.00

1701* ditto, small, loose (12). 1.00

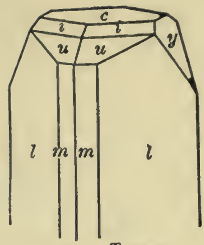
1702 ditto, with adularia, etc. 3.00



1699. Danburite

Type No. Species No.

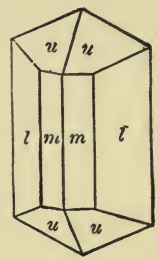
397. Topaz. $[Al(O,F_2)]AlSiO_4$. Orthorhombic, crystals brilliant and sharply developed. Transparent varieties are precious:—



1703. Topaz

1703 unit and brachyprisms *m* and *l*, unit pyramids *u* and *i*, brachydome *y* and base *c* (fig.), transparent pale blue, large, loose. 7.00

1704⊙ *m* and *l*, uneven unit pyramid *u* (fig.), adamantine, deeply striated, clear rich wine-yellow, large and slender, loose. 1.00



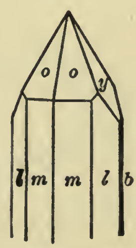
1704. Topaz

1705⊙ unit and brachyprisms *m* and *l*, brachypinacoid *b*, acute unit pyramid *o* and brachydome *y* (fig.), transparent reddish, loose. .40

1706+ unit prism *m* and two brachyprisms *l* and *n*, pyramids *u*, *i* and *x*, brachydome *f* and base *c* (fig.), transparent pale straw-yellow, loose (2). .35

1707 ditto, on quartz. .75

1708+ *m* and *l*, unit and obtuse pyramids *o* and *u*, brachydome *y*, macrodome *d* and base *c*, transparent colorless, loose (2). .35



1705. Topaz

1709⊙ ditto, with extra brachydome *f* and pyramid *i* (similar to fig.), loose. .40

1710 ditto, pale wine-yellow, in rhyolite. .75

1711 unit and brachyprism *m* and *l*, brachydomes *y*, *f* and *X*, pyramid *u*, macrodome *d* (fig.), clear colorless, loose. 1.50

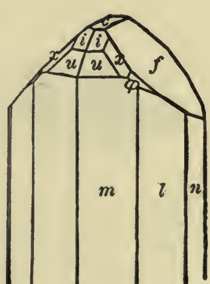
1712⊙ perfect basal cleavage, limpid. 1.00

1713 water-worn pebbles, limpid. .75

1714* granular massive, grayish. .75

1715 compact massive, milky. .75

1716⊙ Pycnite, columnar, pale yellowish. .75



1706. Topaz

1717+**398. Andalusite.** $Al_2O_3.SiO_2$. Orthorhombic, unit prism *m*, base *c* truncated by brachydome *s* (fig.), coarse, large and symmetrical, grayish. 1.00

1718 massive, flesh-red. .75

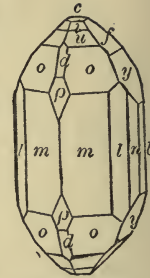
Type No. Species No.

Andalusite—Continued

1719 imperfectly columnar, reddish-brown. .75

1720* Chiastolite, cruciform arrangement of carbonaceous impurities in interior (fig.), polished cross-sections of prisms, loose (5). 1.00

I. Manganandalusite. Contains Mn.



1709. Topaz

——————Hardness 6—7 and 5—7

1721+399. **Sillimanite**, Fibrolite. $Al_2O_3.SiO_2$. Orthorhombic, slender embedded prisms, gray. .40

densely compact (prehistoric European "jade").

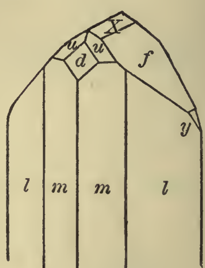
1722⊙ Fibrolite, columnar-fibrous. .30

Bamlite, subplumose, silky.

Xenolite, rolled pebbles (Sp. gr. 3·58).

Wörthite, hydrous (impure altered?), white.

Westanite. SiO_2 42·53, Al_2O_3 51·14. (An altered andalusite?). Prismatic.



1711. Topaz

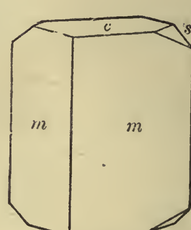
1723 400. **Cyanite**, Disthene. $Al_2O_3.SiO_2$. Triclinic, blue prisms *M* and *m*, macropinacoid *a*, brachypinacoid *b*, pyramid *q* and base *c*, transparent, loose. 2.00

1724⊙ blue, long flat prisms, transparent, in paragonite. 1.00

1725 blue, cruciform-twins crossing at 60°. 2.50

1726+ blue, curved bladed-columnar. .30

1727 green, transparent terminated crystal, loose. 1.00



1717. Andalusite

1720. Andalusite

1728* green, bladed-columnar. .75

1729⊙ white, Rhætizite, curved fibro-columnar. .75

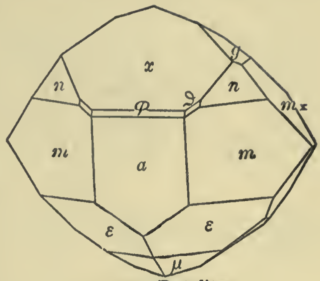
II. **Hibschite.** $CaO.Al_2O_3.2H_2O.2SiO_2$. Isometric, minute crystals, colorless.

12. Datolite Group.

Type No. Species No. Monoclinic. Range of Hardness 5—7

401. Datolite. $H_2O.2CaO.B_2O_3.2SiO_2$. Monoclinic.

1730+ 1. Glassy Crystals, rhombohedral aspect, highly modified (fig.), sharp and perfect. .60



1730. Datolite

1731 ditto, large, colorless. 1.50

1732⊙ ditto, greenish. 1.50

1733⊙ thin sphenoidal by predominance of orthodome *x* and clinodome *t*, truncated by several prisms and pyramids (fig.), triclinic aspect, highly perfect. 3.00

1734⊙ 2. coarse subgranular massive. 1.00

1735 3. compact massive, porcelain-like. 2.00

4. botryoidal, Botryolite, radiated columnar.

altered to Quartz, Haytorite.

II. Bakerite. $8CaO.5B_2O_3.6SiO_2.6H_2O$. Compact, greenish-white.

1736⊙ **402. Homilite.** $2CaO.FeO.B_2O_3.2SiO_2$. Monoclinic, tabular || base *c* (fig.), dark brown. 2.00

octahedroid (*M* and *m* prominent.)

1733. Datolite

Erdmannite. Chiefly silicate of Ce metals and Ca, with formula similar to datolite and gadolinite.

1737 **403. Euclase.** $H_2O.2BeO.Al_2O_3.2SiO_2$. Monoclinic, striated prism, well terminated, clear glassy. 9.00

1738⊙ ditto, fragment. 3.00

1739 **404. Gadolinite.** $2BeO.FeO.2Y_2O_3.2SiO_2$. Monoclinic, very large rough prism with acute pyramid. 5.00

1740+ massive, vitreous black. 2.50

1741 **405. Yttrialite.** Chiefly silicate of Th and Y metals. Amorphous, vitreous greenish-black. 8.00

1742+ **I. Thalénite.** $H_2Y_4Si_4O_{15}$. Monoclinic, massive, flesh-red. 3.00

1743 S. Rowlandite. $2Y_2O_3.3SiO_2$. Massive, dark drab-green. 5.00

13. Epidote Group. Range of Hardness 6—7

Type No. Species No.

1744 **406. Zoisite.** $4CaO.3Al_2O_3.6SiO_2.H_2O$. Orthorhombic, vertically furrowed prism, brownish, bright. 2.00

1745⊙ ditto, greenish. 2.00

1746+ columnar-crystalline, ash-gray. .40

1747 fibrous aggregate, grayish-white. .60

1748* rose-red, Thulite, massive, deep rose variegated with white quartz. .40

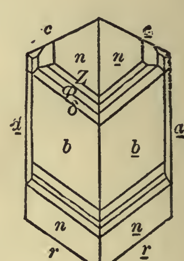
1749 ditto, disseminated in feldspar. .40

1750⊙ ditto, minute indistinct crystals, pale rose. .40

1751+**407. Epidote.** $H_2O.4CaO.3(Al,Fe)_2O_3.6SiO_2$. Monoclinic, slender prismatic || axis *b*, prominent planes are pyramid *n*, orthopinacoid *a*, orthodomes *r* and *i* and base *c*, truncated by lesser planes, sharply and brilliantly defined, transparent greenish-black. Pleochroism strong: vibrations || 𝔠 green, 𝔟 brown and strongly absorbed, 𝔞 yellow. Large, loose. .40

1752⊙ ditto, twins, tw.pl. *a* (fig.). .40

1753 ditto, group of crystals with byssolite. 3.00



1752. Epidote

1754⊙ very large elongated crystal in quartz, opaque pistachio-green. 1.00

1755⊙ large well defined elongated crystal, bright, ash-gray. 1.00

1756⊙ short stout prismatic, small but sharply defined, pistachio-green. .75

1757 divergent columnar crystals, Oisanite, dark. 1.50

1758 acicular with feldspar. .40

1759* crystalline columnar, pistachio-green. .40

1760 granular massive, coarse. .60

1761+ granular massive, fine, green. .40

Scorza (sand).

Bucklandite, unit prism *m*, pyramid *n* and clinodome *o*, equally developed, affording a symmetrical bi-pyramid-like form, instead of the usual elongated habit.

1762⊙ Withamite, small radial aggregates, embedded, deep red to pale yellow, strongly pleochroic. 1.50

1763 Beustite, grayish. 1.50

Epidote—Continued

Type No. Species No.

S. Fouquéite, monoclinic but same composition as zoisite, elongated crystals.

Picroepidote. A magnesium-epidote(?). Prismatic || *b*, whitish, translucent.

1764 **408. Piedmontite.** $H_2O.4CaO.3R_2O_3.6SiO_2$, with R=Al : Mn : Fe=3 : 2 : 1 (?). Monoclinic, prismatic || axis *b*, vitreous dark reddish-brown. 2.00

1765* bladed prismatic, embedded, dark purplish-brown. .75

1766 fibro-columnar in schist. 1.00

1767⊙ massive, dark reddish-brown. .75

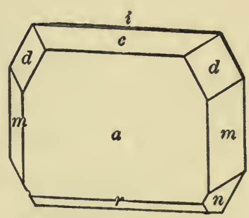
409. Allanite, Orthite. $(Ca,Fe)_2(AlOH)(Al,Ce,Fe)_2(SiO_4)_3$. Monoclinic, varieties:—

1768⊙ 1. Allanite, flat tabular || orthopinacoid *a* (fig.), large, rough. 1.00

1769 slender acicular || axis *b*, very large. 1.50

1770 granular massive, brownish-black. .50

1771+ compact massive, black. .50



1768. Allanite

2. Uralorthite, nearly anhydrous, large prisms.

3. Bagrationite. Contains Ce. Nearly symmetrical (not lengthened).

4. (Orthite originally included the very long *straight* prisms. Some authors now use it as the comprehensive name for the species).

5. Xanthorthite, hydrous, altered.

6. Pyrorthite, contains 30 p.c. carbonaceous impurity, altered, long prisms.

1772⊙ **I. Hancockite.** Pb,Ca,Sr,Al,Fe^{III} silicate. Monoclinic, microscopic flat prisms, bright, transparent brownish-red, with franklinite. 1.50

1773 massive with polyadelphite. 1.00

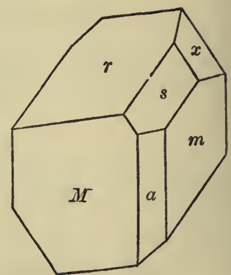
Wasite. Much altered allanite, brownish-black.

Muromontite and Bodenite are chiefly silicates of Y earths and Ce metals with Fe, Al, etc.

14. Axinite Group. Triclinic. Hardness 6·5—7

Type No. Species No.

1774⊙ 410. II. **Axinite.** $R^{II}_7R^{III}_4B_2(SiO_4)_8$, with R^{II}=chiefly Ca, and R^{III}= chiefly Al. Triclinic, unit prisms *M* and *m*, macropinacoid *a*, macrodome *s* and pyramids *r* and *x* (fig.), acute wedge-shaped, brown. 1.00



1774. Axinite

1775* unit prisms *M* and *m*, macropinacoid *a*, brachyprism *w*, distinct, clear brachypinacoid *b*, brachydome *γ*, pyramids *r* and *n* and base *c* (similar to fig.), obtuse-edged table, with datolite. 1.50

1776 crystalline mass, brown. .50

1777 yellow, highly modified, minute, clear glassy. 2.00

1778⊙ yellow, crystalline mass. .50

Other Orthosilicates. Range of Hardness 5·5—6·5

1779 411. **Prehnite.** $H_2Ca_2Al_2Si_3O_{12}$. Orthorhombic, tabular || base *c*, distinct. 2.50

1780 thin tabular aggregate of crystals united by *c*, pale green. 1.50

1781* ditto, thick tabular. 1.00

1782⊙ ditto, wheel-shaped. 1.00

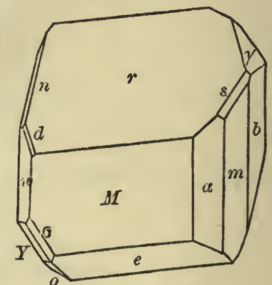
1783 ditto, barrel-shaped, pearly. 1.50

1784+ drusy globular, translucent green. .50

1785⊙ drusy globular, radiated fibro-lamellar, whitish. 1.50

II. **Hillebrandite.** $2CaO.SiO_2.H_2O$. Orthorhombic, fibrous, white.

Uigite. SiO_2 45·98, Al_2O_3 21·93, Na_2O 4·69, CaO 16·15, H_2O 11·25. Radiated sheafs of plates, pearly.



1775. Axinite

412. **Harstigite.** $H_7(Ca,Mn)_{12}Al_3Si_{10}O_{40}$(?). Orthorhombic, prismatic || axis *c*, colorless.

1786 413. **Cuspidine.** Ca_2SiO_4 with CaF_2(?). Monoclinic, contact-twins, tw.pl. *a*, small spear-shaped, whitish. 6.00

IV. Subsilicates. Division 1. $R_5Si_2O_9$

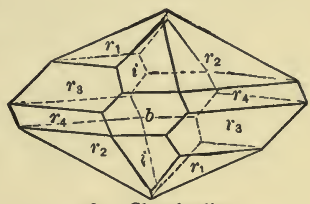
Humite Group. Hardness 6·5. See Ap. I.

These formulæ vary progressively by an increase of one molecule of (Mg_2SiO_4); likewise the vertical axes vary in the ratio 3 : 5 : 7 : 9, corresponding to the total number of magnesium atoms present. Hence the following transposition of the species **415** and **414**.

Type No. Species No.

I. Prolectite. $Mg[Mg(F,OH)]SiO_4$(?). Not yet analyzed. Monoclinic. Measured by Sjogren and named in allusion to Penfield and Howe's earlier prophecy of its discovery.

1787*415. I. **Chondrodite.** $Mg_3[Mg(F,OH)]_2[SiO_4]_2$. Monoclinic, highly modified, flattened || *b*, lenticular (fig.), translucent garnet-red, bright, with clinochlore, etc. 1.50



1787. Chondrodite

1788 rounded, transparent yellow. 1.25

1789⊙ minute, brightly defined, pale yellowish, in lava. .75

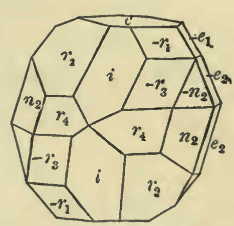
1790 rounded, reddish-brown, in limestone. 1.25

1791+ coarse crystalline grains, embedded, yellow. .40

1792 ditto, reddish-brown. .60

1793 massive, yellowish. .60

1794⊙ altered to talc, highly modified (fig.), distinct. 2.00



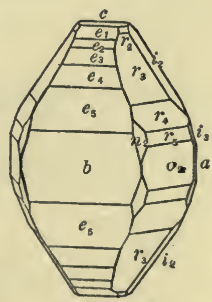
1794. Chondrodite

1795*414. I. **Humite.** $Mg_5[Mg(F,OH)]_2[SiO_4]_3$. Orthorhombic, very highly modified (fig.), small but brightly defined, translucent yellowish, in lava. 2.00

1796 large distinct crystal in limestone. 8.00

1797⊙ penetration-twins in lava. 2.00

1798*416. I. **Clinohumite.** $Mg_7[Mg(F,OH)]_5[SiO_4]_4$. Monoclinic, minute, very highly modified, yellowish, in lava. 4.00



1795. Humite

Type No. Species No.

1799⊙ II. **Leucophoenicite.** $7MnO.3SiO_2.H_2O$. Monoclinic(?), light purplish-red, with franklinite, etc. 1.00

1800 grayish, with hardystonite. 1.00

——————————Range of Hardness 6—6·5

1801 417. **Ilvaite, Lievrite.** $H_2O.CaO.4FeO.Fe_2O_3.4SiO_2$. Orthorhombic, bright distinct prisms, iron-black. 2.00

1802⊙ large rough prism. 2.00

1803* columnar massive. .75

II. **Hellandite.** $2R^{II}O.3R_2^{III}O_3.4SiO_2.3H_2O$, with R^{II}=Ca chiefly, and R^{III}=Al, Fe, Mn and Ce metals. Monoclinic, prismatic, brown.

1804⊙418. **Ardennite.** $5H_2O.8MnO.4Al_2O_3.V_2O_5.8SiO_2$(?). Orthorhombic, indistinct prisms, yellowish. .75

1805⊙419.S. I. **Långbanite.** $37Mn_5SiO_7 10Fe_3Sb_2O_8$(?). Rhombohedral, minute distinct hexagonal prisms with base, black, on paisbergite. 2.00

Kentrolite Group. Hardness 6·5 (Kentrolite 5)

420. **Kentrolite.** $2PbO.Mn_2O_3.2SiO_2$(?). Orthorhombic, minute prism with pyramid.

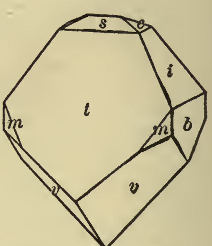
1806⊙ compact massive, black. 2.00

II. Molybdophyllite. $RSiO_4 + H_2O$, with R =Pb, Mg. Hexagonal, foliated, colorless.

421.I. **Melanotekite.** $(Fe_4O_3)Pb_3(SiO_4)_3$. Orthorhombic, minute prism with pyramid.

1807* crystalline druses, disseminated. 1.00

1808⊙ massive, black. 1.00



1810. Calamine

1809⊙422. **Bertrandite.** $H_2O.4BeO.2SiO_2$. Orthorhombic, hemimorphic, small tabular, glassy. 2.00

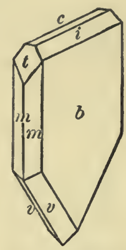
II. Stokesite. $CaO.SnO_2.3SiO_2.2H_2O$(?). Orthorhombic, pyramidal, colorless.

Type No. Species No.

Division 2. Hardness 5·5 (Tourmaline 7)

1810*423. **Calamine.** $H_2O.2ZnO.SiO_2$. Orthorhombic, hemimorphic, group of small sharply defined crystals, short and thick, some showing the upper end (the analogous pole) highly modified with brachy- and macro-domes prominent, truncated by base *c*, others showing the lower (antilogous) pole with only brachy-pyramid *v* (fig.). 1.00

1811⊙ tabular || *b* (fig.), distinct, small. 1.50



1811. Calamine

1812+ sheaf-like groups of tabular crystals, small, clear colorless. 1.00

1813⊙ wheel-shaped groups, milky, large. 3.00

twins, tw.pl. *c*, axes || and antilogous poles of individuals together.

1814+ drusy crystalline. .50

1815⊙ botryoidal, white. 1.50

1816 botryoidal, blue. 2.00

1817 massive. .50

carbonated, pisolitic.

1818 argillaceous, mixed with clay, soapy feel. .50

1819⊙ I. **Clinohedrite.** $H_2ZnCaSiO_4$. Monoclinic-clinohedral, minute, highly modified (fig.), adamantine, transparent pale amethystine. 9.00

1820 Moresnetite. SiO_2 30·31, Al_2O_3 13·68, NiO 1·14, ZnO 43·41, H_2O 11·37. Massive, green. 1.00

1821⊙ fibrous, straw-yellow. .75

1822 I. **Lawsonite.** $H_4CaAl_2Si_2O_{10}$. Orthorhombic, octahedroid, unit prism *m*, brachydome *d*, small. 1.50

1823* tabular, grayish-blue, in margarite schist. ·75

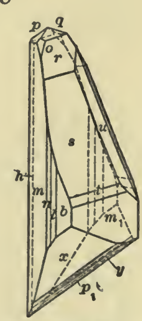
1824⊙ twins, tw.pl. *m*. 1.50

1825⊙424. **Carpholite.** $2H_2O.MnO.Al_2O_3.2SiO_2$. Monoclinic, radio-stellate tufts, silky straw-yellow. 1.00

425. **Cerite.** $3H_2O.2(Ca,Fe)O.3Ce_2O_3.6SiO_2$(?). Orthorhombic, short prismatic.

1826+ massive, purplish-gray. 1.50

II. **Beckelite.** $Ca_3(Ce,La,Di)_4Si_3O_{15}$. Isometric, small crystals, yellow.



1819. Clinohedrite

Type No. Species No.

426. I. Tourmaline. $H_9Al_3(BOH)_2Si_4O_{19}$. Rhombohedral, hemimorphic. Usually a well-formed trigonal prism, rounded by striation, terminated by several rhombohedrons. Transparent varieties are precious.

I. VARIETIES BASED ON COLOR:—

1827⊙ (a) Rubellite, translucent dark purplish-red, short thick prism with rhombs, adamantine, loose. 2.00

1828 rich transparent pink, prism with rhombs, bright, loose. 1.50

1829* pale clear pink, prism with base *c*, bright, loose. .50

1830 ditto, one end base *c*, other end several rhombohedrons, loose. 2.00

1831+ subtranslucent pink, large slender prisms radiating in pale lilac lepidolite. .50

1832⊙ (b) Indicolite, indigo-blue, terminated prism. 2.00

1833 (c) Brazilian Sapphire, transparent prussian-blue. 3.00

1834 (d) Brazilian Emerald or Brazilian Peridot, clear green, bright, prism and acute rhombohedron *y*. 2.00

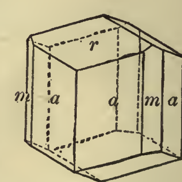
1835 opaque pale green, short thick prism with rhombs, in limestone. 1.50

1836+ subtransparent green, prism with rhomb *r*, loose. .50

1837 (e) Ceylon Peridot, clear yellow. 3.00

1838⊙ (f) Achroite, clear colorless terminated prism. .50

1839* (g) Black, unit and diagonal prisms *m* and *a*, rhombohedron *r* (fig.), very large, rough, loose. 1.00

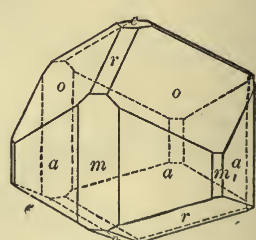


1839. Tourmaline

1840⊙ obtuse rhombohedron *r* prominent at one end and acute rhombohedron *o* at the other end (fig.) 1.00

1841+ large slender bright prisms in white quartz. .40

1842⊙ ditto, bent and broken, cross-sections later joined by quartz. .75



1840. Tourmaline

1843⊙ radiated acicular, in schist. .40

1844 capillary. .60

1845⊙ columnar. .60

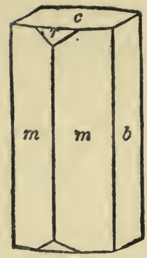
Tourmaline—Continued

Type No. Species No.

1846 fibrous. .60

1847* massive compact. .20

1848⊙ (h) Brown, translucent unit and diagonal prisms *m* and *a*, rhombohedrons *r* and *o*, sharply defined, loose. Dravite, Magnesium Tourmaline. .40

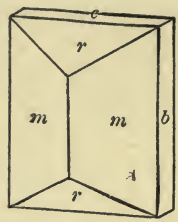


1855. Staurolite

1849 large thick terminated prisms, modified, in limestone. 1.00

1850+ ditto, indistinct, embedded. .40

1851 (i) Bi-colored. terminated prism, subtransparent. 2.00



1856. Staurolite

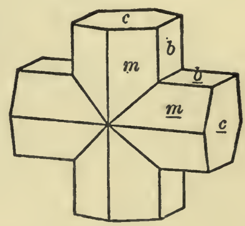
1852⊙ subtransparent polished cross-section, exterior green, interior red. 1.50

III. VARIETIES BASED ON COMPOSITION graduate into one another. The following (a,b,c) are classed above by color.

(a) Alkali Tourmaline, Na and Li or both, also K.
(b) Iron Tourmaline, usually black.
(c) Magnesium Tourmaline.

1853 Tourmaline altered to mica. .75

Division 3. Range of Hardness 6·5—7·5



1858 · Staurolite

427. Dumortierite. $4Al_2O_3.3SiO_2$(?). Orthorhombic, fibrous, blue.

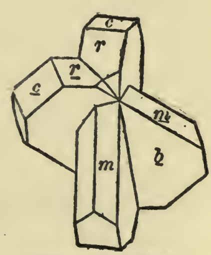
1854⊙ massive, dark violet-blue. 1.00

1855 **428. Staurolite.** $2H_2O.6(Fe,Mg)O.12Al_2O_3.11SiO_2$(?). Orthorhombic, unit prism *m*, brachypinacoid *b* and base *c* (similar to fig.), ideal symmetry, large, loose, brownish. .40

1856⊙ ditto, macrodome *r* prominent (fig.), large, loose. .30

1857⊙ growth parallel to axis *c*, of cyanite within staurolite, both bright and sharply defined prisms, brownish-black. 2.00

1858 cruciform-twins, tw.pl. *x*, individuals crossing nearly at right angles (fig.), ideal symmetry, large. 1.50.



1859. Staurolite

Type No. Species No. — Staurolite—Continued

1859+ ditto, tw.pl. *z* (fig.), crossing at nearly 60°. .75
Nordmarkite, contains Mn.

II. **Grandidierite.** $7SiO_2.11(Al,Fe)_2O_3.7(Mg,Fe,Ca)O.2(Na,K,H)O$. Orthorhombic, bluish-green.

429. **Kornerupine.** $MgO.Al_2O_3.SiO_2$. Orthorhombic, with sapphirine, etc.

1860⊙ Prismatine, slender embedded prisms, gray. 2.00
Kryptotil. A prismatine alteration-product.

1861⊙430. **Sapphirine.** $5MgO.6Al_2O_3.2SiO_2$. Monoclinic, granular, pale blue. 2.00

II. Sevendibite. Al,Ca,Mg basic silicate. Irregular grains, blue.

II. Silicomagnesiofluorite. Ca,Mg fluosilicate. Radio-fibrous.

1862⊙ I. **Roeblingite.** $5H_2CaSiO_4$. $2CaPbSO_4$. Compact mass of microscopic prisms, white. 4.00

Appendix to Anhydrous Silicates

Barylite. $4BaO$. Al_2O_3. $7SiO_2$. Tabular prisms.

Monzonite. SiO_2 52·60, Al_2O_3 17·10, FeO 9·00, CaO 9·65, Na_2O 6·60. Compact, light grayish-green.

1863 Neociano. Anhydrous Cu silicate(?). Monoclinic, microscopic tables, blue, sublimate on lava. 2.00

Sphenoclase. Chiefly Al and Ca silicate. Massive, yellowish.

B. Hydrous Silicates

True hydrous compounds, containing water of crystallization (*e.g.* the Zeolites), also hydrous amorphous clays, as well as certain acid or basic silicates (Micas, Talc, etc.), which yield water on ignition and which bear a close relationship to the true hydrous species. Finally are included certain species in which the chemical constitution and the part played by water, remain in doubt.

I. Zeolite Division

1. Indroductory Subdivision

Hardness 6 and 4—4·5

1864 431. **Inesite.** $2(Mn,Ca)SiO_3+H_2O$. Triclinic, small prisms. 2.50

1865⊙ divergent fibrous, rose-red. 1.25

Type No. Species No.

432. Ganophyllite. $6H_2O.7MnO.Al_2O_3.8SiO_2$. Monoclinic, short prisms terminated by acute clinodome *e* and base *c*.

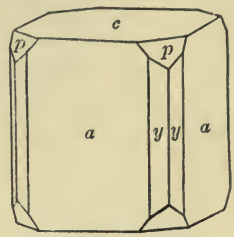
1866 foliated micaceous, brown. 5.00

———————— Hardness 4·5—5, 3—4 and 4·5—5

1867 **433. Okenite.** $2H_2O.CaO.2SiO_2$. Orthorhombic(?), mass of minute white prisms. 2.00

1868 **434. II. Gyrolite** (=Zeophyllite ?). $3H_2O.2CaO.3SiO_2$. Rhombohedral, tetartohedral, white. 3.00

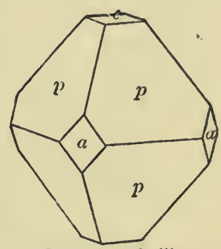
1869 II. Agnolite (formerly Manganocalcite). $3MnO.4SiO_2.2H_2O$. Triclinic, radiating fibrous, pale red. .75



1870. Apophyllite

1870⊙ **435. Apophyllite.** $K_2O.8CaO.16SiO_2.16H_2O$. Tetragonal, cuboid, striated diametral prism *a*, pearly base *c* (similar to fig.), sharp ideal symmetry, white. 1.25

1871 ditto with unit pyramid *p*, cubo-octahedroid (fig.), brilliant limpid, small, with copper. 1.00



1871. Apophyllite

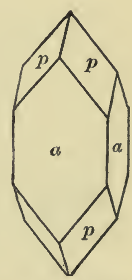
1872⊙ ditto, opaque milky, with pink drusy natrolite. .75

1873+ ditto, elongated, brilliant glassy, subtransparent. .75

1874 unit pyramid *p*, diametral prism *a* (fig.), sharply symmetrical, brilliant, rose-pink. 3.00

1875* ditto, clear colorless, small. .75

1876 thin tabular || base *c*, with prism *a* and pyramid *p* (fig.), clear colorless. 3.00



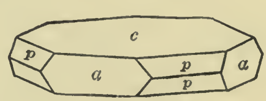
1874. Apophyllite

1877⊙ lamellar massive, pink. 1.00

Albine, altering to calcite.

Xylochlore, contains Fe, olive-green.

Tesselite, cuboid, tessellated structure.



1876. Apophyllite

1878 Leucocyclite. Basal sections show, in polarized light, a black cross with alternate white and violet-black rings. 2.00

Type No. Species No.

II. Astrolite. $(Na,K)_2.Fe(Al,Fe)_2.(SiO_2)_5.H_2O(?)$. Globular, radio-stellate structure, siskin-green.

OTHER HYDROUS CALCIUM SILICATES, IMPERFECTLY DEFINED.

Xonotlite. $4CaSiO_3+H_2O(?)$. Massive.

Tobermorite. Chiefly hyd. Ca silicate. Granular.

Chalcomorphite. Chiefly hyd. Ca silicate. Hexagonal, minute acicular prisms.

Plombierite. $CaSiO_3+2H_2O$. Massive.

2. Zeolites

A family of well defined hydrous silicates, closely related in composition and all occurring as secondary minerals in cavities and veins of basic igneous rocks. They are silicates of aluminium with chiefly sodium and calcium, rarely barium and strontium. The Zeolites are analogous to the Feldspar Group, except that the former include independent groups of diverse form and distinct composition. Intumescence under the blowpipe is marked.

Mordenite Group. Hardness 3—4

1879⊙ **436. Ptilolite.** $(Ca,K_2,Na_2)Al_2Si_{10}O_{24}+5H_2O$. White spongy mass of minute crystalline colorless needles. 1.50

437. Mordenite. $3RAl_2Si_{10}O_{24}+20H_2O$, with $R=K_2:Na_2:Ca=1:1:1$. Monoclinic, tabular || clinopinacoid *b*, minute, pearly.

I. Erionite. $CaO.K_2O.Na_2O.Al_2O_3.6SiO_2 6H_2O$. Orthorhombic, aggregates of slender fibers, pearly white.

Steeleite. Partly altered mordenite. Chalky balls.

Pseudonatrolite. Hydrous Ca, Al silicate. Minute needles.

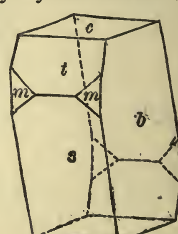
Heulandite Group. Monoclinic. Range of Hardness 3·5—4·5

1880 **438. Heulandite.** $5H_2O.CaO.Al_2O_3.6SiO_2$. Monoclinic, unit prism *m*, orthodomes *s* and *t* and clinopinacoid *b*, tabular || *b* (pearly), small, brilliantly symmetrical, clear. .75

1881+ unit prism *m*, clinopinacoid *b* (pearly), orthodomes *s* and *t* and base *c* (fig.), yellowish-white. .75

1882 ditto, curved, brilliant snow-white, large. 1.50

1883⊙ saddle-shaped group of nearly parallel individuals, large. .75



1881. Heulandite

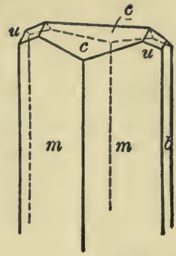
Type No. Species No.

Heulandite—Continued

1884* tabular || clinopinacoid *b* (pearly), copper-red. 1.00

1885⊙439. **Brewsterite.** $(Sr,Ba,Ca)O.Al_2O_3.6SiO_2.5H_2O$. Monoclinic, minute stout prisms, brightly defined, translucent pale yellowish-gray. 2.00

1886⊙440. **Epistilbite.** $CaO.Al_2O_3.6SiO_2.5H_2O$. Monoclinic, twins, tw.pl. orthopinacoid *a*, prismatic (fig.). 1.50

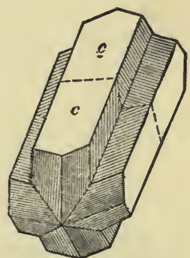


1886. Epistilbite

Phillipsite Group. Monoclinic. Range of Hardness 4—4·5

1887 441. **Phillipsite.** $(K_2,Ca)Al_2Si_4O_{12}+4\frac{1}{2}H_2O$. Monoclinic, simple penetration-twins, tw.pl. base *c*. 1.50

1888 cruciform penetration-twins (preceding twinned, tw.pl. *e*, fig.), small, perfect, opaque white. 1.00



1888. Phillipsite

1889+ ditto, clear glassy, minute. 1.00

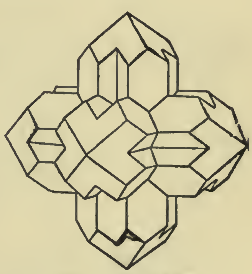
1890⊙ complex penetration-twins (twinning of three of the preceding double twins, tw.pl. *m*, fig.), with phacolite. 1.50

1891⊙ drusy, globular white. 1.00

Spangite. A variety of phillipsite.

1892 S. Offrétite. $(K_2Ca)_2Al_6Si_{14}O_{39}.17H_2O$. Hexagonal, microscopic hexagonal prisms, white. 1.00

1893*442. **Harmotome.** $(K_2,Ba)O.Al_2O_3.5SiO_2.5H_2O$. Monoclinic, cruciform-penetration-twins, tw.pl. *c*, united as fourlings with tw.pl. *e* (fig. 1888), small, brilliant ideal symmetry, white. 1.00


1890. Phillipsite

1894 ditto, aspect of square prism (without re-entrant angle), terminated by diagonal pyramid. 1.00

I. **Wellsite.** $(BaCaK_2)O.Al_2O_3.3SiO_2.3H_2O$. Monoclinic, complex-twins, transparent whitish.

1895⊙443. **Stilbite,** Desmine. $(Na_2,Ca)O.Al_2O_3.6SiO_2.6H_2O$. Monoclinic, penetration-twins, tw.pl. base *c* (fig.), thin tabular || clinopinacoid *b* (pearly), sharply defined, white. 1.00

Type No. Species No. — Stilbite—Continued

1896⊙ sheaf-like groups of preceding in parallel growth (fig.), cream-yellow, large. .60

1897+ ditto, rounded, brown. .40

1898 lamellar-columnar. .40

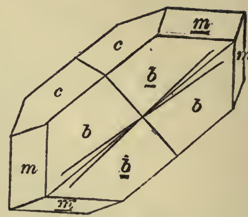
1899* stellate, radio-fibrous. .60

1900 globular. .50

1901 foliated, yellowish. .40

1902⊙ foliated, brick-red. .75

1903 Foresite. Chiefly hyd. Al, Ca silicate. Monoclinic, like stilbite, minute. 2.00



1895. Stilbite

——————————Hardness 4·5

1904⊙**444. Gismondite.** $CaAl_2Si_4O_{12}+4H_2O$. Monoclinic, complex twins, pseudo-tetragonal octahedroids, faces rough composite, small. 2.00

1905 II. Bavenite. $3CaO.Al_2O_3.6SiO_2.H_2O$. Monoclinic, minute prisms in spherical groups, whitish. 4.00

——————————Hardness 4—4·5

1906***445. Laumontite.** $4H_2O.CaO.Al_2O_3.4SiO_2$. Monoclinic, square prism *m*, obliquely terminated by orthodome *e*, embedded, copper-red. .40

1907⊙ ditto, sharply developed, white. 1.00

1908 crystalline amygdules in diabase, salmon-red. .40

1909 Leonhardite, altered. 1.00

446. Laubanite. $2CaO.Al_2O_3.5SiO_2+6H_2O$. Fibrous radiating, white, exterior yellowish.

1896. Stilbite

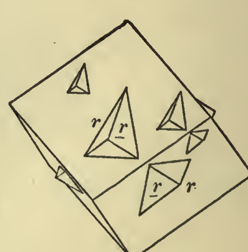
Chabazite Group. Rhombohedral. Range of Hardness 4·5—5

1910 **447. Chabazite.** $(Ca,Na_2)Al_2Si_4O_{12}+6H_2O$. Rhombohedral, cuboid rhombohedron *r*, ideal symmetry, glassy white. .50

1911* ditto, flesh-red, Acadialite. .75

1912+ penetration-twins, tw. axis *c* (fig.), ideal symmetry, lustrous white. .50

1913 ditto, brown. .75



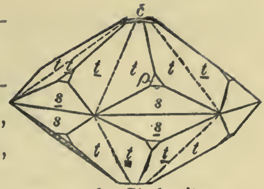
1912. Chabazite

Chabazite—Continued

Type No. Species No.

1914 Haydenite, twinned || R, yellowish, small. 1.00

1915 Phacolite, Herschelite or Seebachite, penetration-twins, ideal pseudo-hexagonal tables, c prominent, small. 1.50



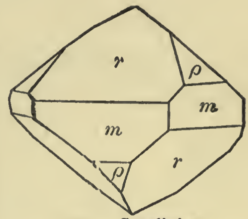
1916. Chabazite

1916° ditto, lenticular (fig.). 1.50

1917° ditto, highly composite cruciform-twins, spherical aspect. 2.00

1918 ditto, drusy-globular. 1.00

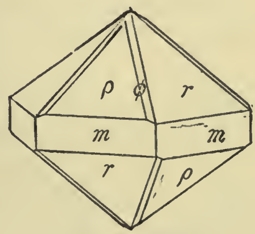
1919°448. **Gmelinite.** $(Na_2,Ca)Al_2Si_4O_{12}+6H_2O$. Rhombohedral, cuboid, rhombohedrons r and ρ with prism m (fig.), small, brightly defined. 1.50



1919. Gmelinite

1920* penetration-twin, tw. axis c, pseudo-hexagonal (fig.), ideal symmetry, small, flesh-red. 1.50

1921 ditto, rounded lenticular, white. 1.50

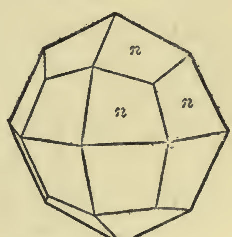


1920. Gmelinite

Groddeckite. Hyd. Fe, Al, Mg, Na silicate. Rhombohedral, clear colorless.

449. **Levynite.** $CaAl_2Si_3O_{10}+5H_2O$. Rhombohedral, twins, whitish.

1922+450. **Analcite.** $Na_2O.Al_2O_3.4SiO_2.2H_2O$. Isometric, trapezohedron n, ideal symmetry (fig.), milky. .75



1922. Analcite

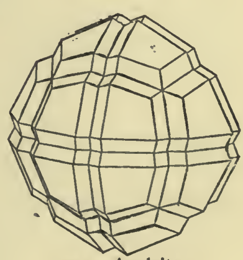
1923 ditto, reddish-white, large. 1.50

1924 composite group of preceding (similar to fig.). 2.00

1925* cube a, truncated by trapezohedron n, (fig.), brilliantly symmetrical, limpid, small, on lava. 1.00

Euthallite, compact, greenish.

Eudnophite, cleavages, unusually strong double refraction.



1924. Analcite

Type No. Species No.

1926⊙451. **Faujasite.** $Na_2O.CaO.2Al_2O_3.10SiO.20H_2O$(?). Isometric, small octahedrons, sharply defined, grayish. 1.00

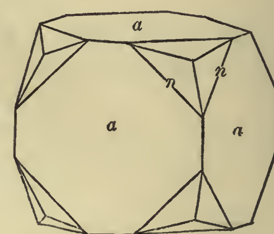
1927⊙452. I. **Edingtonite.** $BaO.Al_2O_3.3SiO_2.3H_2O$(?). Orthorhombic, hemihedral, prismatic cleavage piece, white. 4.00

Natrolite Group. Hardness 5

453. **Natrolite.** $Na_2O.Al_2O_3.3SiO_2+2H_2O$. Orthorhombic.

1. Ordinary varieties:—

1928* (a) square stout unit prism *m* bright, obtuse square unit pyramid *o* dull, ideal symmetry, gray. 1.50



1925. Analcite

1929 ditto, slender, clear colorless, brilliant (fig.), diverging group. 3.00

1930⊙ ditto, very slender, forming surface of large ball with fibro-columnar radiating structure, yellowish-white 1.50

1931 acicular, clear colorless. 1.25

1932⊙ druse of minute prisms, flesh-red, with apophyllite. .75

1933+ (b) radio-fibrous mass, white. .75

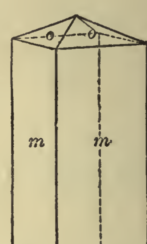
1934 (c) solid amygdules, radiated. .75

1935⊙ (d) compact massive, chalk-white. 1.00

2. Fargite, 4·31 p.c. CaO, red.

3. Iron-natrolite, 10 p.c. iron oxides as impurity, dark green.

Ellagite. SiO_2 47·73, Al_2O_3 25·20, FeO 5·92, CaO 8·72, H_2O 12·81=100·38. Crystalline, pearly yellowish.



1929. Natrolite

1936 454. **Scolecite.** $CaO.Al_2O_3.3SiO_2.3H_2O$. Monoclinic, large prisms, brilliantly terminated, interlacing aggregate, white. 2.00

1937* columnar, divergent. 1.25

radio-fibrous.

1938 455. **Mesolite.** Hyd. Ca, Na, Al silicate. Intermediate between natrolite and scolecite. Monoclinic and triclinic, acicular. 2.50

Type No. Species No. — Mesolite—Continued

1939* downy tufts of diverging hairs. 1.50

1940° radio-fibrous nodules. 1.50

fibrous stalactites, radiated structure.

1941 amorphous, chalk-white. 1.50

1942 I. Gonnardite. $(Ca,Na_2)_2Al_2Si_5O_{15}+5\frac{1}{2}H_2O$. Orthorhombic (?) radio-fibrous amygdules, silky-white. 1.00

Thomsonite Group. Hardness 5—5·5

456. **Thomsonite.** $(Na_2,Ca)O.Al_2O_3.2SiO_2.\frac{5}{2}H_2O$. Orthorhombic.

1. Ordinary varieties:—

1943° (a) Rectangular prisms, base *c* prominent, glassy pearly. 2.50

1944* (b) Slender prisms, small, indistinct, forming surface of a radiated encrustation, with analcite. 1.00

(c) Radio-fibrous.

1945+ (d) Spherical concretions (amygdules), compactly radio-fibrous with concentric zones of white and shades of red, precious. .50

1946 ditto, rolled pebbles (lot). .50

1947 Lintonite, spherical amygdules, compact, translucent sage-green. .75

1948° spherules, compact, translucent pearly. .75

1949 filmy coating on calcite rhombs, translucent pearly. .75

1950 Ozarkite, radiated, white. .75

1951 2. Mesole, Faroelite, radio-lamellar spherules. 1.00

3. Chalilite, compact reddish-brown.

Picrothomsonite. Hyd. Al, Mg, Ca silicate. Radio-lamellar masses, pearly.

1952 457. **Hydronephelite.** $2Na_2O.3Al_2O_3.6SiO_2.7H_2O$. Hexagonal (?), radiated massive, altered from sodalite. 1.25

Ranite, altered from elæolite.

II. Lotrite. $4SiO_2.2(Al,Fe)_2O_3.3(Ca,Mg)O.2H_2O$. Massive, green.

II. Lasallite. $MgO.Al_2O_3.5SiO_2.3\frac{1}{2}H_2O$(?). Fibrous, snow-white.

II. Melite. $2(Al,Fe)_2O_3.SiO_2.8H_2O$. Prismatic, massive, bluish-brown.

Appendix to Zeolites

Type No. Species No.

1953 Chlorastrolite. Impure hyd. Al,Ca, etc. silicate. Amygdules, stellated-mosaic structure, pearly sage-green. 1.00

1954° ditto, rolled pebbles, precious (lot). .50

1955 Zonochlorite. Impure hyd. Al,Ca,Fe, etc. silicate. Banded amygdules, sage-green. 3.00

Sasbachite. Hyd. Al, Ca, K silicate. Massive.

Sloanite. Chiefly hyd. Al, Ca silicate. Radiated masses, pearly.

II. Mica Division

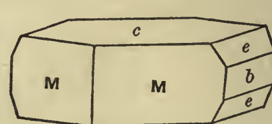
Monoclinic species with highly perfect basal cleavage, easily yielding thin laminæ. Their often closely related forms have a rhombic or hexagonal aspect.

1. Mica Group. Monoclinic. Range of Hardness 2·5—3

Laminæ more or less elastic.

458. Muscovite, Potash Mica. Generally $2H_2O.K_2O.3Al_2O_3.6SiO_2$. Monoclinic.

1956 1. Ordinary Muscovite, tapering rhombic aspect, prism *M*, base *c* (rough), large. .75



1957. Muscovite

1957° ditto, with clinopinacoid *b*, hexagonal outline, tabular (similar to fig.), green, in lava. .75

1958+ ditto, base (bright cleavage), gray, very large. .20

1959° rhombic outline, prism *M*, bright cleavage || *c*, very large, gray. .30

1960 2. Damourite, small silky-gray scales, coating corundum. .40

1961+ Damourite, curved scales, pearly gray. .40

1962* Margarodite, scaly granular, pearly yellowish-white, with tourmaline, dravite. .40

1963 Margarodite, very coarse scaly-granular, pearly-gray, with topaz. .60

1964° Gilbertite, small spherical groups of hexagons, pale olive-green, with fluor, etc. .75

Type No. Species No.

1965 ditto, yellowish-white, pearly. .75

1966 Ivigtite, disseminated in cryolite. .50

1967⊙ Sericite, fine scaly-fibrous schist, silky. .30

Pycnophyllite, spherical masses, greasy feel, green.

1968⊙ 3. ONCOSINE, compact, green. 1.00

1969* Fuchsite, 1 to 4 p.c. Cr_2O_3. Very fine scaly-granular, greenish. .50

1970 Avalite. 14·59 p.c. Cr_2O_3. Earthy mass of microscopic scales, with cinnabar, etc. 1.50

Oellacherite. 4·65 to 5·82 p.c. BaO.

I. Baddeckite. 25·82 p.c. Fe_2O_3. Small scales, pearly copper-red.

PINITE is a general term for numerous alteration-products. It is essentially aluminium and potassium hydrous silicate, often closely corresponding to muscovite, and is probably a compact and usually very impure variety of this species.

1971⊙ Pinite. Altered iolite. Octagonal prisms with base, distinct, loose. .30

Gigantolite. Altered iolite. Very large 12-sided prisms.

1972 Gieseckite. Altered nephelite. Large hexagonal prisms, grayish. .75

Lythrodes. Regarded as altered nephelite.

1973 Liebenerite. Altered nephelite. Small hexagonal prisms, embedded, greenish. .75

1974 Dysyntribite. Altered nephelite. Massive, waxy, mottled greenish and reddish. .40

Rosite. Altered anorthite. Granular, red.

Polyargite. Altered anorthite. Lamellar, reddish.

1975 Pinitoid. Altered feldspar. Massive, green. .50

1976⊙ Agalmatolite, Pagodite. A general term for a soft, compact, easily carved, mottled pinite. (Includes also compact pyrophyllite and steatite). Carved piece. 1.00

1977 Oösite. Altered iolite. Reddish prisms. .40

1978 Cataspilite. Altered iolite, with a little more CaO than the foregoing. Rounded gray prisms in schist. .50

1979⊙459. **Paragonite**, Sodium Mica. $2H_2O.Na_2O.3Al_2O_3.6SiO_2$. Massive, microscopic scales, laminated, pearly grayish-white, with cyanite. .50

Type No. Species No. Paragonite—Continued

Cossaite, compact, greenish.

1980 Euphyllite. Na-K-mica between muscovite and paragonite. Pearly white, with corundum. 1.25

1981⊙**460. Lepidolite**, Lithia Mica. $KLi[Al(OH,F)_2]Al(SiO_3)_3$. Aggregates of short prisms, slightly rounded termination, pearly pale reddish-lilac. 1.00

1982 ditto, tabular, whitish. 1.00

1983⊙ cleavable plates, gray. .40

1984+ coarse scaly-granular, deep lilac. .20

1985 fine scaly-granular, pale lilac. .20

II. Irvingite.

I. Cookeite. Monoclinic. Hyd. lithia mica. Slender six-sided prisms.

1986⊙ fine scaly-granular, whitish. .50

1987⊙**461. Zinnwaldite**, Lithium-iron Mica. $(K,Li)_3FeAl_3Si_5O_{16}(OH,F)_2$. Monoclinic, rosette-like groups of six-sided tables, gray. 1.50

1988* very coarse cleavable-granular, pearly dark-gray. .40

Rabenglimmer, 19·78 p.c. Fe_2O_3. Dark gray.

1989 Cryophyllite, only 16 p.c. Al_2O_3. Strongly pleochroic: 𝔠 violet, 𝔟 greenish-gray. .75

Polylithionite, only 12 p.c. Al_2O_3.

Protolithionite. A dark lithium-iron mica.

462. Biotite, Magnesium-iron Mica. $(H,K)_2(Mg,\overset{II}{Fe})_2(Al\overset{III}{Fe})_2(SiO_4)_3$. Monoclinic. Pleochroism strong.

NOTE—Tschermak classes biotite thus: I. Meroxene. Ax.pl. || *b*, including nearly all varieties. II. Anomite. Ax.pl. ⊥ *b*, rare.

1990* six-sided tables, translucent green, small, in lava. .60

1991 ditto, scale-like, clear brown. .75

1992+ broad cleavage, basal, black. .20

1993⊙ Barytbiotite, 6·84 p.c. BaO. 1.25

Chromglimmer, 5·90 p.c. Cr_2O_3.

1994 Siderophyllite. $3H_2O.6(K,Na,Li)_2O.21FeO.10Al_2O_3.30SiO_2$. Black. .75

Haughtonite. Mg largely replaced by Fe. Blackish.

1995⊙ Manganophyllite. 5·41 to 21·40 p.c. MnO. Tabular, bronze-red. 1.25

1996 mass of fine scales. .75

1997⊙ Rubellan. Altered biotite. Hexagonal forms in basalt, copper-red. .50

Type No. Species No.

Hydrated biotites:—Eukamptite, Voigtite, Rastolyte, Hydrobiotite.

Pseudobiotite. Altered biotite. Chiefly Al,Fe,Mg silicate.

Bastonite. Altered iron mica. Pearly.

1998⊙462A. PHLOGOPITE, Magnesia Mica. $\overset{\mathrm{I}}{R}_3Mg_3Al(SiO_4)_3$, with $\overset{\mathrm{I}}{R}$=H,K,MgF. Monoclinic, very large coarse six-sided tabular prism with basal cleavage. Very thin sheets show strong asterism (six-rayed-star), when held close to the eye, in viewing a candle-flame. Phenomenon due to minute acicular inclusions. Pearly bronze-brown. .75

1999 large coarse tapering six-sided prism (fig.), copper-red. .75


1999. Phlogopite

2000+ cleavage showing parting on edge, asteriated (see 1998) pearly bronze-brown. .20

2001 cleavage, green. .40

2002⊙462B. LEPIDOMELANE. $(H,K)_2Fe_3(FeAl)_4(SiO_4)_5$. Monoclinic, small six-sided tables, adamantine black. .60

Pterolite. An altered lepidomelane. Scaly massive, pearly.

I. Alurgite. $HR_2(AlOH)Al(SiO_3)_4$. Monoclinic, scaly massive, purple.

——————————Soft

2003⊙463. Roscoelite. $H_8K(Mg,Fe)(Al,V)_4(SiO_3)_{12}$(?). Small scales in fan-shaped groups, pearly dark-brown. 3.00

II. Moravite. $H_4Fe_2(Al,Fe)_4Si_7O_{24}$. Foliated, black.

2. Clintonite Group. Monoclinic. Hardness 4·5 (Ottrelite 6—7). Basic. Laminæ brittle

2004 464. Margarite. $H_2CaAl_4Si_2O_{12}$. Monoclinic, very thin tabular $\parallel c$, gray. 2.00

2005+ laminated, pearly grayish-pink. .75

2006⊙ schistose, pearly grayish green, with lawsonite. .50

2007*465. Seybertite. $3H_2O.10(Mg,Ca)O.5Al_2O_3.4SiO_2$. Monoclinic.

1. Clintonite, foliated crystalline, pearly submetallic reddish-brown. .75

Type No. | Species No. | Seybertite—Continued

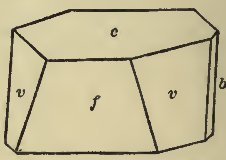
2008 2. Brandisite, hexagonal prisms. 1.25

465A. XANTHOPHYLLITE. $H_8(Mg,Ca)_{14}Al_{16}Si_5O_{52}$(?). Monoclinic, crystalline crust.

2009⊙ Waluewite, tabular || *c*, green. 1.25

466. **Chloritoid.** $H_2(Fe,Mg)Al_2SiO_7$. Monoclinic or triclinic.

1. Original chloritoid, large curving laminæ, mottled green.



2013. Clinochlore

2010 2. Sismondine, with glaucophane. 1.00

3. Salmite. 8·40 p.c. Mn. Saccharoidal masses, gray.

2011+ 4. Masonite, mass of plates, blackish-green. .35

467. OTTRELITE. $H_2(Fe,Mn)Al_2Si_2O_9$(?). Monoclinic or triclinic, hexagonal crystalline scales.

Venasquite, $H_2FeAl_2Si_3O_{11}$. Crystalline radio-lamellar.

2012⊙ Phyllite, small black crystalline scales, in schist. .30

I. Cosmochlore. Cr silicate. Monoclinic(?), emerald-green.

3. Chlorite Group

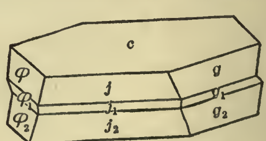
Monoclinic. Hardness 2·5 (Prochlorite 1—2)

Ferrous iron gives to most of these species a green color. They are closely related to the micas in their monoclinic form, basal cleavage and optical characters, but their laminæ are comparatively inelastic. The Chlorites are essentially silicates of aluminium with ferrous iron and magnesium, and chemically combined water, manganese rarely replacing the ferrous iron. Tschermak calls those members of the group which occur in distinct crystals or plates, Orthochlorites; and the fine scaly or indistinctly fibrous forms, Leptochlorites.

468. **Clinochlore**, Ripidolite. $4H_2O.5MgO.Al_2O_3.3SiO_2$. Monoclinic.

1. Ordinary varieties:—

2013⊙ (a) hexagonal crystal, tabular || base *c*, (fig.), dark green, with chondrodite. 1.00



2015. Clinochlore

2014 large rhombic crystal. 2.50

2015 twins, *penninite law*, tw.pl. base *c* (fig.). 1.00

2016+ cleavage plate, green. .50

Type No. Species No.

2017 (b) foliated, green. .75

(c) massive, green.

2018⊙ 2. Leuchtenbergite, large rough tabular hexagon, pale grayish-green. 2.00

3. Kotschubeite, 4 to 11·39 p.c. Cr_2O_3, rhombic habit, red.

4. Manganiferous, 2·3 p.c. MnO, steep rhombs built up of lamellæ in twinning position.

468A. PENNINITE. $H_8(Mg,Fe)_5Al_2Si_3O_{18}$. Monoclinic, pseudo-rhombohedral.

2019* 1. Penninite, hexagonal prisms, pearly base, dark green. 1.00

2020 tapering trigonal to hexagonal prisms, loose (6). .75

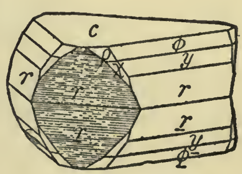
2021 small crested groups of hexagonal tables. 1.00

2022⊙ twins, *penninite law*, tw. pl. *c* (fig.), on chromite, small. .50

2023 2. Kämmererite, small hexagonal forms bounded by steep six-sided pyramids, red, on chromite. 2.00

2024⊙ Kämmererite, fibro-lamellar, pale violet. .75

3. Loganite, altered amphibole, brown.



2022. Penninite

Pseudophite, compact talc-like, green.

2025 **469. Prochlorite, Chlorite.** $H_{40}(Fe,Mg)_{23}Al_{14}Si_{13}O_{90}$. Monoclinic, six-sided prism, vermicular, green. 2.00

2026⊙ spheroidal groups of six-sided tables. 1.00

2027 foliated. .75

2028+ fine scaly-granular, green. .30

II. Pycnochlorite, contains Mg, massive, grayish-green.

Grochauite. Chiefly hyd. Mg,Al silicate. Monoclinic (?), small rough tabular hexagons.

2029 **470. Corundophilite.** $H_{20}Mg_{11}Al_8Si_6O_{45}$. Monoclinic, six-sided tables, dark green, with emery and diaspore. 2.00

2030⊙ foliated, with emery, etc. .75

Amesite. Approximately $H_4(MgFe)_2Al_2SiO_9$. Foliated talc-like, pearly apple-green, with diaspore.

Type No. Species No.

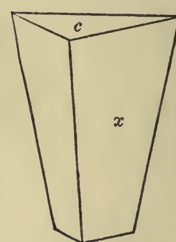
Range of Hardness 1—3·5

471. Daphnite. $H_{56}Fe_{27}Al_{20}Si_{18}O_{121}$. Monoclinic, spherical aggregates, concentric radio-foliated structure, pearly dark green.

2031 Metachlorite. Hyd. Al,Fe silicate. Foliated-columnar, dull leek-green. 1.25

2032 Klementite. SiO_2 27·13, Al_2O_3 24·70, Fe_2O_3 5·84, FeO 9·72, MnO 1·98, MgO 20·52, H_2O 11·35=100·24. Thin scales, olive-green. 1.00

II. Brunsvigite. $6SiO_2.2Al_2O_3.9MgO.8H_2O$. Crypto-crystalline, radio-foliated masses, olive-green.



2033. Cronstedtite

2033⊙**472. Cronstedtite.** $4FeO.2Fe_2O_3.3SiO_2.4H_2O$(?). Rhombohedral, hemimorphic, tapering trigonal unit pyramid *x* and base *c* (fig.), small, ideal symmetry, brilliant black. 2.00

2034 cylindroidal groups of prisms, small but distinct. 2.00

2035⊙**473. Thuringite.** $8FeO.4(Al,Fe)_2O_3.6SiO_2.9H_2O$. Massive, Green. .50

2036 Chamosite, Berthierine. Hyd. Fe, Al silicate. Massive. .50

II. Stilpnochloran. Alteration-product of Thuringite.

474. Stilpnomelane. $2(Fe,Mg)O.(Fe,Al)_2O_3.5SiO_2.3H_2O$(?). Crystalline plates.

2037⊙ Chalcodite, velvety coating of microscopic scales, brass-like luster, brown, with ankerite. .75

475. Strigovite. $2FeO.(Fe,Al)_2O_3.2SiO_2.2H_2O$ (at 100°), or with $3H_2O$ (air-dried). Microscopic hexagonal prisms, dark green altering to brown.

2038 **476. Diabantite.** $12(Fe,Mg)O.2Al_2O_3.9SiO_2.9H_2O$. Monoclinic (?), massive, greenish-black. .50

2039 **477. Aphrosiderite.** $H_{10}Fe_6(Fe,Al)_4Si_4O_{25}$(?). Mass of microscopic hexagonal scales, clear olive-green. .50

2040⊙**478. Delessite.** $H_{10}(Mg,Fe)_4(Al,Fe)_4Si_4O_{23}$(?). Massive, scaly fibrous, green. .75

479. Rumpfite. $7MgO.8Al_2O_3.10SiO_2.14H_2O$. Massive granular, vermicular groups of microscopic hexagonal scales, greenish-white.

Type No. Species No.

II. Spodiophyllite. $(Na_2K_2)_2(Mg,Fe)_3(Fe,Al)_2(SiO_3)_8$. Hexagonal micaceous prisms, gray.

Other Chloritic Minerals, Imperfectly Defined

Epichlorite. Hyd. Al, Fe, Mg silicate. Fibro-columnar, dull leek-green.

Euralite. Hyd. Fe,Al,Mg silicate, near diabantite. Massive, greenish-black.

2041 Chlorophæite. Near delessite and hisingerite. Granular amygdules, blackish-green. .40

Epiphanite. SiO_2 37·11, Al_2O_3 21·13, FeO 20·00, MgO 14·03, H_2O 7·83=100·10.

Melanolite. Chiefly hyd. Fe silicate. Crusts.

Ekmannite. Chiefly Fe, Mn silicate. Foliated.

Berlauite. Chiefly hyd. Al, Fe, Mg silicate. Scaly mass, green.

Steatargillite. Hyd. Al, Fe, Mg silicate. Earthy amygdules, whitish.

Pattersonite. Hyd. Al, Fe, Mg, K silicate. Scaly.

Appendix to Micas—Vermiculites. Soft

Indefinite alteration-products of the micas, etc. Remarkable vermiform exfoliation on ignition. Laminæ generally pearly.

2042*480. **Jefferisite.** Approximately $\overset{\text{I}}{R}_3(AlO_2)MgSiO_4.3H_2O+H_2Mg_2Al_2(SiO_4)_3.3H_2O$. Broad crystalline cleavage plates, yellowish-brown. .40

II. **Tænislite.** $(K,Li)_2O.MgO.3SiO_2.2H_2O$(?). Monoclinic, micaceous blades, colorless with blue tinge.

2043 Vermiculite. SiO_2 35·74, Al_2O_3 16·42, FeO 10·02, MgO 27·44, H_2O 10·30=99·44. Scaly-massive. .75

Kerrite. A trihydrated phlogopite. Fine scales.

Lucasite, Philadelphite, Maconite and Dudleyite are Hyd. Mg, Fe, Al, K silicates.

2044 Lennilite. Hyd. Al, Fe, Mg silicate. Foliated, green. .75

2045 Hallite. Hyd. Mg, Fe, Al silicate. Large rough hexagonal micaceous prisms. .75

2046 Protovermiculite. Hyd. Fe, Mg, Al silicate. Broad micaceous plates, silvery yellowish. .40

Type No. Species No.

Vaalite. Hyd. Mg, Fe, Al silicate. Hexagonal prisms.

2047 Pyrosclerite. Hyd. Mg, Al silicate. Disseminated scales, apple-green. 1.25

2048 Roseite. SiO_2 35·38, Al_2O_3 30·30, MgO 14·66, H_2O 19·88 = 100·32. Spherical groups of small distinct hexagons, pearly drab. .50

Willcoxite. Chiefly hyd. Al, Mg and alkali silicate. Pearly whitish talcose scales.

III. Serpentine and Talc Division

Range of Hardness 2·5—3·5 (Talc 1)

481. **Serpentine.** $3MgO.2SiO_2.2H_2O$. Monoclinic.

A. In Crystals, Pseudomorphs. See altered chrysolite, pyroxene, chondrodite, etc.

2049 In crystals, *i.e.* perfect cubic parting (pseudomorphous?), in part crystalline, pearly. 1.50

B. Massive.

1. Ordinary massive:—

2050 (a) Noble, translucent pale oil-green, veined, polished. .75

2051* Noble, translucent rich oil-green. .30

2052 (b) Common, compact, dark green. .30

2053+ common, granular, light green. .20

2054 2. Resinous, Retinalite, waxy translucent yellowish. .40

3. Porcellanous, compact smooth.

2055° 4. Bowenite, very fine granular, translucent pale apple-green. .40

C. Lamellar.

5. Antigorite, thin lamellar, brownish-green.

2056* 6. Williamsite, sublamellar, impure, translucent leek-green. .30

2057 ditto, more compact, precious, polished. 1.00

D. Thin Foliated.

2058° 7. Marmolite, pearly whitish. .50

8. Thermophyllite, pearly brownish.

E. Fibrous.

2059+ 9. Chrysotile or Serpentine Amianthus, the principal Asbestus of commerce. See also amphibole. Olive-green solid mass of extremely fine and long white silken threads, easily separable. .50

Serpentine—Continued

Type No. Species No.

2060 ditto, veins of short threads in massive serpentine. .50

II. Radiotite. $3MgO.2SiO_2.2H_2O$. Fibrous, yellow.

2061° 10. Picrolite, long splintery fibrous, leek-green. .40

2062 ditto, pale grayish. .50

E. SERPENTINE ROCKS, MARBLES.

2063° (a) Verd-antique, mottled green, polished. .75

2064° (b) Ophicalcite, green veined with white limestone, polished. .75

2065 (c) Mottled red in green, polished. 1.00

DOUBTFUL MAGNESIAN SILICATES ALLIED TO SERPENTINE:—

Totaigite. Hyd. Mg, Ca silicate. Pseudomorphous.

Metaxoite. Hyd. Mg, Al, Fe, Ca, Mn silicate. Massive.

Hydrophite. Iron-serpentine. Massive.

2066 Cerolite. Hyd. Mg silicate. Massive, greasy feel, yellowish. 1.50

Limbachite. Hyd. Mg, Al silicate. Massive, whitish.

2067° 482. **Deweylite.** $4MgO.3SiO_2.6H_2O$. Amorphous, translucent greenish. .50

2068* light yellowish, much cracked. .50

2069 manganiferous, dark brown, with franklinite, etc. 1.50

2070+ 483. **Genthite.** $2NiO.2MgO.3SiO_2.6H_2O$. Amorphous, minutely globular, encrusting chromite, apple-green. .50

2071+ 483A. Garnierite. $H_2(Ni,Mg)SiO_4+H_2O$(?), very variable. Amorphous, much cracked, bright apple-green. .50

II. **Nepouite.** $3(Ni,Mg)O.2SiO_2.2H_2O$. Microscopic crystals, green.

2072 DeSaulesite. Hyd. Ni, Zn silicate. Amorphous, emerald-green. 2.00

Pimelite. Hyd. Mg, Ni, Fe, Al silicate. Massive, greasy feel, apple-green.

Alipite. Hyd. Ni, Mg silicate. Earthy, green.

Refdanskite. Hyd. Ni, Mg, Fe, Al silicate. Pulverulent.

484. **Talc.** $H_2O.3MgO.4SiO_2$. Orthorhombic or monclinic. Greasy feel, pearly.

2073* 1. Foliated, light sea-green. .20

2074 foliated, whitish. .30

2. Massive, Steatite or Soapstone:—

2075+ (a) Coarse granular-schistose, grayish. .20

2076° (b) Fine granular, French Chalk, white. .20

Type No. | Species No. — Talc—Continued

2077 (c) Indurated, impure slaty, dark green, dull. .50

3. Pseudomorphous:—

(a) Fibrous, altered from enstatite.

2078⊙ (b) Rensselaerite, wax-like. .30

(c) Pyrallolite, partly altered pyroxene.

2079+485. **Sepiolite**, Meerschaum. $2H_2O.2MgO.3SiO_2$. Very compact earthy, smooth feel, white. .40

486. **Connarite.** $2H_2O.2NiO_2.3SiO_2$(?). Hexagonal(?), small crystals, greenish.

487. **Spadaite.** $5MgO.6SiO_2.4H_2O$(?). Massive, greasy luster, translucent flesh-red.

I. Batavite. $4H_2O.4MgO.Al_2O_3.4SiO_2$. Micaceous, pearly hexagonal scales.

———————Soft

2080*488. **Saponite.** Hyd. Mg, Al silicate, impure(?). Massive. .40

2081⊙489. **Celadonite.** Fe, Mg, K silicate. Earthy, celandine-green. .50

2082 490. **Glauconite.** Chiefly hyd. Fe, K silicate, variable mixture. Amorphous, earthy chloritic, green, in rock. .40

2083* sand, "marl", grayish-green. .20

491. **Pholidolite.** Approximately $5H_2O.K_2O.12(Fe,Mg)O.Al_2O_3.13SiO_2$. Minute crystalline scales, grayish-yellow.

IV. Kaolin Division. Hardness 1—2 (Allophane, Schrötterite 3)

492. **Kaolinite.** $2H_2O.Al_2O_3.2SiO_2$. Monoclinic, 1. Crystals.

2. Ordinary:—

2084+ (a) argilliform, soft clayey, white. .20

2085 (b) fariniform, loose mealy. .20

2086⊙ (c) indurated, Lithomarge, firm compact. .50

3. Ferruginous, red lithomarge.

2087 Rectorite. $2HAlSiO_4 + H_2O$. Monoclinic(?), leathery plates, soapy feel, pearly whitish. 1.00

Leverrierite. $2Al_2O_3.5SiO_2.5H_2O$(?). Orthorhombic(?), hexagonal prisms, pearly brownish.

493. **Halloysite.** $2H_2O.Al_2O_3.2SiO_2 + H_2O$. Massive, clayey.

2088* 1. Ordinary, opaque waxy white. .40

2. Smectite, transparent when moist.

3. Lenzinite, compact, opaline white.

Halloysite—Continued

Type No. Species No.

2089 4. Bole. Impure(?). Some Fe and 24 p.c. H_2O. .40

II. Termierite. Hyd. Al silicate. Clay-like.

494. **Newtonite.** $Al_2O_3.2SiO_2.5H_2O$. Rhombohedral, soft compact mass of microscopic cuboid rhombs, white.

2090◎495. **Cimolite.** $2Al_2O_3.9SiO_2.6H_2O$. Amorphous clayey, adheres to the tongue, whitish. .50

2091◎496. **Montmorillonite.** $H_2Al_2Si_4O_{12}+nH_2O$(?). Massive clayey, rose-red. .50

Razoumovskyn. $Al_2O_3.3SiO_2+6H_2O$(?). Clayey, green.

2092+497. **Pyrophyllite.** $H_2O.Al_2O_3.4SiO_2$. Monoclinic(?), radiated fibro-lamellar, greasy feel, pearly whitish. .75

2093 ditto, brownish. .75

2094◎ compact massive, steatitic, grayish. .50

Neurolite. Hyd. Al silicate. Fibrous, yellow.

Biharite. Hyd. Al, Mg, Ca, K silicate. Massive.

498. **Allophane.** $Al_2SiO_5+5H_2O$. Amorphous, mammillary incrustation, translucent yellowish.

2095+ ditto, sky-blue, cupriferous. .75

2096 ditto, compact mass. .75

Plumballophane, contains some Pb, stalactitic.

2097 Carolathine. Hyd. Al silicate. Mammillary, yellow. 1.00

Samoite. $2Al_2O_3.3SiO_2.10H_2O$(?). Stalactitic, whitish.

499. **Collyrite.** $2Al_2O_3.SiO_2.9H_2O$. Amorphous, greasy feel, adheres to the tongue, white.

2098 500. **Schrötterite.** $8Al_2O_3.3SiO_2.30H_2O$. Amorphous. 1.25

I. Alexandrolite. Contains $H_2O,Al_2O_3,Cr_2O_3,SiO_2$. Amorphous, green.

Appendix to Clays

See the "System of Mineralogy" for brief description of numerous other hydrous aluminous silicates, mostly impure clays and all of doubtful character.

V. Concluding Division. Range of Hardness 3—5·5

2099 501. I. **Cenosite.** $Ca(Y,Er)_2(SiO_3)_4.CaCO_3.2H_2O$. Orthorhombic, small short prisms, greasy brownish. 4.00

2100*502. I. **Thaumasite.** $[(CaOH)CO_2][(CaOH)SO_3][(CaOH)HSiO_4] + 13H_2O$. Hexagonal, loose mass of minute prisms, white. .50

Type No. Species No.

II. **Spurrite.** $2Ca_2SiO_4.CaCO_3$. Monoclinic(?), granular, gray.

2101⊙503. **Uranophane.** $CaO.2UO_3.2SiO_2+6H_2O$. Orthorhombic, massive, lemon-yellow. 2.00

——————Range of Hardness 2—4

2102+504. **Chrysocolla.** $CuSiO_3+2H_2O$. Cryptocrystalline, deep turquois-blue. .50

2103 ditto, finely banded, agate-like. 1.00

2104⊙ ditto, banded with malachite. 2.00

2105 ditto, brecciated, polished. 4.00

2106⊙ botryoidal crust, bluish-green. 1.00

2107 ditto, coated with drusy quartz, affording glistening translucent turquois-blue surface. 4.00

II. **Plancheite.** $15CuO.12SiO_2.5H_2O$. Fibrous, blue.

2108*505. **Chloropal.** $Fe_2O_3.3SiO_2.5H_2O$(?). Amorphous, opal-like, greenish-yellow. .50

Anthosiderite. $2Fe_2O_3.9SiO_2.2H_2O$. Fibrous flowery tufts, yellowish.

I. Hoeferite. $2Fe_2O_3.4SiO_2.7H_2O$. Amorphous, green.

II. Müllerite. $Fe_2O_3.3SiO_2.2H_2O$. Massive, yellowish-green.

506. **Hisingerite.** A hydrated ferric silicate of doubtful homogeneity. Amorphous, compact, brownish.

Scotiolite, contains much Mg, black.

2109 Gillingite. Hydrated ferric silicate. Compact. 2.00

Jollyte. Hyd. Al, Fe, Mg silicate. Compact.

Melanosiderite. $4Fe_2O_3.SiO_2.6H_2O$. Amorphous, compact, vitreous black.

II. Morencite. Silicate of Fe^{III} with H_2O(?). Fibrous, brownish-yellow.

2110⊙507. **Bementite.** Approximately $2MnSiO_3.H_2O$. Foliated-stellate mass, pale grayish-yellow. 2.00

2111 508. **Caryopilite.** Approximately $4MnO.3SiO_2.3H_2O$. Massive, minutely reniform crust, brown. 1.00

2112 509. **Neotocite.** Hyd. Mn, Fe silicate. Amorphous, black. 2.50

Penwithite. $MnSiO_3+2H_2O$. Massive, clear glassy brownish.

II. Bityite. Hyd. Ca,Al silicate, also contains Be, Li, Mg, Na and K. Pseudo-hexagonal, minute plates.

II. Aloisiite. Hyd. silicate containing FeO,CaO, MgO, Na_2O. Amorphous cement in tuff, brown to violet.

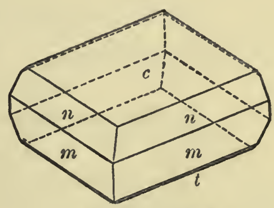
Appendix to Hydrous Silicates

Under this heading in the "System of Mineralogy," will be found brief description of a large number of amorphous, massive and often heterogeneous compounds, mostly of doubtful chemical constitution. They are mainly silicates of magnesium, very frequently with aluminium, iron, calcium, etc.

Titano-Silicates, Titanates. Hardness 5·5—6·5

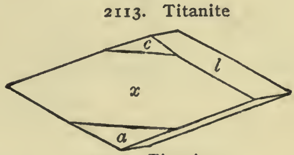
Type No. Species No.

2113+510. **Titanite**, Sphene. $CaO.TiO_2.SiO_2$. Monoclinic, unit prism *m*, pyramid *n*, base *c* (fig.), large, symmetrical wedge-shaped, flattened || *c*, brownish-black, loose. .50



2113. Titanite

2114⊙ orthodome *x*, clinodome *l*, base *c* (similar to fig.), brightly defined, translucent yellowish. 1.00



2114. Titanite

2115 modified pyramidal, small, adamantine translucent brown. 1.00

2116⊙ contact-twin, tw.pl. *a*. 1.50

2117* cruciform-penetration-twin, tw.pl. *a*, brilliant, translucent green. 2.00

2118 cleavage, brownish-black. .50

Titanomorphite, granular, white.

2119⊙ manganesian, Greenovite, rose-red. 1.50

Grothite and Alshedite contain a little Y_2O_3.

Eucolite-titanite contains 2·57 p.c. Ce oxides.

2120⊙ I. **Neptunite.** Fe, Mn, K, Na titano-silicate. Monoclinic, small octahedroids, brilliant black. 2.00

2121 511. **Keilhauite**, Yttrotitanite. $15CaSiTiO_5.(Al,Fe,Y)_2(Si,Ti)O_5$. Monoclinic, large coarse crystal. 2.00

2122* cleavage mass, dark brown. 1.00

2123 512. **Guarinite.** $CaO.TiO_2.SiO_2$. Orthorhombic, minute tables, yellow, in sanidine lava. 3.00

Type No. Species No. ——————Hardness 6 and 5·5

2124 **513. Tscheffkinite.** Chiefly Th and Ce metals titano-silicate. A heterogeneous alteration-product. Massive, vitreous velvet-black. 3.00

2125*514. **Astrophyllite.** $\overset{I}{R}_4\overset{II}{R}_4Ti(SiO_4)_4$, with $\overset{I}{R}$=H, Na, K, and $\overset{II}{R}$= Fe, Mn chiefly, including also the Fe_2O_3. Orthorhombic, very long thin blades, elongated || cleavage by development of brachypinacoid, pearly bronze. .75

2126 ditto, slender squarish prisms, stellated. .75

II. Lorenzenite. $Na_2O.2TiO_2.2SiO_2$. Orthorhombic, minute needles, nearly colorless.

I. Lamprophyllite. Contains SiO_2,Ti,Fe,Mn,Na. Minute flattened prisms, yellow-brown.

2127 **II. Benitoite.** $BaO.TiO_2.3SiO_2$. Rhombohedral, transparent blue. 7.00

II. Narsarsukite. Fe^{III} and Na acidic titano-silicate. Tetragonal, tabular, honey-yellow.

——————Range of Hardness 4—5

2128 **515. Johnstrupite.** A complex Ce, Ca and Na titano-fluo-silicate. Monoclinic, brownish-green. 1.50

2129⊙**516. Mosandrite.** Ce, Ca and Na titano-fluo-silicate. Monoclinic, very rough large flat prism, not terminated, brown. 1.00

517. Rinkite. $(F_8Ti_4)Na_9Ca_{11}Ce_3(SiO_4)_{12}$(?). Monoclinic, flattened || *a*, yellowish-brown.

——————Hardness 5·5

2130*518. **Perovskite.** $CaTiO_3$. Isometric or pseudo-isometric, cube, brownish, loose. .50

2131 highly modified, adamantine blackish, small. 1.00

2132⊙ I. **Knopite.** $RO.TiO_2$, with R=Ce,Zr,Y,Si,Fe,Ca,Mn,Mg, K,Na. Isometric, small cubo-octahedrons, blackish lead-gray. 1.50

I. **Zirkelite.** $(Ca,Fe)O.2(Zr,Ti,Th)O_2$. Isometric, octahedrons, black.

2133 I. II. **Geikielite.** $MgO.TiO_2$. Rhombohedral, rolled pebbles, black. 4.00

2134*519. **Dysanalyte.** Approximately $6(Ca,Fe)TiO_3.(Ca,Fe)Nb_2O_6$. Isometric, perfect cubes, splendent iron-black, loose (6) .50

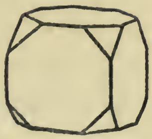
2135 ditto, cubo-octahedrons (fig.), (6). .25

2136 ditto, with monticellite, small. 1.00

Type No. Species No.

II. **Yttrocrasite.** Y earths and Th hyd. titanate. Orthorhombic, pitch-black.

2137 Hydrotitanite. Altered dysanalyte, perfect cubo-octahedrons, dull yellowish-gray, loose (6). .25



2135. Dysanalyte

II. **Delorenzite.** $2FeO.UO_2.2Y_2O_3.24TiO_2$(?). Orthorhombic, prismatic, black.

3. Columbates, Tantalates

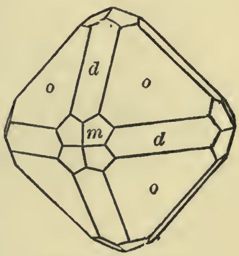
(*Columbates* is the latest international usage; *Niobates* is employed in the "System of Mineralogy.")

Chiefly salts of metacolumbic and metatantalic acid, RCb_2O_6 and RTa_2O_6.

1. Pyrochlore Group. Isometric. Range of Hardness 5—5·5

2138 II. **Chalcolamfrite.** $R^{II}O.(Cb_2O_5).R^{II}F_2$. $R^{II}O.SiO_2$(?). Nb_2O_5 59·65 p.c., SiO_2 10·86, ZrO_2 5·71, CaO 9·08, Na_2O 3·99, F 5·06. Isometric, small octahedrons, dark grayish-brown inclining to red. 1.25

2139*520. **Pyrochlore.** Chiefly Ca, Na and Ce metals columbate with Ti, Th and F. Isometric, octahedron *o*, perfect, brown. 1.25



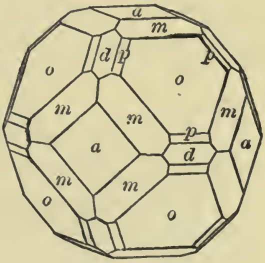
2140. Pyrochlore

2140 ditto, with dodecahedron *d*, trapezohedron *m* (fig.). 2.00

II. Marignacite.

2141 520A. Koppite. Essentially Ce and Ca pyrocolumbate. Isometric, minute dodecahedrons, clear brown. 1.00

521. **Hatchettolite.** U and Ca tantalo-columbate. Isometric, resinous yellowish-brown.



2142. Microlite

2142⊙522. **Microlite.** Essentially $Ca_2Ta_2O_7$. Isometric, octahedron *o*, dodecahedron *d*, trapezohedron *m*, cube *a* (similar to fig.), brown, loose. 1.50

Pyrrhite. (Microlite?). Isometric, microscopic octahedrons, orange-yellow.

2. Fergusonite Group

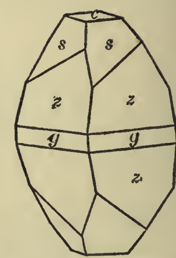
Tetragonal. Hardness 5·5—6

Type No. Species No.

2143+523. **Fergusonite.** (Y,Er,Ce)(Cb,Ta)O_4. Highly radio-active. Tetragonal, hemihedral pyramid *z* prominent, unit pyramid *s*, base *c* (similar to fig.), distinct, dull grayish-brown externally, brilliantly vitreous brownish-black fracture, loose. 1.50

2144 ditto, large, imperfect, in feldspar. 1.50

2145 ditto, fragments with autunite (lot). 1.50



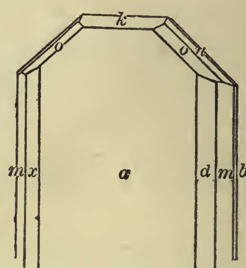
2143. Fergusonite

2146 524. **Sipylite.** Chiefly Er CbO_4. Tetragonal, massive, brownish-black. 3.00

Adelpholite. Fe, Mn columbate. Tetragonal.

3. Columbite Group. Orthorhombic. Hardness 6

2147 525. **Columbite.** (FeMn)Cb_2O_6 with (Fe, Mn) Ta_2O_6. Orthorhombic, macropinacoid *a*, brachypinacoid *b*, macrodome *k*, pyramids *o* and *u*, base *c*, flattened || *a* (fig.), large, distinct, iron-black, loose. 2.00



2147. Columbite

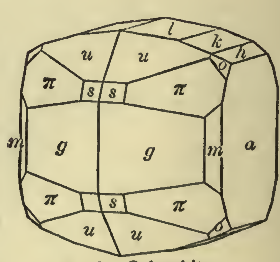
2148⊙ unit prism *m*, prism *g*, macropinacoid *a*, macrodomes *h*, *k* and *l*, several pyramids (similar to fig.), brilliantly defined short prism, loose. 2.00

2149+ imperfect tables, in pegmatite. 1.00

2150⊙ massive. 2.00

Note:—Normal Columbite, the nearly pure columbate, graduates into normal Tantalite, the nearly pure tantalate.

2151⊙526. **Tantalite.** (Fe,Mn)Ta_2O_6 with (Fe Mn) Cb_2O_6. Orthorhombic, minute bright crystals on crystalline mass, with stibiotantalite, iron-black. 2.00



2148. Columbite

Tantalite—Continued

Type No. Species No.

2152 disseminated in pegmatite. 1.50

2153 water-worn grains, lot. 1.50

2154 conglomerate of pebbles, ferruginously cemented. 1.50

2155⊙ Manganotantalite (high in Mn), macropinacoid *a*, brachypinacoid *b* and base *c*, all prominent, dull iron-black, large, loose. 3.00

2156+ Manganotantalite, massive. 1.50

2157 526A. SKOGBÖLITE. $FeTa_2O_6$. Orthorhombic, prisms, black. 2.00

II. **Neotantalite.** Near tantalite in composition. Isometric, octahedral, clear yellow.

Ixiolite. Fe,Mn columbo-tantalate with some Sn. Orthorhombic, rectangular prisms, dark-gray.

2158 II. Stibiotantalite. $(SbO)_2(Ta,Cb)_2O_6$. Orthorhombic, hemimorphic, adamantine, yellowish. 9.00

2159⊙ crystalline rolled pebble, with tantalite, resinous. 2.50

2160 **527. Tapiolite.** $Fe(Ta,Cb)_2O_6$ where Ta : Cb=4 : 1. Tetragonal, square octahedroids, black. 8.00

2161⊙ massive. 4.00

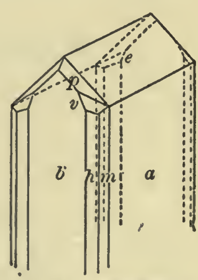
I. **Mossite.** $Fe(Cb,Ta)_2O_6$. Tetragonal, small twins, tw.pl. *e*, black.

II. Strüverite. $FeO.(TaCb)_2O_5.4TiO_2$(?). Tetragonal, iron-black.

4. Samarskite Group. Orthorhombic. Range of Hardness 5—6

2162*528. **Yttrotantalite.** Essentially $\overset{II}{R}\overset{III}{R}_2(Ta,Cb)_4O_{15}+4H_2O$., with $\overset{II}{R}$=Fe,Ca; $\overset{III}{R}$=Y,Er,Ce,etc. Orthorhombic, prisms. 3.00

2163⊙529. **Samarskite.** $\overset{II}{R}_3\overset{III}{R}_2(Cb,Ta)_6O_{21}$, with $\overset{II}{R}$=Fe,Ca,UO_2, etc.; $\overset{III}{R}$=Ce and Y metals chiefly. Highly radioactive. Orthorhombic, macropinacoid *a*, brachypinacoid *b* and macrodome *e*, all prominent (similar to fig.) dull but distinct faces, large, loose. 2.50



2163. Samarskite

2164+ massive, splendent velvet-black. 2.50

S. Hydrosamarskite, 10 p.c. H_2O.

Type No. Species No.

Nohlite. Chiefly U, Y, Fe columbate. Massive, brown.

Vietinghofite. An iron-samarskite. Amorphous.

II. Loranskite. Chiefly $Ta_2O_5, Y_2O_3, Ce_2O_3, CaO, FeO, ZrO, H_2O$. Massive, black.

530. **Annerödite**. Essentially U and Y pyro-columbate. Orthorhombic, prisms.

2165⊙ massive, black. 4.00

2166⊙531. **Hielmite**. Y, U, Fe, Mn and Ca stanno-tantalate and columbate. Orthorhombic, indistinct crystal, black. 2.00

Aeschynite Group

Orthorhombic. Range of Hardness 6—6·5

2167 532. **Æschynite**. Chiefly Ce metals columbate and titanate (thorate). Orthorhombic, flat prism, distinct. 2.50

2168⊙ massive, brownish-black. 1.50

2169⊙533. **Polymignite**. Ce metals, Th, Fe, Ca columbate and titanate (zirconate). Orthorhombic, slender prisms, black. 6.00

534. **Euxenite**. Y, Er, Ce, U columbate and titanate. Highly radio-active. Orthorhombic, prismatic.

2170+ massive, bright vitreous black. 1.50

2171 535. **Polycrase**. Y, Er, Ce, U columbate and titanate. Orthorhombic, prisms tabular || *b*, black. 3.00

2172⊙ II. **Epistolite**. Containing $Cb_2O_5, SiO_2, TiO_2, Na_2O, H_2O, F(?)$. Monoclinic, tabular, pearly-gray. 2.00

II. **Blomstrandine**, Priorite. Y, Er, Ce, U columbate and tantalate. Orthorhombic, tabular, brownish-black.

II. **Endeiolite**. $R^{II}O.(Cb_2O_5)H_2O.R^{II}O.SiO_2$. Cb_2O_5 59·93, SiO_2 11·48, ZrO_2 3·78, Al_2O_3 4·43, CaO 7·89, Na_2O 3·58, H_2O 4·14. Isometric, minute crystals, dark chocolate-brown.

Appendix to Columbates, Tantalates

Blomstrandite. Chiefly U tantalo-columbate and titanate. Massive, vitreous black.

2173 Rogersite. Y etc., columbate. Encrusting, white. 1.50

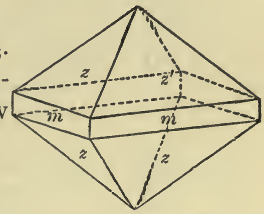
4. Phosphates, Arsenates, Vanadates, Antimonates

A. Anhydrous Phosphates, Vanadates, Arsenates, Antimonates

1. Introductory Subdivision. Hardness 5

Type No. Species No.

2174⊙536. **Xenotime.** Essentially $Y_2O_3.P_2O_5$. Tetragonal obtuse unit pyramid *z*, truncated by narrow unit prism *m* (fig.). 2.00



2174. Xenotime

2175 prism *m* predominating. 3.00

2176+ massive, dull brown. 1.50

II. Hussakite, with small amount SO_3

2177⊙537. **Monazite.** Essentially $(Ce,La,Di)PO_4$. Monoclinic, flattened || orthopinacoid *a*, orthodome *x* also prominent, with prism *m*, pyramids *v* and *r* distinct, opaque dull brown, loose. 1.00

2178⊙ highly modified (fig.), small, brilliantly defined, transparent yellowish-brown. 2.00

2179 contact-twin, tw.pl. *a*, opaque, dull, loose. 1.50

2180 water-worn pebbles, brown (lot). .60

2181+ sand, containing 4 or 5 p.c. ThO_2. .40

II. **Britholite.** Ce metals and Ca silicate and phosphate. Orthorhombic, prisms, brown.

II. **Erikite.** Containing $SiO_2,P_2O_5,ThO_2,(Ce,La,Di)_2O_3,Al_2O_3,Na_2O,H_2O$(?). Orthorhombic, prismatic, brown.

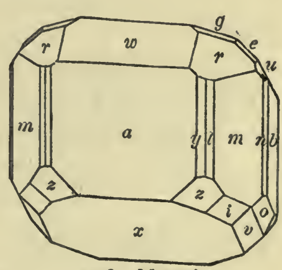
——————————Hardness 5, 6

538. **Berzeliite.** $R_3As_2O_8$, with R=Ca,Mg,Mn. Isometric, trapezohedron *n* truncated by cube *a* and dodecahedron *d*.

2182⊙ massive, resinous yellow. 2.00

I. Soda-berzeliite. 5 p.c. Na_2O.

Pseudoberzeliite. $R_3.As_2O_8$, with R=Ca, Mg, Mn. Orthorhombic(?). Massive, yellow.



2178. Monazite

Type No. Species No.

539. **Monimolite.** $R_3Sb_2O_8$, with R=Pb: Fe=3: 1. Isometric, octahedrons. Varieties:—
1. With Ca.
2. Without Ca.

———————Hardness 3, 2

2183 II. **Graftonite.** $R_3P_2O_8$, with R=Fe,Mn,Ca. Monoclinic, salmon-pink. 8.00

2184⊙540 **Caryinite.** $R_3As_2O_8$, with R=Pb,Mn,Ca,Mg. Monoclinic(?), massive, greasy brown. 2.00

541. **Carminite.** $Pb_3As_2O_8.10FeAsO_4$(?). Orthorhombic, acicular, carmine.

———————Hardness 4

2185 542. **Pucherite.** $Bi_2O_3.V_2O_5$. Orthorhombic, tabular || *c*, minute, distinct. 2.50

2186⊙ minute short needles, adamantine, brown. 2.50

2. Triphylite Group. Orthorhombic. Hardness 4·5—5

2187+543. **Triphylite.** $Li(Fe,Mn)PO_4$. Orthorhombic, massive, bluish-gray. .60

NOTE:—Triphylite with increasing Fe and decreasing Mn, graduates into Lithiophilite.

2188*544. **Lithiophilite.** $Li(Mn,Fe)PO_4$. Orthorhombic, cleavage, resinous pale yellowish-brown. .60

Heterosite. Hyd. Mn, Fe phosphate. Altered triphylite. Cleavages, resinous greenish and bluish-gray, submetallic violet on exposure.

Pseudotriplite. Chiefly hyd. Fe phosphate. Altered triphylite. Incrustation.

Alluaudite. Hyd. Mn, Fe phosphate. Altered triplite(?). Cleavages, brown.

Melanchlor. Hyd. Fe phosphate. Altered triphylite(?). Blackish-green.

545. **Natrophilite.** $Na_3PO_4.Mn_3P_2O_8$. Orthorhombic, massive cleavable, clear wine-yellow.

———————Hardness 6, 5

2189 546. **Beryllonite.** $Na_3PO_4.Be_3P_2O_8$. Orthorhombic, highly complex, colorless. 4.00

2190⊙ crystal fragment, transparent. 1.00

Type No.	Species No.	
2191⊙	547.	I. **Herderite.** $(CaF)BePO_4$. Monoclinic, small short prism, yellowish-white. 4.00
		——————Hardness 4·5
2192	548.	I. **Hamlinite.** $[Al(OH)_2]_3[SrOH]P_2O_7$. Rhombohedral, minute, transparent. 8.00
		II. **Florencite.** $3Al_2O_3.Ce_2O_3.2P_2O_5.6H_2O$. Rhombohedral, clear pale yellow.

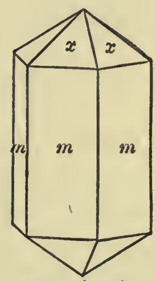
3. Apatite Group. Hexagonal with pyramidal hemihedrism.

Hardness 5, 3·5 and 3

Phosphates, Arsenates, Vanadates of calcium and lead, with chlorine and fluorine.

549. Apatite, ordinary or Fluor-apatite, $3Ca_3P_2O_8+CaF_2$ and Chlor-apatite, $3Ca_3P_2O_8+CaCl_2$, also intermediate compounds. Hexagonal with pyramidal hemihedrism.

1. Ordinary varieties, crystals bright and of ideal symmetry and perfection:—



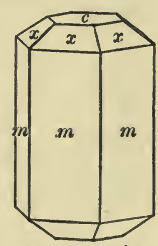
2193. Apatite

2193⊙ unit prism *m*, unit pyramid *x* (fig.), large, greenish-blue. .50

2194+ *m*, *x* with base *c* (fig.), very large, brown, loose. .50

2195 ditto, large green, in calcite. .50

2196⊙ ditto, with second order prism *a*, truncated by unit pyramid *r* and second order pyramid *s*, transparent pale violet-blue, with cassiterite. 1.50



2194. Apatite

2197⊙ highly modified (fig.), brilliant, clear colorless, with epidote. 2.00

2198* ditto, milky, with adularia. 1.00

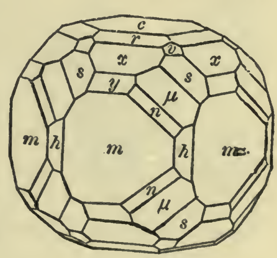
2199⊙ thin tabular || base *c*, unit pyramid *r* (similar to fig.), white, small. 1.00

2200 ditto, truncated by unit prism *m*, translucent pale red. 1.50

2201 acicular prism, clear colorless, in lava. 1.50

2202+ granular massive, sea-green. .20

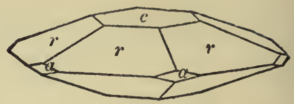
2203 granular massive, brown. .20



2197. Apatite

Type No. Species No. Apatite—Continued

2204⊙ compact massive, yellowish-white. .20



2199. Apatite

2205⊙ Asparagus-stone, unit prism *m*, unit pyramid *x* (similar to fig.), clear pale yellowish-green, brilliant. 1.50

Lasurapatite, sky-blue crystals with lapis.

2206 Francolite, globular groups of small distinct hexagonal tables, translucent greenish-white. 1.50

2. Manganapatite, Mn replaces Ca.

Cupro-apatite. Contains 20·93 p.c. CuO(?).

2207 3. Fibrous concretionary, Phosphorite. .60

2208 4. Earthy apatite, Osteolite, impure altered. .40

Pseudoapatite, altered pyromorphite.

2209* Staffelite, botryoidal concentric incrustation, compact radio-fibrous, translucent yellowish-green. .50

Hydroapatite. A hydrous apatite, mammillary concretions, chalcedony-like, milky.

2210⊙ Phosphatic Nodules, fossiliferous, impure, gray. .20

2211+ Phosphate Rock, fossiliferous, whitish. .20

2212 Phosphate Rock, granular, brown. .20

2213⊙ Guano, organic origin, earthy, brown. .20

550. Pyromorphite. $3Pb_3P_2O_8.PbCl_2$. Hexagonal, pyramidal hemihedrism. 1. Ordinary varieties:—

2214⊙ (a) unit prism *m*, base *c*, bright, sharply symmetrical, brown. 1.00

2215 ditto, translucent pale yellowish-green, small. 1.25

2216+ ditto, dark green. .75

2217⊙ ditto, barrel-shaped. .75

2218 ditto, wax-yellow. 2.00

2219* ditto, tapering parallel grouping, brown (fig.). .30

2220 (b) acicular, brown. 1.50

2221⊙ moss-like group, brown. 1.00

2222 (c) concretionary group. 1.00

(d) fibrous.

2223+ (e) granular massive. .75

(f) earthy, incrusting.


2219. Pyromorphite

2. Polysphœrite, contains CaO. Globular groups.

2224 3. Chromiferous, short acicular, bright orange. 2.50

4. Arseniferous, pale green.

Type No. Species No.

2225⊙ altered to Galena. 1.50

2226⊙ S. Svabite. $H_2O.10CaO.3As_2O_5$. Six-sided prisms. 2.50

551. **Mimetite.** $3Pb_3As_2O_8.PbCl_2$. Hexagonal, pyramidal hemihedrism. 1. Ordinary:—

2227+ (a) minute groups of prisms, pale yellowish-brown. 1.50

2228 minute globular groups, yellow. 1.50

(b) capillary, somewhat asbestiform.

(c) concretionary.

2. Calciferous.

2229⊙ 3. Campylite. 3.34 p.c. P_2O_5. Nearly spherical barrel-shaped hexagons, resinous brownish-red, small, distinct. 2.00

2230+ Endlichite. Nearly equal amounts of $Pb_3As_2O_8$ and $Pb_3V_2O_8$ with PbCl (between Mimetite and Vanadinite). Hexagonal, unit prism *m*, base *c*, adamantine, transparent straw-yellow, ideal symmetry, small. 1.00

2231 ditto, brownish. 1.00

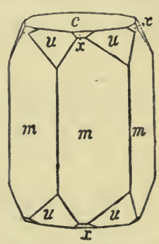
2232 bi-colored slender unit prism *m*, clear straw-yellow, termination red and etched, loose (12). .50

2233⊙ unit prism *m*, unit pyramids *x* and *y*, base *c*, red, loose (3). .50

2234 spherical groups, pale yellow. 1.00

2235⊙ massive, orange. 1.50

2236+552. **Vanadinite.** $3Pb_3V_2O_8.PbCl_2$. Hexagonal, pyramidal hemihedrism, unit prism *m*, base *c*, truncated by unit pyramid *x* and dihexagonal pyramid *u* (fig.), minute, ideal symmetry, adamantine, translucent red. 1.00



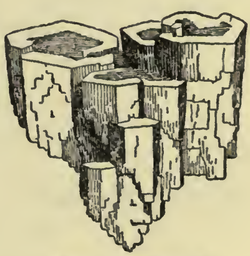
2236. Vanadinite

2237 unit prism *m*, unit pyramids *x* and *y*, base *c*, perfect, clear yellowish-red, minute. 1.50

2238* hollow prisms in tapering groups (fig.), distinct, bright red, loose (6). 1.00

2239 ditto, brown on descloizite. 1.50

2240⊙ barrel-shaped prism *m*, base *c*, ideal symmetry, adamantine, brown, small. 1.00


2238. Vanadinite

Type No. Species No. Vanadinite—Continued

2241 acicular, clear brownish-yellow, small. 1.00
2242⊙ globular incrustation, resinous brownish-yellow. 1.50

I. Hedyphane. A calcium-mimetite. Hexagonal, highly complex pyramidal.

2243⊙ massive, resinous, whitish. 1.50

II. **Georgiadésite.** $Pb_3(AsO_4)_2.3PbCl_2$. Orthorhombic, white.

4. Wagnerite Group. Monoclinic. (RF)RPO_4

Range of Hardness 4—5

2244 553. **Wagnerite.** $Mg_3P_2O_8.MgF_2$. Monoclinic, complex. 4.00
2245 Kjerulfine, large rough crystal. 3.00
2246* Kjerulfine, massive, pale yellowish. 2.00

Cryphiolite. P_2O_5 47·59, MgO 33·72, CaO 14·74. Monoclinic, tabular || *a*, small, clear honey-yellow, in lava.

554. **Spodiosite.** $Ca_3P_2O_8.CaF_2$(?). Orthorhombic(?), flattened || *b*, prisms, grayish.

2247*555. **Triplite.** Fe,Mn,Ca,Mg phosphate, with F. Monoclinic, massive, resinous-brown. .50

Zwieselite, Fe and Mn only, clove-brown.

Talktriplite, much Mg and Ca, grains, yellowish.

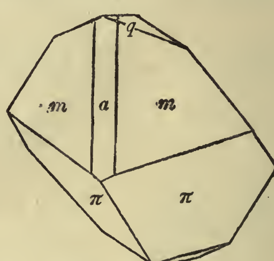
2248⊙ Griphite. Mn, Al, Ca, Na, Fe phosphate. Massive, resinous blackish-brown. .40

Sarcopside. Impure altered triplite(?).

2249⊙556. **Triploidite.** $4(Mn,Fe)O.P_2O_5.H_2O$. Monoclinic, crystalline, clear yellowish. 2.00

S. I. **Adelite.** $(MgOH)CaAsO_4$. Monoclinic, grayish.

I. **Tilasite** (Fluor-Adelite). (Mg,F)$CaAsO_4$. Massive, granular.



2251. Durangite

2250⊙557. **Sarkinite.** $4MnO.As_2O_5.H_2O$. Monoclinic, elongated || axis *b*, flattened || *a*, minute, rose-red. 2.50

5. Amblygonite Group

Monoclinic, Triclinic. Hardness 5 and 6

2251⊙558. **Durangite.** $AlAsO_4.NaF$. Monoclinic, oblique pyramids *m* and *π* predominating, (fig.) small, distinct, orange-red, loose (6). 1.00

Type No. Species No.

559. **Amblygonite.** $AlPO_4.LiF$. Triclinic, large coarse crystal.
2252+ cleavage, white. .50

S. Morinite. Contains $H_2O,F,P_2O_5,Al_2O_3,Na_2O$. An amblygonite alteration-product. Monoclinic, crystals.

B. Acid and Basic Phosphates, Arsenates, Etc.

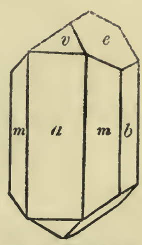
Hardness 3·5

2253 560. **Monetite.** $2CaO.P_2O_5.H_2O$. Triclinic, clear yellowish-white. 1.00

Natrophite. HNa_2PO_4.

Olivenite Group. Orthorhombic. Range of hardness 3—4

2254+561. **Olivenite.** $4CuO.As_2O_5.H_2O$. Orthorhombic, octahedroid, unit prism *m* and brachydome *e* prominent, ideal symmetry, adamantine, blackish-green, small. 1.50



2255. Olivenite

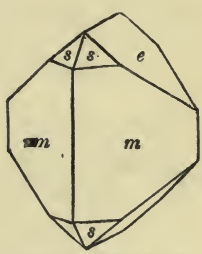
2255° unit prism *m*, macro- and brachypinacoids *a* and *b*, macro- and brachydomes *v* and *e* (fig.). 1.50

2256 acicular, clear olive-green, small. 1.50

2257° fibrous diverging, concentric, greenish. 2.00

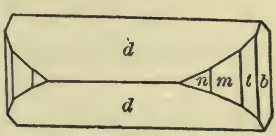
2258 earthy felt-like mass, whitish. 2.00

2259*562. **Libethenite.** $4CuO.P_2O_5.H_2O$. Orthorhombic, octahedroid, unit prism *m* and brachydome *e* predominating (fig.), minute, ideal symmetry, brilliant, dark green. 2.00



2259. Libethenite

2260 563. **Adamite.** $4ZnO.As_2O_5.H_2O$. Orthorhombic, prismatic || axis *b* by extension of macrodome *d*, terminated by several prisms and brachypinacoid *b* (fig.), small, ideal symmetry, brilliant translucent green. 2.00



2260. Adamite

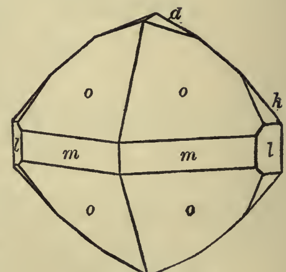
2261 ditto, colorless, minute. 1.00

Type No. Species No. Adamite—Continued

2262* drusy incrustation, bright green. 1.00

II. **Tarbuttite.** $4ZnO.P_2O_5.H_2O$. Triclinic, striated crystals, transparent.

564. **Descloizite.** $4RO.V_2O_5.\ H_2O.$, with R=Pb, Zn chiefly. Orthorhombic, prismatic.



2263. Descloizite

2263* pyramid *o* predominating (fig.), minute, ideal symmetry, brilliant, dark brown. 1.50

2264 drusy globular, crystalline, red. 1.00

2265 mammillary crust, radio-fibrous, brownish-red. 1.00

2266⊙ Cuprodescloizite, drusy botryoidal, dull greenish-black. 1.00

Eusynchite. Massive descloizite(?).

Dechenite. $PbO.V_2O_5$(?). Massive.

2267⊙565. **Calciovolborthite.** $4(Cu,Ca)O.V_2O_5.H_2O$(?). Rosette-like aggregates of small thin scales, pearly green. 4.00

fine crystalline granular, gray.

———Soft

2268 566. **Brackebuschite.** $R_3V_2O_8+H_2O.$, with R=Pb chiefly, also Fe, Mn.(?). Monoclinic(?), small flat prisms, black. 2.50

2269 567. **Psittacinite.** $4RO.V_2O_5.2H_2O$, with R=Pb : Cu=1 : 1(?). Cryptocrystalline coating, green. 6.00

Mottramite (Psittacinite?). Pb and Cu vanadate. Crystalline incrustation, resinous velvety-black.

———Range of Hardness 3—4.5

2270 568. **Erinite.** $5CuO.As_2O_5.2H_2O$. Crystalline groups, concentric mammillary, fibrous structure, fine emerald-green. 2.00

2271 569. **Dihydrite.** $5CuO.P_2O_5.2H_2O$. Monoclinic or triclinic, hemispherical aggregates of small crystals, adamantine, dark emerald-green. 3.00

2272⊙570. **Pseudomalachite.** In part $6CuO.P_2O_5.3H_2O$. Massive, reniform radio-fibrous, dark emerald-green. 1.50

2273 Ehlite. $5CuO.P_2O_5.3H_2O$. 1.50

2274 571. **Clinoclasite.** $6CuO.As_2O_5.3H_2O$. Monoclinic, minute prisms, vitreous dark green. 2.50

2275* hemispherical radio-fibrous. 2.50

Type No. Species No.

572. **Chondrarsenite.** Perhaps $6MnO.As_2O_5.3H_2O$. Embedded grains, translucent yellow.

Xantharsenite. Essentially $5MnO.As_2O_5.5H_2O$(?).

Range of Hardness 3·5—5

(Arseniosiderite 1—2)

2276 573. **Dufrenite.** Partly $2Fe_2O_3.P_2O_5.3H_2O$. Orthorhombic, drusy radio-fibrous. .75

2277+ diverging fibro-columnar, blackish-green. .50

2278 574. **Lazulite.** $(Fe,Mg)O.Al_2O_3.P_2O_5.H_2O$. Monoclinic, unit pyramids *p* and *e*, ideal symmetry, azure-blue. .75

2279 ditto, with orthodome *t*, flattened by extension of one pair of pyramidal planes. .75

2280+ contact-twins, tw.axis *c* (fig.). .75

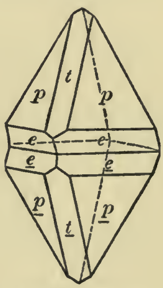
2281⊙ massive, pale greenish-blue. 1.00

I. Gersbyite. P_2O_5 32·26, Al_2O_3 46·68, CaO, FeO, MnO 6·66, MgO 5·33, H_2O 9·07=100. Grains, blue.

575. **Tavistockite.** $3CaO.Al_2O_3.P_2O_5.3H_2O$. Microscopic acicular crystals, pearly white.

576. **Cirrolite.** $6CaO.2Al_2O_3.3P_2O_5.3H_2O$(?). Compact, pale yellow.

2282⊙577. **Arseniosiderite.** $6CaO.4Fe_2O_3.3As_2O_5.9H_2O$. Tetragonal or hexagonal(?), fibro-lamellar concretion, silky golden-brown. 1.50



2280. Lazulite

I. **Retzian.** Mn, Ca and rare earths basic arsenate. Orthorhombic, prismatic, dark-brown.

2283⊙578. **Allactite.** $7MnO.As_2O_5.4H_2O$. Monoclinic, tabular || *a*, minute but distinct, adamantine, translucent pale red. 2.00

2284⊙579. **Synadelphite.** $2(Al,Mn)AsO_4.5Mn(OH)_2$. Monoclinic, minute sharp pyramids, bright brownish-black. 4.00

I. Basiliite. $11(Mn_2O_3.Fe_2O_3)Sb_2O_5.21H_2O$. Foliated, steel-blue.

580. **Flinkite.** $4MnO.Mn_2O_3.As_2O_5.4H_2O$. Orthorhombic, thin tabular || *c*, minute, transparent greenish-brown.

581. **Hematolite.** $(AlMn)AsO_4.4Mn(OH)_2$. Rhombohedral, rhomboids, red, blackening on the surface.

Type No. Species No.

2285⊙582. **Arseniopleite.** $9RO.R_2O_3.3As_2O_5.3H_2O$, with $\overset{II}{R}$=Mn,Ca also Pb,Mg; $\overset{III}{R}$=Mn also Fe. Rhombohedral (?), massive cleavable, brownish-red. 2.00

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583. **Manganostibiite.** $10MnO.Sb_2O_5$(?). Orthorhombic(?), compact, black.

Ferrostibian and Stibiatil. Mn, Fe antimonates. Monoclinic(?), black.

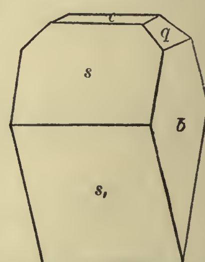
2286⊙584. **Atelestite.** $3Bi_2O_3.As_2O_5.2H_2O$. Monoclinic, tabular || *a*, minute, adamantine, clear sulphur-yellow. 2.00

C. Hydrous Phosphates, Arsenates, Etc.—Normal Division

Range of Hardness 2—2·5

2287⊙585. **Struvite.** $NH_4MgPO_4+6H_2O$. Orthorhombic, hemimorphic, macrodomes *s* s_1, brachypinacoid *b*, base *c* (similar to fig.), distinct, loose. .50

2288 unit prism *m*, macrodome *s*, base *c*, small, loose (3). .50



2287. Struvite

Guano Minerals: See "System of Mineralogy" for brief reference to numerous doubtful compounds.

II. Dittmarite. $MgNH_4PO_4.2Mg_2H_2(PO_4)_2+8H_2O$. Orthorhombic(?), transparent.

II. Schertelite. $Mg(NH_4)_2H_2(PO_4)_2+4H_2O$. Small crystals, transparent.

586. **Collophanite.** $3CaO.P_2O_5.H_2O$. Amorphous, opaline.

587. **Hopeite.** $Zn_3P_2O_8+H_2O$(?). Orthorhombic, minute prisms.

——————Hardness 4—4·5

II. **Parahopeite.** $3ZnO.P_2O_5.4H_2O$. Triclinic, striated crystals, transparent.

588. **Dickinsonite.** $3R_3P_2O_8+H_2O$ with R=Mn,Fe,Na_2, chiefly also Ca,K_2,Li_2. Monoclinic, pseudo-rhombohedral tables, green.

589. **Fillowite.** $3R_3P_2O_8+H_2O$, with R=Mn : Fe(+Ca) : Na_2= 6 : 2 : 1(?). Monoclinic, pseudo-rhombohedral cuboid.

Roselite Group.

Triclinic. Hardness 3·5, 5 and 3·5

Type No. Species No.

2289◎590. **Roselite.** $(Ca,Co,Mg)_3As_2O_8.2H_2O$. Triclinic, minute complex crystal, glassy translucent dark rose-red. 2.50

2290◎591. **Brandtite.** $2CaO.MnO.As_2O_5.2H_2O$. Triclinic, highly modified, prismatic by development of several brachydomes, base *c* prominent, minute, divergent groups, vitreous white. 1.50

592. **Fairfieldite.** $Ca_2MnP_2O_8+2H_2O$. Triclinic, prisms, white.

Range of Hardness 3—3·5

2291 593. **Messelite.** $(Ca,Fe)_3(PO_4)_2+2\frac{1}{2}H_2O$. Triclinic, minute indistinct tables. .75

II. **Anapäite.** $(Ca,Fe)_3(PO_4)_2.4H_2O$. Triclinic, tabular, greenish-white.

Hardness 3·5

594. **Reddingite.** $Mn_3P_2O_8+3H_2O$. Orthorhombic, octahedroids, clear whitish.

595. **Picropharmacolite.** $R_3As_2O_8+6H_2O$, with R=Ca,Mg. Spherical, radio-foliated, white.

Hardness 2·5

596. **Trichalcite.** $Cu_3As_2O_8+5H_2O$. Radio-columnar groups, silky verdigris-green.

2292 Lavendulan. Hyd. Cu arsenate with Co and Ni. Amorphous, lavender-blue. 2.00

Chlorotile. $Cu_3As_2O_8+6H_2O$. Orthorhombic, minute capillary.

Vivianite Group. Monoclinic. Range of Hardness 1—2·5

2293 597. **Vivianite.** $Fe_3P_2O_8+8H_2O$. Monoclinic, large sharply defined prism, flattened || *a*, translucent dark blue, brilliant. 3.00

2294+ ditto, dull. .75

2295 ditto, rounded lenticular. .75

2296◎ stellated group in pyrite. .75

2297◎ acicular, replacing fossils. .75

2298◎598. **Symplesite.** $Fe_3As_2O_8+8H_2O(?)$. Monoclinic, small prisms, translucent greenish. 2.00

Type No. Species No.

599. **Bobierrite.** $Mg_3P_2O_8+8H_2O$. Monoclinic, microscopic prisms, white, in guano.

I. **Hautefeuillite.** $(Mg,Ca)_3P_2O_8+8H_2O$. Monoclinic, lamellar masses, radiated, colorless.

600. **Hœrnesite.** $Mg_3As_2O_8+8H_2O$. Monoclinic, prismatic, flexible folia, white.

2299 601. **Erythrite.** $Co_3As_2O_8+8H_2O$. Monoclinic, acicular, translucent purplish-red. 2.00

2300 ditto, globular, drusy surface. 1.50

2301⊙ foliated-columnar, stellated. 1.50

2302+ earthy, Cobalt Bloom, dull purplish-red. 1.00

2303⊙602. **Annabergite.** $Ni_3As_2O_8+8H_2O$. Monoclinic, earthy, apple-green. 1.00

2304⊙603. **Cabrerite.** $(Ni,Mg)_3As_2O_8+8H_2O$. Monoclinic, minute distinct prisms, flexible folia, clear brilliant apple-green. 4.00

604. **Köttigite.** $Zn_3As_2O_8+8H_2O$. Co and Ni replace some Zn. Monoclinic, light red.

————————Hardness 3·5

605. **Rhabdophanite.** RPO_4+H_2O, with R=La,Di,Y. Massive, brown.

606. **Churchite.** $CePO_4+4H_2O$. Monoclinic(?), minute crystals, pale reddish-gray.

Scorodite Group. Orthorhombic. Hardness 3·5

2305 607. **Scorodite.** $Fe_2O_3.As_2O_5.4H_2O$. Orthorhombic, octahedroid, unit pyramid *p* prominent, sharply symmetrical, vitreous translucent bluish-green, small. 3.00

2306* ditto, minute, pale leek-green. 1.00

2307⊙608. **Strengite.** $Fe_2O_3.P_2O_5.4H_2O$. Orthorhombic, drusy globular, radio-fibrous, red. 2.00

————————Range of Hardness 3·5—5·5

II. **Purpurite.** $2(Fe,Mn)PO_4+H_2O$. Orthorhombic(?), massive, reddish-purple.

609. **Phosphosiderite.** $Fe_2O_3.P_2O_5.3\frac{1}{2}H_2O$. Orthorhombic, prisms, *b* prominent, clear reddish.

610. **Barrandite.** $(AlFe)_2O_3.P_2O_5.4H_2O$. Spheroidal concretions, grayish.

Type No. Species No.

2308*611. **Variscite.** $Al_2O_3.P_2O_5.4H_2O$. Orthorhombic, drusy globular incrustation, translucent deep apple-green. .75

2309⊙ massive, opaque pale green, precious. 1.50

Planerite. Chiefly Al hyd. phosphate. Subcrystalline layers in rock, green.

612. **Callainite.** $Al_2O_3.P_2O_5.5H_2O$. Massive, wax-like, translucent mottled green.

613. **Zepharovichite.** $AlPO_4.3H_2O$. Crystalline, whitish.

2310⊙614. **Koninckite.** $Fe_2O_3.P_2O_5.6H_2O$. Spherical, radiated, transparent yellow. 1.50

I. Minervite. $Al_2O_3.P_2O_5.7H_2O$. Massive, plastic.

II. Gorceixite. $BaO.2Al_2O_3.P_2O_5.5H_2O$. Pebbles, white.

Hydrous Phosphates, Etc.—Acid Division. Hardness 2

615. **Stercorite.** $HNa(NH_4)PO_4+4H_2O$. Monoclinic, crystalline masses, clear whitish.

2311⊙616. **Haidingerite.** $2CaO.As_2O_5.3H_2O$. Orthorhombic, minute crystals, small botryoidal groups, clear whitish. 3.00

Pharmacolite Group. Monoclinic. Hardness 2—2·5

2312*617. **Pharmacolite.** $2CaO.As_2O_5.5H_2O$. Monoclinic, minute needles, stellated, white. 1.25

618. **Brushite.** $2CaO.P_2O_5.5H_2O$. Monoclinic, small prisms, pearly clear whitish.

II. Stoffertite, $2CaO.P_2O_5.6\frac{1}{2}H_2O$.

————————Range of Hardness 2·5—3 (Hureaulite 5)

619. **Metabrushite.** $2CaO.P_2O_5.4H_2O$. Monoclinic, imperfect crystals, yellowish-white.

620. **Martinite.** $5CaO.P_2O_5.\frac{1}{2}H_2O$. Rhombohedral, microscopic rhombs, clear whitish.

2313 621. **Newberyite.** $2MgO.P_2O_5.7H_2O$. Orthorhombic, composite tabular crystal built of distinct individuals (tabular || *a*), arranged parallel, vitreous translucent gray, loose. 1.00

2314⊙ cavernous group of preceding composite tables. .50

2315 622. **Wapplerite.** $2CaO.As_2O_5.8H_2O$. Monoclinic (or triclinic), crystalline incrustation, white. 1.50

Type No. Species No.

Rösslerite. $HMgAsO_4 + 7H_2O$. Crystalline plates, whitish.

623. **Hannayite.** $(NH_4)_2O.3MgO.2P_2O_5.10H_2O$. Triclinic, small slender prisms, yellowish.

624. **Hureaulite.** $5MnO.2P_2O_5.5H_2O$. Monoclinic, short prisms, clear glassy reddish.

2316 625. **Forbesite.** $H_2(Ni,Co)_2As_2O_8 + 8H_2O$. Fibro-crystalline, whitish. 4.00

II. Palmerite. $HK_2Al_2(PO_4)_3.7H_2O$.

Hydrous Phosphates, Etc.—Basic Division

Hardness 1·5—3

626. **Isoclasite.** $4CaO.P_2O_5.5H_2O$. Monoclinic, minute dull crystals, whitish.

627. **Hemafibrite.** $6MnO.As_2O_5.5H_2O$. Orthorhombic, prisms, red, blackening.

———————Range of Hardness 3—5

(Tyrolite and Chalcophyllite soft, Turquois 6)

2317*628. **Conichalcite.** $4(Cu,Ca)O.As_2O_5.1\frac{1}{2}H_2O$. Massive globular, vitreous emerald-green. 1.00

2318⊙629. **Bayldonite.** $4(Pb,Cu)O.As_2O_5.2H_2O$. Minute mammillary concretions, drusy, resinous green. 3.00

630. **Tagilite.** $4CuO.P_2O_5.3H_2O$. Monoclinic, green.

2319 631. **Leucochalcite.** $4CuO.As_2O_5.3H_2O$(?). Acicular, silky greenish-white. 1.00

2320*632. **Euchroite.** $4CuO.As_2O_5.7H_2O$. Orthorhombic, small distinct octahedroids, vitreous emerald-green. 2.00

633. **Volborthite.** $(Cu,Ca,Ba)_3(OH)_3VO_4 + 6H_2O$(?). Minute six-sided tables.

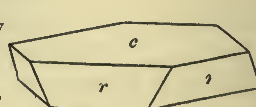
2321 incrustation, green. 3.00

634. **Cornwallite.** $5CuO.As_2O_5.3H_2O$. Massive, green.

2322+635. **Tyrolite.** Perhaps $5CuO.As_2O_5.9H_2O$. Orthorhombic, fan-shaped foliations, green. 1.00

2323 636. **Chalcophyllite.** $7CuO.As_2O_5.14H_2O$(?). Rhombohedral, small six-sided tables, rhombohedron *r*, base *c* (fig.), pearly verdigris-green. 3.00

2324* foliated massive, emerald-green. 2.00



2323. Chalcophyllite

Type No. Species No.

637. **Veszelyite.** $(CuZn)_7(OH)_8(As,P)_2O_8+5H_2O$. Monoclinic (or triclinic?), incrustation, greenish-blue.

2325⊙638. **Ludlamite.** $7FeO.2P_2O_5.9H_2O$. Monoclinic, tabular || *c*, minute, distinct, vitreous pale green. 3.00

2326 639. **Wavellite.** $3Al_2O_3.2P_2O_5.12H_2O$. Orthorhombic, crystal terminations forming surface of radio-fibrous hemispheres, bright green. 2.00

2327⊙ globular, radio-fibrous, yellowish-white. .75

2328⊙ stalactitic, radio-fibrous, grayish-white. 1.50

2329+ stellated fibrous, bright green. .40

2330 stellated fibrous, grayish. .75

2331 reniform, chalcedony-like, brownish. .75

640. **Fischerite.** $2Al_2O_3.P_2O_5.8H_2O$. Orthorhombic, minute crystals, green.

641. **Peganite.** $2Al_2O_3.P_2O_5.6H_2O$. Orthorhombic, indistinct prisms, greenish.

2332+642. **II. Turquois.** $[Al(OH)_2.Fe(OH)_2.Cu(OH).H]_3PO_4$. Massive in matrix, sky-blue, precious. .75

2333⊙ massive, greenish. .50

2334 massive, grayish. .50

2335⊙ **I. Wardite.** $2Al_2O_3.P_2O_5.4H_2O$. Massive, concretionary, light green. 1.25

643. **Sphærite.** $5Al_2O_3.2P_2O_5.16H_2O(?)$. Globular concretions.

2336⊙644. **Liskeardite.** $3(Al,Fe)_2O_3.As_2O_5.16H_2O$. Microscopic needles on fibrous incrustation, white. 2.00

2337⊙645. **Evansite.** $3Al_2O_3.P_2O_5.18H_2O$. Massive, white. 1.00

2338 Cœruleolactite. $3Al_2O_3.2P_2O_5.10H_2O(?)$. Cryptocrystalline, pale sky-blue. .40

Taranakite. Al, K, Fe hyd. phosphate. Massive, yellowish-white.

Berlinite. $2Al_2O_3.2P_2O_5.H_2O$. Compact.

Trolleite. $4Al_2O_3.3P_2O_5.3H_2O$. Compact, pale green.

I. Augelite. $2Al_2O_3.P_2O_5.3H_2O$. Monoclinic, tabular, red.

Attacolite. Al, Mn, Ca, Fe hyd. phosphate. Massive, red.

2339*646. **Pharmacosiderite.** $4Fe_2O_3.3As_2O_5.15H_2O(?)$. Isometric, tetrahedral, minute distinct bright cubes, translucent brown. 1.50

2340⊙ ditto, small, green. 2.50

2341 cube *a*, tetrahedron *o*, distinct. 4.00

Type No. Species No.

2342⊙647. **Cacoxenite.** $2Fe_2O_3.P_2O_5.12H_2O$. Radiated tufts, brownish-yellow. 1.00

2343 velvety incrustation, drusy botryoidal. 1.00

II. Kertschenite. Hyd. basic ferric phosphate, fibrous, dark green.

2344⊙648. **Beraunite.** $3Fe_2O_3.2P_2O_5.8H_2O$. Monoclinic, drusy incrustation. 1.00

2345 Eleonorite, small tabular prisms, brownish-red. 1.50

Globosite. Chiefly hyd. Fe fluo-phosphate. Globular.

Picite. Chiefly hyd. Fe phosphate. Amorphous, brown.

Delvauxite. $2Fe_2O_3.P_2O_5.24H_2O$.

2346*649. **Childrenite.** $(Fe,Mn)Al(OH)_2.PO_4+2H_2O$, (Fe predominates). Orthorhombic, unit prism *m*, pyramid *r*, minute, brilliantly defined, translucent brown. 1.50

2347 650. **Eosphorite.** $(Mn,Fe)Al(OH)_2PO_4+2H_2O$, (Mn predominates). Orthorhombic, indistinct minute prisms in crystalline mass, translucent yellowish. 5.00

——————Range of Hardness 2·5—4·5

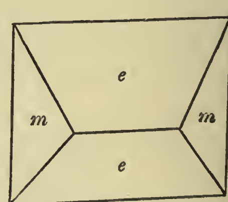
2348 651. **Mazapilite.** $3CaO.2Fe_2O_3.2As_2O_5.6H_2O$. Orthorhombic, small prisms, sharply defined, black. 4.00

652. **Calcioferrite.** $6CaO.3Fe_2O_3.4P_2O_5.19H_2O$. Monoclinic(?), foliated mass.

653. **Borickite.** $Ca_3Fe_2(PO_4)_4.12Fe(OH)_3+6H_2O$(?). Reniform massive, reddish-brown.

2349 Richellite. $4FeP_2O_8.Fe_2OF_2(OH)_2+36H_2O$. Massive, yellow. 1.00

2350*654. **Liroconite.** $18CuO.4Al_2O_3.5As_2O_5.55H_2O$(?). Monoclinic, thin rhombic octahedroids, unit prism *m*, clinodome *e* (fig.), small, sharply symmetrical, translucent bright blue. 2.00



2350. Liroconite

I. Kehoeite. $ZnO.4Al_2O_3.5P_2O_5.9H_2O$. Amorphous, massive.

655. **Chenevixite.** $2CuO.Fe_2O_3.As_2O_5.3H_2O$(?). Massive, greenish.

2351 Henwoodite. Chiefly hyd. Al, Cu phosphate. Botryoidal, crystalline structure, turquois-blue. 2.00

Type No. Species No.

2352⊙656. **Chalcosiderite.** $CuO.3Fe_2O_3.2P_2O_5.8H_2O$. Triclinic, minute distinct crystals in sheaf-like groups, vitreous, translucent dark green. 1.25

Andrewsite. $5Fe_2O_3.P_2O_5.5H_2O$. Radio-globular disks, bluish-green.

657. **Goyazite.** $3CaO.5Al_2O_3.P_2O_5.9H_2O$. Tetragonal or hexagonal, rounded grains, clear whitish.

2353⊙658. **Plumbogummite.** $PbO.2Al_2O_3.P_2O_5.9H_2O$(?). Hexagonal, botryoidal, gum-like, translucent brownish, with pyromorphite. 6.00

2354 ditto, grayish-white on schist. 9.00

Uranite Group.

Hardness 2—2·5 (Walpurgite 3·5, Rhagite 5)

2355+659. **Torbernite.** $CuO.2UO_3.P_2O_5.8H_2O$. Tetragonal, thick square tables, minute, sharply defined, pearly emerald-green. 1.50

2356 ditto, small, extremely thin, transparent. 2.50

2357⊙ ditto, microscopic, yellowish-green. 1.50

2358⊙660. **Zeunerite.** $CuO.2UO_3.As_2O_5.8H_2O$. Tetragonal, thick square tables, minute but distinct, pearly emerald-green. 3.00

2359+661. **Autunite.** $CaO.2UO_3.P_2O_5.8H_2O$. Orthorhombic, thin square tables, minute, pearly sulphur-yellow. 1.25

2360⊙ foliated aggregate, micaceous. 2.50

662. **Uranospinite.** $CaO.2UO_3.As_2O_5.8H_2O$(?). Orthorhombic, thin square tables, siskin-green.

2361⊙663. **Uranocircite.** $BaO.2UO_3.P_2O_5.8H_2O$. Orthorhombic, very thin square tables, pearly translucent yellow-green, small. 3.00

664. **Phosphuranylite.** $3UO_3.P_2O_5.6H_2O$. Pulverulent incrustation of microscopic rectangular scales, pearly lemon-yellow.

665. **Trögerite.** $3UO_3.As_2O_5.12H_2O$. Monoclinic, druses of thin crystals, tabular || *b*, pearly lemon-yellow.

Fritzscheite. A mangan-uranite with some V. Squarish tables, pearly red.

2362 666. **Walpurgite.** $5Bi_2O_3.3UO_3.2As_2O_5.12H_2O$(?). Triclinic, scale-like crystals, yellow. 2.00

Type No. Species No.

2363° I. **Carnotite.** $K_2O.U_2O_3.V_2O_5.3H_2O$(?). Highly radio-active. Microscopic crystals, scale-like, bright canary-yellow. 2.00

2364 amorphous pulverulent mass. 4.00

2365+ ditto, disseminated in sandstone. 1.50

667. Rhagite. Perhaps $5Bi_2O_3.2As_2O_5.9H_2O$. Smooth crystalline aggregates, yellowish.

2366° **668. Mixite.** Perhaps $20CuO.Bi_2O_3.5As_2O_5.22H_2O$. Minute acicular tufts, bright green. 1.50

2367 incrustation, dull green. 1.00

Antimonates; Also Antimonites, Arsenites

A number of antimonates are included among the phosphates, arsenates, etc. Hardness 6 and 4

669. Atopite. Perhaps $2CaO.Sb_2O_5$. Isometric, octahedrons.

Schneebergite. Chiefly Ca and Sb. Isometric, microscopic octahedrons, clear honey-yellow.

2368+ **670. Bindheimite.** Hyd. Pb antimonate. Amorphous, minutely curved-lamellar, resinous yellow, with jamesonite. 1.00

I. **Tripuhyite.** $2FeO.Sb_2O_5$. Micro-crystalline aggregates, dull greenish-yellow.

———————Range of Hardness 3—4 (Romeite 5·5)

I. **Derbylite.** $6FeO.5TiO_2.Sb_2O_5$(?). Orthorhombic, slender prisms.

I. **Lewisite.** $5CaO.2TiO_2.3Sb_2O_5$. Isometric, minute octahedrons.

I. **Mauzeliite.** $4(Ca,Pb)O.TiO_2.2Sb_2O_5$. Isometric, octahedrons, dark brown.

671. Romeite. Perhaps $CaSb_2O_4$. Tetragonal, minute octahedrons, yellow.

2369* **672. Nadorite.** $PbSb_2O_4.PbCl_2$. Orthorhombic, very thin tabular || *a*, yellow and brown. 1.50

2370° **673. Ecdemite.** Perhaps $Pb_4As_2O_7.2PbCl_2$. Tetragonal(?), incrustation, foliated, pearly yellow. 1.50

674. Ochrolite. $Pb_4Sb_2O_7.2PbCl_2$(?). Orthorhombic, small, adamantine sulphur-yellow.

675. Trippkeite. Essentially (nCuO,As_2O_3)(?). Tetragonal, small brilliant octahedrons, bluish-green.

Type No. Species No.

II. Ceraleite, Coeruleite. $CuO.2Al_2O_3.As_2O_3$. Massive, claylike, turquois-blue.

Antimonates or Antimonites of Doubtful Character

2371 Barcenite. Chiefly Sb and Hg. Massive, gray-black. 2.50
Coronguite. Pb, Ag antimonate(?). Amorphous.

Phosphates or Arsenates with Carbonates, Sulphates, Borates. Range of Hardness 2·5—5

2372 676. **Dahllite.** $2Ca_3P_2O_8.CaCO_3.\frac{1}{2}H_2O$. Fibrous crusts, resinous yellowish-white. 2.50
Ciplyte. $4CaO.2P_2O_5.SiO_2$(?).
II. Podolite. $3Ca_3(PO_4)_2.CaCO_3$. Hexagonal, microscopic crystals, yellow.
677. **Diadochite.** Perhaps $2Fe_2O_3.2SO_3.P_2O_5.12H_2O$. Monoclinic, microscopic six-sided tables.
2373⊙ globular, yellowish-brown. 1.00
2374 Destinezite, earthy nodular, yellowish. 1.00
2375⊙678. **Pitticite.** Hyd. Fe^{III} arsenate and sulphate(?). Massive, whitish. 2.00
2376⊙679. **Svanbergite.** Chiefly hyd. Al and Ca phosphate and sulphate. Rhombohedral, small cuboids, red. 3.00
2377 I. **Lossenite.** $2PbSO_4.3(FeOH)_3As_2O_8+12H_2O$. Orthorhombic, acute pyramids, brownish-red. 1.50
II. Harttite. $(Sr,Ca)O.2Al_2O_3.P_2O_5.SO_3.5H_2O$. Hexagonal, pebbles, flesh-red.
2378 680. **Beudantite.** Fe^{III} and Pb phosphate or arsenate with sulphate. Rhombohedral, small bright rhombs. 2.50
681. **Lindackerite.** $3NiO.6CuO.SO_3.2As_2O_5.7H_2O$. Orthorhombic, oblong rhombic tables, vitreous green.
2379 682. **Lüneburgite.** $3MgO.B_2O_3.P_2O_5.8H_2O$. Flat masses. 2.00

Nitrates. Hardness 2

2380+683. **Soda Niter, Chile Saltpeter.** $NaNO_3$. Rhombohedral, crystalline mass, translucent white. .40
2381⊙684. **Niter, Saltpeter.** KNO_3. Orthorhombic, white crust. .60

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685. **Nitrocalcite.** $Ca(NO_3)_2+nH_2O$. Silky tufts, grayish-white.

Type No. Species No.

686. **Nitromagnesite.** $Mg(NO_3)_2+nH_2O$. Efflorescences, white.

687. **Nitrobarite.** $Ba(NO_3)_2$. Isometric, tetartohedral, plus and minus tetrahedrons forming octahedron, colorless.

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688. **Gerhardtite.** $4CuO.N_2O_5.3H_2O$. Orthorhombic, vitreous deep emerald-green.

689. I. **Darapskite.** $NaNO_3.Na_2SO_4+H_2O$. Monoclinic, tabular || *a*, colorless.

690. **Nitroglauberite.** $6NaNO_3.2Na_2SO_4.3H_2O$. Fibrous crystalline, white.

5. Borates. Range of Hardness 6—8

(Ludwigite 5, Warwickite, Szaibelyite, Howlite 3·5)

691. **Nordenskiöldine.** $CaO.SnO_2.B_2O_3$. Rhombohedral, tabular, yellow.

II. Hulsite (=Pageite?). $10(Fe^{II},Mg)O.2Fe_2O_3.SnO_2.3B_2O_3.2H_2O(?)$. Orthorhombic(?), blackish.

692. **Jeremejevite.** $Al_2O_3.B_2O_3$. Hexagonal, long prisms, clear.

2382 693. **Sussexite.** $2(Mn,Zn,Mg)O.B_2O_3.H_2O$. Orthorhombic(?), fibrous, silky whitish. 3.00

2383 694. **Ludwigite.** Perhaps $3MgO.B_2O_3+FeO.Fe_2O_3$. Orthorhombic, reniform, concentric radio-fibrous, black. 3.00

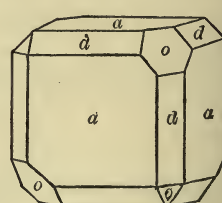
2384* finely fibrous mass, silky black. 1.00

2385⊙695. **Pinakiolite.** $3MgO.B_2O_3+MnO.Mn_2O_3$. Orthorhombic, thin prisms, tabular || *b*, brilliant black. 1.25

696. **Hambergite.** $4BeO.B_2O_3.H_2O$. Orthorhombic, prisms, vitreous whitish.

2386⊙697. **Szaibelyite.** $5MgO.2B_2O_3.1\frac{1}{2}H_2O$. Minute indistinct needles, whitish. 1.50

2387*698. **Boracite,** Stassfurtite. $6MgO.MgCl_2.8B_2O_3$. Isometric tetrahedral externally, orthorhombic and pseudo-isometric in molecular structure. Cube *a* truncated by dodecahedron *d* and tetrahedrons (fig.), small, ideal symmetry, bright, translucent pale gray. .50



2387. Boracite

2388 ditto, octahedron (tetrahedrons *o* and o_1) prominent. .75

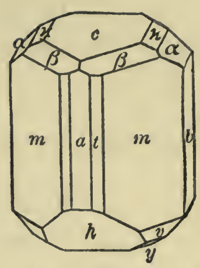
Boracite—Continued

Type No. Species No.

2389 ditto, d prominent, pale green, loose. .75

2390⊙ tetrahedron, truncated by cube a, minute, ideal symmetry, adamantine, clear pale green, loose (3). .50

2391+ massive, white. .40



2395. Colemanite

699. **Rhodizite.** $R_2O.2Al_2O_3.3B_2O_3$, with R= K,Rb,Cs(?). Isometric, tetrahedral, dodecahedrons, vitreous white.

2392⊙700. **Warwickite.** Perhaps $6MgO.FeO.2TiO_2.3B_2O_3$. Orthorhombic, small slender prisms in limestone, dull black. .50

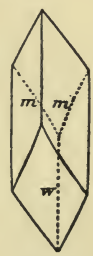
2393⊙701. **Howlite.** $4CaO.5B_2O_3.2SiO_2.5H_2O$. Orthorhombic(?), crystalline nodules, embedded, white. 1.00

——————————Range of Hardness 2·5—4 (Ulexite 1)

702. **Lagonite.** $Fe_2O_3.3B_2O_3.3H_2O$. Earthy, yellow.

2394 703. **Larderellite.** $(NH_4)_2O.4B_2O_3.4H_2O$. Monoclinic, very light mass of microscopic tables, whitish. 2.00

2395⊙704. **Colemanite.** $2CaO.3B_2O_3.5H_2O$. Monoclinic, highly complex, unit prism m prominent (fig.), perfect, adamantine, transparent pale yellow. 1.50



2397. Colemanite

2396⊙ ditto, pyramids prominent, colorless. 1.50

2397 acute pseudo-rhombic, prism m, orthodome W rounded (fig.), sharply defined. 4.00

2398+ cleavage, brilliant, white. .50

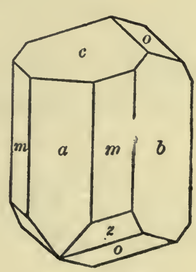
2399 Priceite. $5CaO.6B_2O_3.9H_2O$. Massive, friable chalky, snow-white. .75

2400⊙ Pandermite, compact, porcelain-like. .75

2401⊙705. **Pinnoite.** $MgO.B_2O_3.3H_2O$. Tetragonal, pyramidal hemihedrism, minute prisms, vitreous pale yellow. 2.00

Kaliborite. Hyd. Mg, K borate. Massive, resembling pinnoite.

706. **Heintzite.** $K_2Mg_4B_{18}O_{32}.16H_2O$(?). Monoclinic, clear whitish.



2402. Borax

Type No. Species No.

I. **Ascharite.** $3Mg_2B_2O_5.2H_2O$. Amorphous, white.

2402+707. **Borax.** $Na_2O.2B_2O_3.10H_2O$. Monoclinic, unit prism *m*, ortho- and clinopinacoids *a* and *b*, pyramids *z* and *o*, base *c* (fig.), ideal symmetry, white, loose (3). .40

2403*708. **Ulexite.** $Na_2O.2CaO.5B_2O_3.16H_2O$(?). Very light loose mass of capillary crystals, white. .50

Franklandite. $Na_2CaB_6O_{11}.7\frac{1}{2}H_2O$. Fine fibrous, white.

Cryptomorphite. Hyd. Ca,Na borate. Kernels of microscopic rhombic plates, white.

709. **Bechilite.** $CaO.2B_2O_3.4H_2O$. Crusts, white.

710. **Hydroboracite.** $CaO.MgO.3B_2O_3.6H_2O$. Monoclinic(?), lamellar-fibrous, white, spotted red with iron oxide.

I. **Sulphoborite.** $4MgHBO_3.2MgSO_4.7H_2O$. Orthorhombic, small prisms, colorless.

Uranates. Hardness 5·5, 3 and 2·3

711. II. **Uraninite.** Uranate of uranyl, Pb, usually Th (or Zr), often the La and Y metals and N with He. Highly radio-active. Isometric.

1. Crystallized varieties, black:

(a) Uranniobite, chiefly UO_2, less UO_3, octahedrons.

2404+ (b) Bröggerite, O ratio of UO_3 : other bases=1 : 1, cubo-octahedrons, loose. 3.00

2405⊙ (c) Cleveite, much UO_3, with 10 p.c. Y earths, cubo-octahedron modified by dodecahedron. 3.00

(d) Nivenite, much UO_3, with 10 p.c. Y earths, massive.

2406+ 2. Massive, Pitchblende, no Th, N or rare earths, pitch-black. 3.00

II. Rutherfordine, alteration-product of uraninite.

2407+ II. Thorianite. Chiefly ThO_2,U_3O_8. Highly radio-active. Isometric, ideal cubes, brilliant black. 2.50

2408⊙ penetration-twins, fluor type. 2.50

2409⊙712. **Gummite.** $(PbCa)U_3SiO_{12}.6H_2O$(?). Highly radio-active. Alteration-product of uraninite. Nodules, resinous reddish-yellow. 2.00

Yttrogummite. Y and U oxides, hydrous.

2410⊙ Thorogummite. $UO_3.3ThO_2.3SiO_2.6H_2O$. Highly radio-active. Tetragonal, prisms, dull yellowish-brown, loose. 2.00

Type No. Species No.

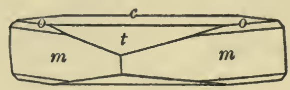
I. **Mackintoshite.** $UO_2.3ThO_2.3SiO_2.3H_2O$. Tetragonal, black.

713. **Uranosphærite.** $Bi_2O_3.2UO_3.3H_2O$. Hemispheres of minute acute crystals, reddish-yellow.

6. Sulphates, Chromates, Tellurates.

A. Anhydrous Sulphates, Etc. Range of Hardness 2—3

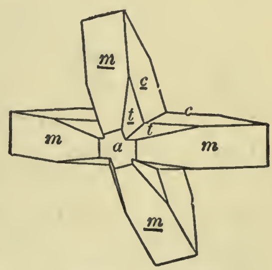
2411⊚714. **Mascagnite.** $(NH_4)_2SO_4$. Orthorhombic, mealy, yellowish. 1.50



2412. Thenardite

715. **Taylorite.** $5K_2SO_4.(NH_4)_2SO_4$. Crystalline concretions, yellowish-white.

2412⊚716. **Thenardite.** Na_2SO_4. Orthorhombic, prism *m* with macrodome *t* and base *c* rounded in combination, very large thick tabular || *c* (similar to fig.), eroded, translucent yellowish. 1.00

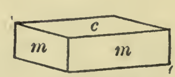


2414. Thenardite

2413 ditto, large, very thin. (3) .50

2414+ cruciform-twin, tw.pl. *e* (fig.). (3) .50

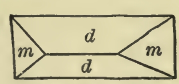
2415⊚717. **Aphthitalite.** $(K,Na)_2SO_4$. Rhombohedral, very thin hexagonal tables, white. 2.00



2419. Barite

II. **Palmierite.** $3(K,Na)_2SO_4.4PbSO_4$(?). Hexagonal, microscopic plates, colorless.

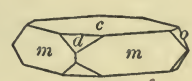
2416*718. **Glauberite.** $Na_2SO_4.CaSO_4$. Monoclinic, tabular || base *c*, symmetrical, loose. .75



2420. Barite

2417 prismatic by extenison of unit pyramid *s*, distinct, pale yellowish. 1.50

I. **Langbeinite.** $K_2SO_4.2MgSO_4$. Isometric-tetartohedral, highly modified.



2421. Barite

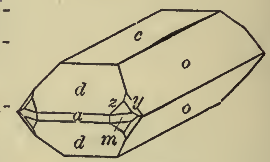
2418 II. **Vanthoffite.** $3Na_2SO_4.MgSO_4$. Colorless. 2.50

Barite Group. Orthorhombic. Range of Hardness 2·5—3·5

Type No. Species No.

719. Barite, Barytes. $BaSO_4$. Orthorhombic. 1. Ordinary varieties:—

(a) Crystals, perfectly developed, clear, brilliant:—



2425. Barite

2419* unit prism *m*, tabular || base *c* (fig.), large gray. .75

2420+ ditto, with macrodome *d* elongated, prismatic aspect (fig.), yellowish. .50

2421⊙ ditto, with macrodome *d*, brachydome *o* (fig.), very large, thick tabular || *c*, translucent, dull brownish, loose. .75

2422⊙ ditto, thick tabular, colorless, parallel growth producing serrate-edged group, very large, loose. 1.00

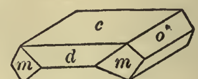
2423⊙ ditto, very thin tabular, greenish-blue, with calcite. 1.00

2424 *m*, *d*, *o*, *c* with pyramid *z* and prismatic by elongation of brachypinacoid *b*. .50

2425 *m*, *d*, *c*, with macropinacoid *a*, prismatic by elongation of brachydome *o*, (similar to fig.) blue, large, loose. .30

2426+ macrodome *d*, brachydome *o*, base *c* (similar to fig.), tabular, colorless. .50

2427⊙ II. prismatic || axis *c*, highly complex, small but perfectly defined, adamantine. 1.50



2426. Barite

2428 acicular, reddish. .40

2429* (b) crested aggregate, white. .40

2430 (c) columnar. .40

2431 (d) globular, Bologna Stone, grayish. .40

2432+ (e) lamellar, curved, white. .20

2433⊙ (f) granular, grayish. .30

2434 (g) compact, yellowish. .30

2435 (h) earthy. .30

2436⊙ (i) stalactitic, polished section, concentric bands. 1.50

2437⊙ 2. fetid, coarse granular, grayish. .50

3. Allomorphite, rectangular cleavages (pseudomorphous after anhydrite?).

4. Celestobarite, with much $SrSO_4$.

2438 altered to quartz. 1.00

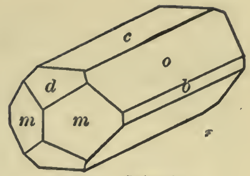
Type No. Species No.

720. Celestite. $SrSO_4$. Orthorhombic.

1. Ordinary:—

(a) Crystals brilliant, perfectly developed:—

2439+ unit prism *m*, macrodome *d*, base *c*, prismatic by elongation of brachydome *o* (similar to fig.), subtransparent white. 1.00

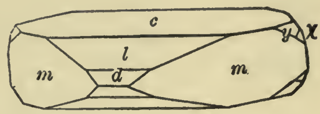


2439. Celestite

2440 ditto, with pyramid *y*. 1.00

2441* *d*, *c* with *m* prominent, translucent bluish. .75

2442 tabular || *c*, clear colorless. .50



2451. Anglesite

2443⊙ rough flat prisms, red. .50

2444+ cleavage, translucent pale sky-blue. .20

2445⊙ stalactitic, radio-columnar structure with drusy crystalline surface, white. .50

2446* (b) fibrous, blue. .50

2447 (c) lamellar, bluish-white. .75

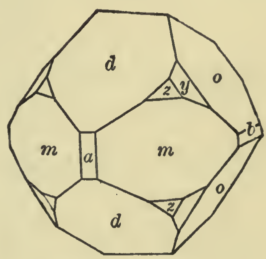
2448⊙ (d) granular, coarse, pale blue. .20

2449⊙ (e) concretionary. .30

2450 (f) earthy. .30

2. Calciocelestite, contains much Ca.

3. Barytocelestite, contains much Ba.



2454. Anglesite

2451+**721. Anglesite.** $PbSO_4$. Orthorhombic, unit prism *m*, macropinacoid *a*, macrodome *d*, pyramids and base *c*, tabular (aspect like fig.), ideal symmetry, adamantine translucent gray, on galena. 1.50

2452⊙ prism *m* prominent, terminated by low brachydomes, limpid, small. 1.00

2453 pyramids predominating. 2.50

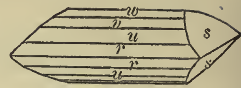
2454⊙ highly modified stout crystals (aspect like fig.), translucent yellowish-white, perfect. 2.00

2455 pale green crystals. 2.50

2456 drusy crystals coating twinned cerussite. 1.50

Type No. Species No.

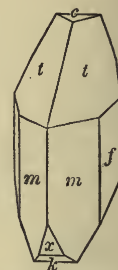
Anglesite—Continued



2458. Anhydrite

2457* compact massive, concentrically banded, grayish. 1.50

2458*722. **Anhydrite.** $CaSO_4$. Orthorhombic, prismatic by elongation of several macrodomes, brachydome *s* (fig.), bright translucent reddish-white, loose. .40



2465. Crocoite

2459° cleavage, rectangular, red. .75

2460 cleavage, rectangular, grayish. .75

2461 fibrous. 1.00

2462+ fine granular, pale bluish. .20

scaly granular, Vulpinite.

2463° compact, banded vein in granular rock salt, grayish. .40

pseudomorphous, in cubes after rock salt.

723. **Zinkosite.** $ZnSO_4$. Orthorhombic. Needs confirmation.

2464 724. **Hydrocyanite.** $CuSO_4$. Orthorhombic, green, in lava. 5.00

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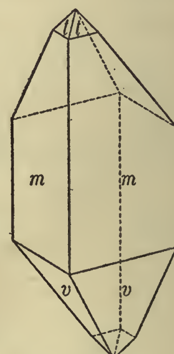
725. I. II. **Crocoite.** $PbCrO_4$. Monoclinic, crystals perfectly developed, highly adamantine, translucent brilliant scarlet:—

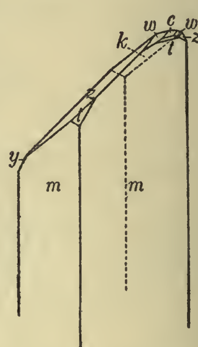


2466. Crocoite

2465* short unit prism *m*, prism *f*, pryamid *t*, base *c* (similar to fig.), small, with vauquelinite. 2.50

2466° short unit prism *m* with unit pyramid *v* (similar to fig.), small, on limonite. 1.00

2467° long unit prism *m*, clinodome *z*, loose, large. 2.00



2468. Crocoite

2468+ ditto, with clinodome *w*, pyramid *t*, orthodome *k*, base *c* (similar to fig.). 2.00

2469 ditto, with clinodome *y* and new clinodome *j* (fig.). 6.00

2470° acicular, on limonite. 1.00

2471 long prism, not terminated, large, loose. .25

2472+ ditto, on limonite, large. 1.00

2473 ditto, hollow, loose. 1.00

Crocoite—Continued

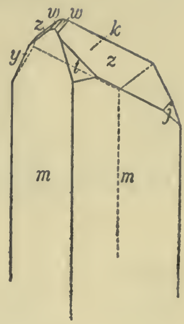
Type No. Species No.

2474 dull etched rounded crystals on white schist. 1.50

726. Phœnicochroite. $3PbO.2CrO_3$. Orthorhombic(?), red, yellow on exposure.

2475 **727. Vauquelinite.** Perhaps $2(Pb,Cu)CrO_4.(Pb,Cu)_3P_2O_8$. Monoclinic, druse of microscopic crystals, dark greenish-brown. 5.00

Jossaite. Contains Cr_2O_3, PbO, ZnO. Orthorhombic, minute orange-yellow crystals on vauquelinite.



2469. Crocoite

2476⊙ Tarapacaite. Chiefly K_2CrO_4. Minute fragments, canary-yellow, disseminated in soda niter. 1.00

2477 I. Euchlorine. Contains SO_3,CuO,K_2O,Na_2O. Orthorhombic, incrustation on lava, emerald-green. 1.50

I. Dietzeite. $7Ca(IO_3)_2$. $8CaCrO_4$. Monoclinic, dark gold-yellow.

II. Bellite. $PbCrO_4$ with As_2O_3. Hexagonal, minute tufted needles, bright crimson-red.

Sulphates with Chlorides, Carbonates, Etc.—In Part Hydrous Compounds. Range of Hardness 2—4·5

728. Sulphohalite. $3Na_2SO_4.2NaCl$. Isometric, transparent greenish-yellow.

729. Caracolite. $Pb(OH)Cl.Na_2SO_4$. Orthorhombic(?), pseudo-hexagonal twins, incrustation.

Chlorothionite. $K_2SO_4.CuCl_2$. Crystalline crusts, bright blue, from lava.

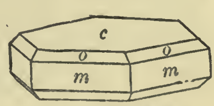
II. Arzrunite. $(Pb_2O)SO_4.3(CuCl_2.H_2O).Cu(OH)_2$(?). Orthorhombic, small prisms, bluish-green.

730. Kainite. $MgSO_4.KCl+3H_2O$. Monoclinic, tabular || *c*.

2478⊙ granular massive. .40

2479 **731. Connellite.** $Cu_{15}(Cl,OH)_4SO_{16}.15H_2O$(?). Hexagonal, small prisms, translucent blue. 4.00

732. Spangolite. $(AlCl)SO_4.6Cu(OH)_2+3H_2O$. Rhombohedral, hexagonal tables, dark green.



2480. Hanksite

Type No. Species No.

2480*733. **Hanksite.** $4Na_2SO_4.Na_2CO_3$. Hexagonal, short unit prism *m*, unit pyramid *o*, base *c* prominent (fig.), ideal symmetry, translucent yellowish-white, loose. .50

2481 ditto, with prism also prominent. 1.00

2482⊙ ditto, with pyramid alone prominent. 1.00

2483 ditto, with pyramid *s*, tabular || *c*. .75

2484*734. **Leadhillite.** $4PbO.SO_3.2CO_2.H_2O$(?). Monoclinic, pseudo-hexagonal twins, tw.pl. prism *m*, tabular, pearly straw-yellow. 2.50

2485 ditto, translucent apple-green. 4.00

2486 cleavage. 1.00

2487 Susannite. $4PbO.SO_3.2CO_2.H_2O$(?). Formerly regarded as rhombohedral but very probably monoclinic and therefore leadhillite, acute rhombic aspect. 8.00

I. Beresowite. $6PbO.3CrO_3$. CO_2.Crystalline lamellar, red.

B. Acid and Basic Sulphates. Range of Hardness 2·5—3·5

735. **Misenite.** $K_2SO_4.H_2SO_4$. Fibers, silky-white.

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736. **Alumian.** $Al_2O_3.2SO_3$(?). Rhombohedral(?), white.

II. Doughtiyite. $Al_2(SO_4)_3.5Al_2(OH)_6.21H_2O$. Powder, white.

2488⊙737. **Lanarkite.** $PbSO_4.PbO$. Monoclinic, slender prismatic by extension of orthopinacoid *a*, adamantine, translucent straw-yellow. 5.00

2489 738. **Dolerophanite.** $2CuO.SO_3$(?). Monoclinic, brown. 4.00

2490⊙739. **Caledonite.** $2(Pb,Cu)O.SO_3.H_2O$(?). Orthorhombic, microscopic, prismatic || axis *a*, translucent bluish-green. 3.00

2491+740. **Brochantite.** $4CuO.SO_3.3H_2O$. Orthorhombic, unit prism *m* and domes prominent, ideal symmetry, adamantine, translucent dark emerald-green, small. 1.25

2492⊙ acicular, clear emerald-green. 1.25

2493 drusy incrustation, emerald-green. 1.00

2494 massive, dull. 1.00

2495* fibrous vein, silky emerald-green. 1.50

2496⊙ altered to cuprite, fibrous vein, silky reddish-violet. 1.50

II. Steltznerite. $CuSO_4.2Cu(OH)_2$. Orthorhombic, green.

Waringtonite, doubly curving wedge-shaped crystals, pale green.

Type No. Species No.

2497⊙**741. Linarite.** $PbO.CuO.SO_3.H_2O$. Monoclinic, flat prismatic || axis *b*, adamantine, translucent deep azure-blue, small, perfect. 2.00

2498 minute acicular. 2.00

Antlerite. $10CuO.3SO_3.7H_2O$(?). Massive, green.

C. Hydrous Sulphates.—Normal Division

Hardness 2 (Kieserite 3, Szmikite 1·5)

742. Lecontite. $(Na,NH_4,K)_2SO_4+2H_2O$. Orthorhombic, prisms.

Guanovulite. $7K_2O.2(NH_4)_2O.12SO_3.11H_2O$. Crystalline, silky yellowish-white, organic origin.

2499***743. Mirabilite**, Glauber Salt. $Na_2SO_4+10H_2O$. Monoclinic, efflorescent crust, white. .75

Exanthalose. $Na_2SO_4.+2H_2O$. Efflorescence, white.

2500***744. Kieserite.** $MgSO_4+H_2O$. Monoclinic, granular massive, whitish. .40

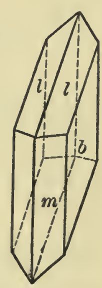
I. Cubeite (Kubeite). Contains SO_3,Fe_2O_3,MgO,H_2O. Rhombic or monoclinic pyramids.

II. Ferrofallidite. $FeO.SO_3+H_2O$. Clear grains.

745. Szmikite. $MnSO_4+H_2O$. Amorphous, reddish-white.

746. Gypsum. $CaSO_4+2H_2O$. Monoclinic.

1. Selenite, large crystals of ideal symmetry, transparent colorless:—

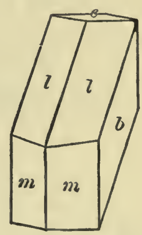


2501. Gypsum

2501+ unit prism *m*, unit pyramid *l*, clinopinacoid *b* (fig.), phosphoresces green in ultra-violet light, loose. .20

2502 ditto, with "phantom" lines of growth. .30

2503 ditto, very large, loose (not phosphorescent). 1.00



2504. Gypsum

2504 ditto, with rough orthodome *e* (fig.), phosphorescent, loose. .20

2505⊙ ditto, very large (not phosphorescent). .75

2506⊙ wedge-shaped, very large, enclosing sulphur, etc. .50

2507* lenticular, dull yellowish in clay. .30

2508⊙ ditto, rosette-like group, red. .50

2509 acicular, small, on lava. .75

2510 bent crystal, very large. .50

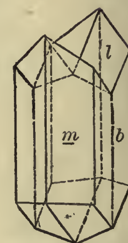
Type No. | Species No. | Gypsum—Continued

2511* contact-twins, tw.pl. *a* (fig.), "swallow-tail twins," yellowish, loose. .20

2512 ditto, aggregate. .75

2513 cruciform-penetration-twins, tw.pl. *a*. .75

2514+ cleavage || pinacoid *b* perfect, || *a* imperfect conchoidal, || *n* imperfect fibrous, clear, rhomboidal outline. .20



2511. Gypsum

2515 arenaceous, containing sand. .50

2516⊙ containing moving liquid. 1.25

2517+ 2. fibrous, fine, Satin spar, white. .40

2518 fibrous, fine, Satin spar, flesh-red. .60

2519⊙ fibrous, coarse, white. .30

2520⊙ fibrous, plumose, lamellar-stellate. .60

2521⊙ fibrous, curving flower-like forms. .75

2522+ 3. massive, Alabaster, very fine grained, white. .20

2523* massive, scaly-granular, reddish. .20

2524 massive, earthy, "rock-gypsum." .30

2525⊙ altered to quartz. .50

747. Ilesite. RSO_4+4H_2O, with R=Mn,Zn,Fe. Monoclinic (?), prismatic, loose aggregates.

II. Scleropasthite. Hyd. Fe^{II}, Cr sulphate. Felted mass, white.

2526+ **748. Epsomite**, Epsom Salt. $MgSO_4+7H_2O$. Orthorhombic, fibrous, white. .75

Tauriscite. $FeSO_4+7H_2O$(?). Orthorhombic, acicular, greenish.

2527 **749. Goslarite**, Zinc Vitriol. $ZnSO_4+7H_2O$. Orthorhombic, acicular. 2.00

2528* massive, white. 1.00

II. Cuprogoslarite, contains Cu.

750. Morenosite. $NiSO_4+7H_2O$. Orthorhombic, acicular, greenish.

II. Boothite. $CuO.SO_3.7H_2O$. Monoclinic, blue.

Fauserite. $(MnMg)SO_4+6H_2O$(?). Orthorhombic, white.

Melanterite or Copperas Group

Monoclinic. Soft

These species are the ordinary vitriols, being identical in general formula with the members of the Epsomite group, and regarded as essentially the same compound under oblique crystallization.

Type No. Species No.

2529+751. **Melanterite**, Copperas or Green Vitriol. $FeSO_4 + 7H_2O$. Monoclinic, fibrous. .75

2530 pulverulent coating. .40

752. **Mallardite.** $MnSO_4 + 7H_2O$. Monoclinic, fibrous crystalline masses, colorless.

2531 753. **Pisanite.** $(Fe,Cu)SO_4 + 7H_2O$. Monoclinic, concretionary, bright blue. 1.25

I. Salvadorite. $(Cu,Fe)SO_4 + 7H_2O$. Monoclinic, aggregates of rough prisms, bluish-green.

754. **Bieberite.** $CoSO_4 + 7H_2O$. Monoclinic, crusts, red.

Cupromagnesite. $(CuMg)SO_4 + 7H_2O$. Monoclinic, crusts on lava, bluish-green.

2532◎755. **Chalcanthite**, Blue Vitriol. $CuSO_4 + 5H_2O$. Triclinic, flattened || *p*. 2.00

2533 fibrous, translucent. 1.50

2534+ massive, fine prussian-blue. .50

I. Siderotil. $FeSO_4 + 5H_2O$. Divergent needles.

2535 756. **Syngenite.** $CaSO_4.K_2SO_4 + H_2O$. Monoclinic, prisms flattened || *a*, clear colorless. 3.00

757. **Löweite.** $MgSO_4.Na_2SO_4 + 2\frac{1}{2}H_2O$. Tetragonal, cleavable, whitish.

2536◎758. **Blödite.** $MgSO_4.Na_2SO_4 + 4H_2O$. Monoclinic, highly modified short prism, large, clear colorless. 1.50

2537 ditto, small, with kröhnkite. .75

2538* massive. .50

I. **Leonite.** $K_2SO_4.MgSO_4 + 4H_2O$. Monoclinic, tabular.

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759. **Boussingaultite.** $(NH_4)_2SO_4.MgSO_4 + 6H_2O$. Monoclinic, prismatic with *c* prominent.

760. **Picromerite.** $MgSO_4.K_2SO_4 + 6H_2O$. Monoclinic, crystalline incrustation, white.

761. **Cyanochroite.** $CuSO_4.K_2SO_4 + 6H_2O$. Monoclinic, crystalline crust, clear blue.

———————Hardness 4.5 and 3

2539* II. **Natrochalcite.** $Na_2SO_4.Cu_4(OH)_2(SO_4)_2 + 2H_2O$. Monoclinic, sharply developed acute pyramids (fig.), brilliant and translucent, fine emerald-green. 3.00

2540 762. **Polyhalite.** $2CaSO_4.MgSO_4.K_2SO_4 + 2H_2O$. Monoclinic(?), cleavage, red. .75

Type No. | Species No. — Polyhalite—Continued

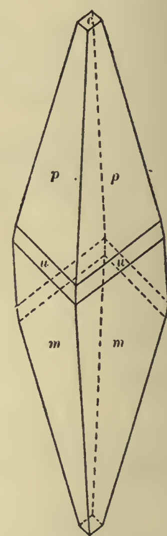
2541° fibrous, translucent. .75

2542+ granular-cleavable, reddish. .30

2543 Krugite. $4CaSO_4.MgSO_4.K_2SO_4+2H_2O$. Crystalline massive, gray. .50

Mamanite. Like polyhalite but $CaO:MgO:K_2O=3:2:1$. Fibro-foliated, silky white.

763. Wattevillite. $CaSO_4.Na_2SO_4+4H_2O$(?). Orthorhombic or monoclinic, microscopic needles, silky snow-white.



2539. Natrochalcite

Alum Group

Isometric. Range of Hardness 1—3

Hydrous sulphates of aluminium with an alkali metal and 24 molecules of water.

2544°**764. Kalinite.** $K_2SO_4.Al_2(SO_4)_3+24H_2O$. Isometric, crusts, white. .75

765. Tschermigite. $(NH_4)_2SO_4.Al_2(SO_4)_3+24H_2O$. Octahedrons.

2545° fibrous, subtransparent white. 1.25

2546 **766. Mendozite.** $Na_2SO_4.Al_2(SO_4)_3+24H_2O$. Fibrous mass, white. 4.00

I. Kauaiite. $Al_2(SO_4)_3$ 7·18, Al_2O_3 33·40, K_2SO_4 17·00, Na_2SO_4 4·91, H_2O 31·57. Chalk-like.

2547°**767. Tamarugite.** $Na_2SO_4.Al_2(SO_4)_3+12H_2O$. Massive, white. 1.00

Halotrichite Group. Monoclinic. Soft

Hydrous sulphates of aluminium with magnesium, manganese, etc. and 22 to 24 molecules of water.

2548°**768. Pickeringite.** $MgSO_4.Al_2(SO_4)_3+22H_2O$. Monoclinic(?), silky fibrous mass, white. 1.00

I. Seelandite, $MgAl_2(SO_4)_4+27H_2O$.

Stüvenite. $(Na_2Mg)SO_4.Al_2(SO_4)_3+24H_2O$(?). Needles.

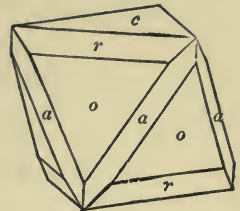
2549 Picroallumogene. $2MgSO_4.Al_2(SO_4)_3+28H_2O$(?). Massive, whitish. 1.25

Type No. | Species No.

Sonomaite. $3MgSO_4.Al_2(SO_4)_3+33H_2O$. Crystalline, silky colorless.

Dumreicherite. $4MgSO_4.Al_2(SO_4)_3+36H_2O$. Monoclinic(?), columnar crusts.

Aromite. $6MgSO_4.Al_2(SO_4)_3.54H_2O$. Crystalline.



2552. Coquimbite

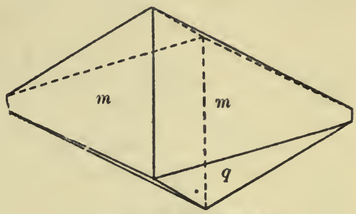
2550*769. **Halotrichite.** $FeSO_4.Al_2(SO_4)_3+24H_2O$. Monoclinic or triclinic, silky fibers, white. 1.50

2551 pulverulent incrustation. .75

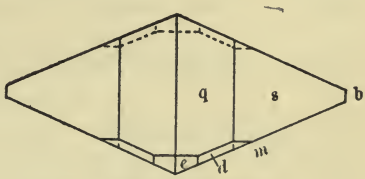
770. Apjohnite. $MnSO_4.Al_2(SO_4)_3+24H_2O$. Monoclinic (?), fibrous mass, whitish.

Bushmanite, $(Mn.Mg)SO_4.Al_2(SO_4)_3+22$ (or 24)H_2O.

771. Dietrichite. $(Zn,Fe,Mn)SO_4.Al_2(SO_4)_3+22H_2O$. Monoclinic (?), silky fibers.



2555. Kröhnkite

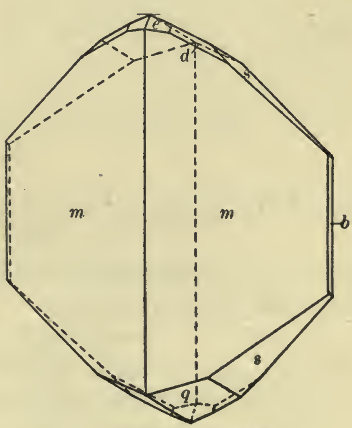


2556a. Kröhnkite

2552 **772. Coquimbite.** $Fe_2(SO_4)_3+9H_2O$ Rhombohedral, octahedroid, rhombohedron *o* and base *c* predominating, truncated by diagonal prism *a* and rhombohedron *r* (fig.), distinct. 2.50

2553° granular massive. 1.00

773. Quenstedtite. $Fe_2O_3.3SO_3.10H_2O$. Monoclinic, transparent reddish-violet.



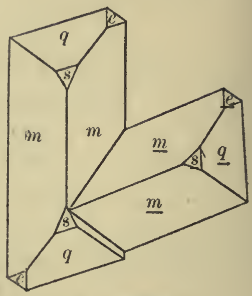
2556b. Kröhnkite

Type No. Species No.

774. **Ihlëite.** $Fe_2(SO_4)_3+12H_2O$. Efflorescence, yellow.

Kornelite. $Fe_2(SO_4)_3+7\frac{1}{2}H_2O$.

2554+775. **Alunogen.** $Al_2(SO_4)_3+18H_2O$. Monoclinic, fine needles forming surface of silky fibrous mass, yellowish-white. .75



2558. Kröhnkite

2555*776. **II. Kröhnkite.** $CuSO_4.Na_2SO_4+2H_2O$. Monoclinic, octahedroid, unit prism *m*, unit pyramid *q* (fig.), ideal symmetry, bluish-green. 1.50

2556⊙ slender prisms *m*, with pyramids *q* and *s* prominent (similar to figs. a and b), ideal symmetry, adamantine, fine clear blue. 2.00

2557 ditto, but short prisms forming solid crusts. 3.00

2558 contact-twins, tw.pl. base *c*, imperfect (fig.), fine clear blue. 2.00

2559⊙ penetration-twins, tw.pl. base *c*, ideal symmetry with aspect of parallel growth, bluish-green. 1.50

Phillipite. $CuSO_4.Fe_2(SO_4)_3+nH_2O$, approximately. Massive, azure-blue.

777. **Ferronatrite.** $3Na_2O.Fe_2O_3.6SO_3.6H_2O$. Rhombohedral, spherical, lamellar-stellate, whitish.

778. **Römerite.** Perhaps $FeSO_4.Fe_2(SO_4)_3+12H_2O$. Triclinic, tabular || *c*.

2560⊙ granular massive, brown. 1.25

C. Hydrous Sulphates.—Basic Division

Hardness 2·5

2561 779. **Langite.** $4CuO.SO_3.4H_2O$. Orthorhombic, minute twins, tw.pl. prism *m*, pseudo-hexagonal.

2562⊙ concretionary crust, green. 1.50

2563⊙780. **Herrengrundite.** $CaO.4CuO.2SO_3.6H_2O$. Monoclinic, small scale-like hexagons in spherical groups, pearly, bright emerald-green. 1.25

780A. ARNIMITE. $5CuO.2SO_3.6H_2O$. Crystalline incrustation, bright green.

Type No. Species No.

I. Kamarezite. $(CuOH)_2SO_4.Cu(OH)_2.6H_2O$. Orthorhombic(?), minute tables, grass-green.

2564 **781. Cyanotrichite**, Lettsomite. $4CuO.Al_2O_3.SO_3.8H_2O$. Orthorhombic, capillary, fine blue. 3.00

2565⊙**782. Serpierite.** Basic Cu and Zn sulphate. Orthorhombic, tufts of microscopic crystals, tabular || c, blue. 2.00

——————Range of Hardness 1·5—3 (Carphosiderite 4)

783. Castanite. $Fe_2O_3.2SO_3.8H_2O$. Monoclinic, minute prisms, brilliant, chestnut-brown.

Rubrite. $Fe_2O_3.2SO_3.3H_2O$.

784. Copiapite. Perhaps $2Fe_2O_3.5SO_3.18H_2O$. Monoclinic, tabular || b.

2566+ granular massive, brownish-yellow. 1.00

785. Knoxvillite. Hyd. Cr,Fe^{III} and Al sulphate. Orthorhombic(?), rhombic plates, greenish-yellow.

Redingtonite. Hyd. Cr sulphate. Finely fibrous mass silky pale purple.

2567 **786. Utahite.** $3Fe_2O_3.3SO_3.4H_2O$. Rhombohedral, microscopic hexagonal scale-like tables, silky orange-yellow. 1.50

787. Amarantite. $Fe_2O_3.2SO_3.7H_2O$. Triclinic, slender prisms.

2568⊙ columnar mass, red. 2.00

2569⊙**788. Fibroferrite.** $Fe_2O_3.2SO_3.10H_2O$. Monoclinic(?), radio-fibrous silky mass, pearly pale yellow. 1.50

789. Raimondite. $2Fe_2O_3.3SO_3.7H_2O$. Hexagonal or rhombohedral, scale-like hexagons, pearly yellow.

2570 Apatelite. $4Fe_2O_3.6SO_3.3H_2O$. Nodular, clear yellow. .75

2571⊙**790. Carphosiderite.** Perhaps $3Fe_2O_3.4SO_3.10H_2O$. Rhombohedral(?). Submicaceous mass, straw-yellow. 1.50

2572*__791. Aluminite.__ $Al_2O_3.SO_3.9H_2O$. Monoclinic, chalky reniform nodules. .50

oölitic earthy, whitish.

Werthemanite. $Al_2O_3.SO_3.3H_2O$. Massive, white.

Winebergite. Al Basic sulphate.

I. Planoferrite. $Fe_2O_3.SO_3.15H_2O$. Orthorhombic(?), tabular, greenish.

792. Glockerite. $2Fe_2O_3.SO_3.6H_2O$. Massive.

793. Felsöbanyite. $2Al_2O_3.SO_3.10H_2O$. Orthorhombic, mass of minute hexagonal scales, pearly white.

794. Paraluminite. $2Al_2O_3.SO_3.15H_2O(?)$. Massive, whitish.

Type No. Species No.

795. **Cyprusite.** Perhaps $7Fe_2O_3.Al_2O_3.10SO_3.14H_2O$. Hexagonal(?), chalky mass of microscopic hexagons, yellow.

————————Range of Hardness 2·5—3·5

796. **Voltaite.** $(Fe^{II},Mg)_5(Fe^{III},Al)_4S_{10}O_{41}.15H_2O$(?). Isometric (?), cubo-octahedrons, resinous dark-greenish.

797. **Metavoltine.** Perhaps $5(K_2,Na_2,Fe)O.3Fe_2O_3.12SO_3.18H_2O$. Hexagonal, mass of minute scales, yellow.

2573⊙798. **Botryogen.** Perhaps $MgO.FeO.Fe_2O_3.4SO_3.18H_2O$. Monoclinic, small prisms, deep red, 1.00

II. Palacheite, $2MgO.Fe_2O_3.4SO_3.15H_2O$, prisms.

I. Idrizite. $(Mg,Fe)(Fe,Al)_2S_3O_{13}+16H_2O$. Crystalline, yellowish-gray.

2574⊙799. **Sideronatrite.** $2Na_2O.Fe_2O_3.4SO_3.7H_2O$. Orthorhombic, fibro-crystalline mass, yellow. 2.00

2575⊙800. **Alunite.** $K_2O.3Al_2O_3.4SO_3.6H_2O$. Rhombohedral, minute cuboid rhombs, brightly defined. .50

2576+ granular massive, white. .30

2577 compact massive. .30

801. **Jarosite.** $K_2O.3Fe_2O_3.4SO_3.6H_2O$. Rhombohedral.

2578+ 1. Crystallized, minute cuboid rhombs, sharp and symmetrical, brown. 1.00

2579⊙ tabular || *c*, yellow-brown, small, sharply defined. 1.00

2580 modified, translucent brown. 1.50

2581 2. Concretionary, tuberose incrustation. 3.00

II. Natrojarosite, Na replaces K.

II. Plumbojarosite, Pb replaces K.

Decomposition products of pyrite:—

Plagiocitrite. $(K,Na)_2O.2FeO.3(Al,Fe)_2O_3.6SO_3.27H_2O$(?). Monoclinic or triclinic, microscopic prisms, yellow.

Clinophæite. $4(K,Na)_2O.FeO.(Fe,Al)_2O_3.5SO_3.8H_2O$(?). Monoclinic(?), microscopic crystals, blackish-green.

802. **Löwigite.** Perhaps $K_2O.3Al_2O_3.4SO_3.9H_2O$. Rounded masses, pale straw-yellow.

803. **I. Ettringite.** Perhaps $10CaO.2Al_2O_3.5SO_3.54H_2O$. Hexagonal, minute needles, clear colorless.

804. **Quetenite.** $MgO.Fe_2O_3.3SO_3.13H_2O$. Monoclinic or triclinic(?), indistinct prisms, reddish-brown.

805. **Zincaluminite.** $6ZnO.3Al_2O_3.2SO_3.18H_2O$. Hexagonal (?), minute hexagonal scales, bluish-white.

Type No. Species No.

Lamprophanite. Hyd. Pb, Mn, Ca, Mg, Na, K sulphate. Cleavable folia, pearly white.

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806. **Johannite.** Hyd. U,Cu sulphate. Monoclinic, masses of microscopic tables, fine emerald-green.

807. **Uranopilite.** Perhaps $CaO.8UO_3.2SO_3.25H_2O$. Incrustation of minute needles, yellow.

Tellurates; Also Tellurites, Selenites. Soft

808. **Montanite.** $Bi_2O_3.TeO_3.2H_2O$. Incrusting, earthy, whitish.

——————Hardness 5 and 2

809. **Emmonsite.** Hyd. Fe^{III} tellurite(?). Monoclinic(?), thin cleavage scales, clear yellowish-green.

810. **Durdenite.** $Fe_2O_3.3TeO_2.4H_2O$. Massive, small mammillary forms, greenish-yellow.

Magnolite. Hg_2TeO_4(?). Microscopic needles, silky white.

——————Hardness 3

811. **Chalcomenite.** $CuO.SeO_2.2H_2O$. Monoclinic, small short prisms, bright blue.

Molybdomenite. Pb selenite(?). Orthorhombic, very thin scales, pearly white.

Kerstenite. Chiefly SeO_2,PbO. Botryoidal, sulphur-yellow.

7. Tungstates, Molybdates. Hardness 5 (Raspite 2·5)

812. **Wolframite.** (Fe,Mn)WO_4. Monoclinic.

2582⊙ I. 1. Normal Wolframite, Fe WO_4, square prismatic || axis *b*, orthopinacoid *a* and base *c* both prominent, highly modified (?), small, brilliantly distinct, black. 1.00

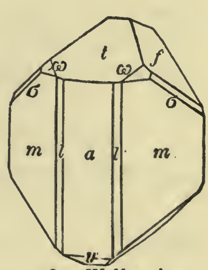
2583 ditto, long lenticular. 1.00

2584* 2. Ordinary, ratio Fe : Mn=9 : 1 to 2 : 3, tabular || orthopinacoid *a*, unit prism *m*, orthodome *t*, clinodome *f* all prominent (similar to fig.), large, sharply defined, brilliant black, loose. 1.00

2585+ bladed basal cleavage. .75

2586 lamellar massive. 1.00

2587⊙ granular massive. .75



2584. Wolframite

Type No. Species No.

2588⊙813. **Hübnerite.** $MnWO_4$. Monoclinic, distinct bladed crystals, dark reddish-brown. 2.00

2589+ ditto, large, embedded in quartz. 1.00

2590⊙ I. **Raspite.** $PbWO_4$. Monoclinic, minute tables, adamantine, clear brownish-yellow. 6.00

Scheelite Group. Tetragonal. Range of Hardness 3—4·5

2591⊙814. **Scheelite.** $CaWO_4$. Tetragonal, pyramidal hemihedrism, octahedroid, unit pyramid *p* prominent, small, perfect, brownish. 1.00

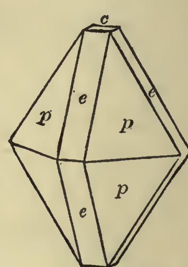
2592 octahedroid, diametral pyramid *e*, ideal symmetry, translucent straw-yellow. 3.00

2593* unit pyramid *p*, truncated by diametral pyramid *e* (similar to fig.), small, brightly defined. 1.00

2594⊙ obtuse diametral pyramid *o* prominent, small but distinct, grayish. 1.25

2595⊙ tabular || base *c* dull, bounded by pyramids *e* and *p* adamantine, minute, perfect. .75

2596 ditto, globular groups, greenish. .75



2593. Scheelite

2597+ massive cleavable-granular, whitish. .75

2598 altered to wolframite. 2.00

815. **Cuprotungstite.** $CuWO_4$, also $(Ca,Cu)WO_4$. Crystalline-granular, glassy green.

816. **Powellite.** $CaMoO_4$. Tetragonal, minute modified octahedroids, subtransparent, resinous greenish-yellow.

2599⊙817. **Stolzite.** $PbWO_4$. Tetragonal, pyramidal hemihedrism, very acute pyramid and base, nearly opaque, resinous brownish, small. 3.00

2600 unit pyramids *n*, *v*, unit prism *m*, base *c*, ideal symmetry, small, red. 6.00

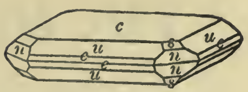
2601* thick tabular || base *c*, unit pyramid *n*, diametral pyramid *e*, minute, ideal symmetry, adamantine, clear reddish-brown. 3.00

2602 818. **Wulfenite.** $PbMoO_4$. Tetragonal, pyramidal hemihedrism, minute ideal octahedroid, unit pyramid *e*, red. 1.25

2603 tabular || base *c* with unit pyramid *u*, ideal symmetry, adamantine, translucent fine orange-red. 1.50

Type No. | Species No. | Wulfenite—Continued

2604° ditto, with diametral pyramid *s* (similar to fig.). 1.50



2604. Wulfenite

2605+ ditto, less symmetrical, paler red, cavernous aggregate of brilliant crystals. 1.00

2606* prism *m* rounded, with base *c*, small, ideal symmetry, resinous yellowish-brown. 1.00

2607 ditto, thick tabular, resinous brownish, large. 1.50

2608° ditto, very thin tabular, clear lemon-yellow. 2.00

2609 819. **Reinite.** $FeWO_4$. Tetragonal, pyramidal, blackish-brown. 8.00

Achrematite. $3[3Pb_3As_2O_8.PbCl_2].4[Pb_2MoO_5]$. Massive, cryptocrystalline, yellowish-red.

820. **Belonesite.** $MgMoO_4$(?). Tetragonal, minute needles, clear white.

VIII. Iodates

S.,I. **Lautarite.** $Ca(IO_3)_2$. Monoclinic, radiately arranged prisms.

VII. Salts of Organic Acids

Oxalates, Mellates, Etc. Range of Hardness 2—2·5

2610 821. **Whewellite.** $CaC_2O_4+H_2O$. Monoclinic, twins, tw.pl. *e*, small heart-shaped, sharp and perfect, glassy colorless. 9.00

822. **Oxammite.** $(NH_4)_2C_2O_4+2H_2O$. Orthorhombic, prismatic, silky clear whitish.

2611 823. **Humboldtine.** $2FeC_2O_4+3H_2O$. Plates, yellowish. 4.00

2612*824. **Mellite.** $Al_2C_{12}O_{12}+18H_2O$. Tetragonal, obtuse unit pyramid *o*, sharply defined, resinous translucent honey-yellow. 1.00

2613° Pigotite. $4Al_2O_3.C_{12}H_{10}O_8+27H_2O$. Massive, brown. 1.50

II. Moissanite. CSi. Hexagonal plates in meteoric iron.

VIII. Hydrocarbon Compounds

The hydrocarbon compounds in general, with perhaps a few exceptions, are not homogeneous substances, but mixtures, which by the action of solvents or by fractional distillation may be separated into two or more component parts. Hence, they are not definite mineral species. Those printed in capitals are indicated by Dana as leading compounds. A very large number of names of related but less important substances are here omitted.

1. Simple Hydrocarbons

Chiefly Members of the Paraffin Series. CnH_{2n+2}.

Type No.

SCHEERERITE. C 73 p.c., H 24 p.c. A polymer of marsh gas(?). Monoclinic, thin tables, translucent.

2614 HATCHETTITE. C 85·55 p.c., H 14·45 p.c. Massive, translucent yellowish. .50

2615* OZOCERITE. C 84·43 p.c., H 13·69 p.c. Foliated wax, dark brownish. .20

2616 FICHTELITE. $C_{15}H_{26-28}$(?). Monoclinic, translucent white.. 75

2617 HARTITE. Ratio of C to H=12 : 20. Triclinic or monoclinic, translucent white. .75

KÖNLITE. Ratio of C to H=1 : 1. $n(C_6H_6)$. A polymer of benzene. Amorphous, brownish.

2 Oxygenated Hydrocarbons

Comprise chiefly the numerous kinds of native fossil resins often designated by the generic term, *amber*.

2618+ SUCCINITE, True Amber. Ratio of C,H,O=40 : 64 : 4. Irregular mass, translucent yellow, clouded. .50

2619 transparent, precious. .50

2620⊙ ditto, containing insects. .75

RETINITE. A generic name including Copalite and many other amber-like resins. They contain little or no succinic acid.

2621⊙ Copalite. Ratio for C,H,O=40 : 64 : 1. Amorphous, resinous clear pale yellow. .40

Copalite—Continued

Type No.

2622 ditto, containing insects. .60

2623⊙ I. Allingite. A fossil resin, in shale. .50

BATHVILLITE. Ratio of C,H,O=40 : 68 : 4. Amorphous, like completely decayed wood, dull fawn-brown.

2624⊙ TASMANITE. Ratio of C,H,O,S=40 : 62 : 2 : 1. Minute scales in shale, resinous brown. .40

DYSODILE. C 69 p.c., H 10 p.c., O 16·9 p.c., S 2·35 p.c., N 1·7 p.c. Thin folia, yellowish.

PYRORETINITE. Ratio of C, H, O=40 : 56 : 4. Resin-like.

LEUCOPETRITE. $C_{50}H_{84}O_3$. Between resin and wax in characters.

GEOMYRICITE. $C_{34}H_{68}O_2$. Wax-like.

GEOCERITE. $C_{28}H_{56}O_2$. Wax-like, white.

BOMBICCITE. C_7HO_{13}. Triclinic, clear colorless.

2625⊙ IDRIALITE. $C_{80}H_{56}O_2$. Massive, white, mixed with cinnabar, clay, pyrite, gypsum and a solid brownish-black earth. 1.00

ROCHLEDERITE. Ratio of C,H,O=40 : 56 : 6. Resin-like, transulcent reddish-brown.

DOPPLERITE. $C_{12}H_{14}O_6$. Amorphous, jelly-like, brownish.

Appendix to Hydrocarbons

In general the following more complex substances are less definite than those described in the preceding groups.

2626+ PETROLEUM. Chiefly consists of members of the paraffin and asphaltum series, $C_n H_{2n+2}$, varying from Marsh Gas, CH_4, to the solid forms. Oily liquid. .20

2627+ ASPHALTUM, Mineral Pitch. A mixture of different hydrocarbons, part of which are oxygenated. Amorphous, blackish, solid. .20

2628 ditto, viscous. .20

2629⊙ ELATERITE, Elastic Bitumen. Approximately C 85 p.c., H 12—13 p.c. Massive, soft, very elastic, dark brown. .40

2630⊙ Wurtzilite. Compact, brilliant black. .20

2631⊙ Uintahite, Gilsonite. An asphaltum. Compact, brilliant black. .20

Type No.

MINERAL COAL. Mainly oxygenated hydrocarbons of vegetable origin. Massive:—

2632+ 1. Anthracite, Hard Coal, 85—93 p.c. C, compact, brilliant black. .20

2633 ditto, in limestone. .20

2. Bituminous, Soft Coal, 5—15 p.c. O:—

2634⊙ (a) Caking or coking coal, fragile, greasy pitch-black. .20

2635* (b) Non-caking coal, fragile, greasy pitch-black. .20

2636⊙ ditto, breaking in layers, iridescent. .20

2637* (c) Cannel coal, compact, dull grayish-black. .20

2638⊙ (d) Brown coal, Lignite, friable, dark brownish. .20

2639 Brown coal, Jet, compact, brilliant black, polished. .40

2640⊙ Peat, partly carbonized vegetable fibres, loosely matted mass. .30

Supplement

Minerals Measured but not Analyzed

The angles of the following very rare minerals have been measured and the forms so determined, indicate that future chemical analyses may prove them to be distinct species.

S. Hessenbergite. A silicate. Monoclinic, tabular || *c*, adamantine, clear colorless with bluish tinge.

S. Mursinskite. Tetragonal, clear yellow.

PART III

Index to

Complete Type Collection, Dana's System

Price List

of Hand Size Specimens

Index

to

Complete Type Collection—Dana's System

Price List

of

Hand Size Specimens

Abbreviations. The species numbers preceding the names are those in Dana's "System of Mineralogy," 6th Ed. Where "r" or "n" follows the name of a mineral, it is *related* to or *near* the species, the number of which precedes the indexed name; when followed by "s," it is a *synonym;* followed by "s. v.," "s.n." or "s. r." it is a synonym of a variety of the species, or a synonym of a mineral near or related to it; if followed by "ap." it will be found in the first *appendix* following the species number given. "H" designates *Hydrocarbons*, described at the end of the "System."

Approximate Prices are quoted on good typical specimens of minerals ordinarily in stock. A range of price indicates different types or varieties. Hence selections are best made from the preceding systematic list, giving composition, crystallization, structure and color, with separate price for each type.

Hand Size Specimens, *averaging* 10 x 7 cm. (4 x 2¾ in.), furnished at approximately the *list prices*.

Museum Size Specimens, *averaging* 12x9 cm. (4¾x3½ in.), sold at *double the list prices*.

Printed Labels attached give name, composition and locality.

Pasteboard Trays are included (or blocks with museum specimens if requested).

Free Transportation to any address in the world. Any or all specimens may be *returned at our expense*.

Our Approval System with its risk of double transportation cost assumed by us, gives assurance that purchasers will be pleased.

A Deduction of 10 per cent. is made on $20.00 worth of hand or museum specimens without chest, if all are kept.

Detailed Information as to sizes, labels, trays, transportation, terms, chests, cabinets, etc. is given in Part I.

Other Price Lists. Besides the preceding complete descriptive list of over 2600 minerals, price lists will be found in: Part IV., 180 of the Common Minerals arranged according to metallic constituents; Part V., 400 Economic Minerals, similarly arranged; Part VI., 300 crystals, classified under their system of crystallization; Part VIII., Laboratory List (alphabetical) of pure minerals sold by weight for chemical purposes.

Index and Price List

PART IV

Elementary Systematic Collections

The arrangement, apart from the silicates, is according to the metallic constituents. Adapted for a short course in any popular book for beginners.

No. 14A. Normal or High School Collection

One hundred and eighty museum size specimens, averaging 12 x 9 cm. (4¾ x 3½ in.). Prepared especially to meet the demand among Normal and High Schools and private Academies for a practical reference collection, embracing only the common or most important species and varieties. The striking colors and choice crystallizations, in which the collection abounds, make it an attractive and essential feature in the class-room or school museum. The list includes every name in the summary of species as given in Prof. E. S. Dana's "Minerals and How to Study Them."

Indiviudal museum specimens may be purchased at double the (hand size) prices given after each name in the High School List. The sum of such individual values in the museum size is $228.10. The "collection price" for all the specimens is $180.00, delivered to any address. This price includes pasteboard trays (or blocks if requested) and three No. 3 Oak Chests, as shown in Plate IX. Without chests, 10 per cent. less. Mahogany 10-drawer cabinet $45.00. See Plate.

Purchase in Parts. Free delivery with trays and No. 3 chest. Without chest, 10 per cent. less.

Part I. (School Collection No. 21A) 60 names marked with +, totaling $58.40 ....$50.00

Part II. 60 names marked with *, totaling $67.80 .. 50.00

Part III. 60 remaining names, totaling $101.90 .... 80.00

No. 14. Student's Normal or High School Collection

One hundred and eighty hand size specimens averaging 10 x 7 cm. (4 x 2¾ in.). Like the preceding, but smaller size. Individual specimens sold at listed prices. These total $114.05. The "collection price" for all the specimens is $90.00, delivered to any address with pasteboard trays and three No. 2 Oak Chests, as shown in Plate X. Without chests, 10 per cent. less. Mahogany 6-drawer cabinet, $30.00.

Purchase in Parts. Free delivery with trays and No. 2 chest. Without chest, 10 per cent. less.

Part I. (Student's School Collection No. 21) 60 names marked with +, totaling $29.20 ...$25.00

Part II. 60 names marked with *, totaling $33.90 .. 25.00

Part III. 60 remaining names, totaling $50.95 .... 40.00

No. 18A. Secondary School Collection

One hundred and twenty museum size specimens, averaging 12 x 9 cm. (4¾ x 3½ in.).

An abridgment of No. 14A. arranged for schools desiring to cut down the specimens to the minimum number required in a brief course. Except in point of numbers, it presents the same attractive and showy appearance as the foregoing, and forms an excellent nucleus about which may be conveniently gathered other important minerals. The Secondary School List is exactly as recommended by Prof. E. S. Dana, and comprises the names marked with + or * in the following High School List.

Individual museum specimens may be purchased at double the prices listed (for the hand size). The sum of such individual values in the museum size is $126.20. The "collection price" for all the specimens is $100.00, delivered to any address. This price includes pasteboard trays (or blocks if requested), and two No. 3 Oak Chests, as shown in Plate X. Without chests, 10 per cent. less.

PURCHASE IN PARTS. Free delivery with trays and No. 3 Chest. Without chest, 10 per cent. less.

PART I. (School Collection No. 21A) 60 names marked with +, totaling $58.40 ....$50.00
PART II. 60 names marked with *, totaling $67.80 .. 50.00

No. 18. Student's Secondary School Collection

One hundred and twenty hand size specimens, averaging 10 x 7 cm. (4 x 2¾ in.). Like the preceding, but smaller. Individual specimens sold at listed prices. These total $63.10. The "collection price" for all the specimens is $50.00, delivered to any address. This includes pasteboard trays with one No. 3 Oak Chest, as shown in Plate X. Without chest, 10 per cent. less.

PURCHASE IN PARTS. Free delivery with trays and No. 2 Chest. Without chest, 10 per cent. less.

PART I. (Student's School Collection No. 21.) 60 names marked with + in High School List, totaling $29.20 ....$25.00
PART II. 60 names marked with *, totaling $33.90 .. 25.00

No. 21A. School Collection

Sixty museum size specimens, averaging 12 x 9 cm. (4¾ x 3½ in.). This limited selection is not intended for serious study, but more to interest beginners by the beauty of form and color of the specimens and the utility of a few of the popularly known kinds. Excellent for illustrating nature-study talks and elementary work generally. It will also serve as the smallest practicable nucleus essential in beginning a more extensive collection, these first specimens being always worthy of a place beside the later and rarer additions. According to the following "School List," comprising the minerals marked +.

Individual museum specimens may be purchased at double the listed prices (for the hand size). The sum of such individual values in the museum size is $58.40. The "collection price" for all the specimens, delivered to any address, is $50.00. This price includes pasteboard trays (or blocks if requested) and one No. 3 Oak Chest, shown in Plate X. Without chest, 10 per cent. less.

No. 21. Student's School Collection

Sixty hand size specimens averaging 10 x 7 cm. (4 x 2¾ in.). Like the preceding, but smaller. Individual specimens sold at listed prices. These total $29.20. The "collection price" for all the specimens is $25.00, delivered to any address. This includes pasteboard trays and one No. 2 Oak Chest, shown in Plate XI. Without chest, 10 per cent. less.

The High School List

Entire 180 names. Collections 14A and 14.

The Secondary School List

120 names marked + or *. Collections 18A and 18.

The School List

60 names marked +. Collections 21A and 21.

Carbon. C

1 DIAMOND. Small octahedral crystal.................... $1.50
2+ GRAPHITE, Plumbago or Black Lead. Foliated mass..... .40

Sulphur. S

3+ SULPHUR. Native, group of brilliant perfect crystals, translucent bright yellow......................... .75

Arsenic. As

4 ARSENIC. Native, fine granular, gray.................. .75
5 REALGAR. As monosulphide, red...................... 1.00
6* ORPIMENT. As trisulphide, foliated, fine yellow......... 1.00
7+ ARSENOPYRITE, Mispickel. Fe sulph-arsenide, granular, tin-white....................................... .20

Antimony. Sb

8 ANTIMONY. Native, crystalline, gray................. 2.50
9+ STIBNITE, Antimony Glance. Sb trisulphide, crystalline, bladed-columnar, steel-gray..................... .35

Bismuth. Bi

10 BISMUTH. Native, crystalline foliated................ 1.00

Molybdenum. Mo

11* MOLYBDENITE. Mo disulphide, crystallized, tabular, lead-gray... .40

Gold. Au

12+ GOLD. Native, free grains disseminated in quartz $2.00
13 SYLVANITE. Au and Ag telluride, crystallized........... 2.00

Platinum. Pt

14 PLATINUM. Native, grains, steel-gray................. 1.50

Silver. Ag

15+ SILVER, "Leaf Silver." Native, plate................. 1.50
16* ARGENTITE, Silver Glance. Ag sulphide, massive, black . 1.25
17 PYRARGYRITE, Dark Ruby Silver. Ag sulphantimonite. . 1.00
18 PROUSTITE, Light Ruby Silver. Ag sulpharsenite, disseminated... 1.25
19 CERARGYRITE, Horn Silver. Ag chloride, grayish........ 1.25

Mercury. Hg

20 MERCURY, Quicksilver. Native, globules on matrix..... 1.00
21+ CINNABAR. Hg sulphide, crystalline, crimson.......... 1.25

Copper. Cu

22+ COPPER. Native, in "Calumet Conglomerate."........ .20
23* CHALCOCITE, Copper Glance. Cu sulphide, dark steel-gray... 1.00
24* BORNITE, Peacock Ore. Cu and Fe sulphide, coppery bluish-brown, tarnishing iridescent................ .75
25+ CHALCOPYRITE, Copper Pyrites. Cu and Fe sulphide, brass-yellow................................. .35
26+ TETRAHEDRITE, Fahlerz or Gray Copper. Cu sulphantimonite, massive 1.00
27+ CUPRITE, Chalcotrichite, Ruby Copper. Cu oxide, crystallized, capillary........................... .75
28+ MALACHITE. Cu basic carbonate, bright green.......... .75
29+ AZURITE. Cu basic carbonate, crystallized, blue....... 1.00
30 DIOPTASE. Cu basic ortho-silicate, loose crystal, brilliant emerald-green................................ 1.00
31 CHRYSOCOLLA. Cu hydrous silicate, turquois-blue, amorphous.. .50
32 BROCHANTITE. Basic Cu sulphate, brilliant crystals, dark green .... .75

Lead. Pb

33 LEAD. Native, on matrix........................... 1.00

34+	GALENA. Pb sulphide, cubic cleavage, shining lead-gray.	$ .40
35	JAMESONITE, Feather Ore. Pb sulphantimonite, crystalline granular, steel-gray	1.00
36	BOURNONITE, Wheel Ore. Pb and Cu sulphantimonite, crystallized, splendent blackish-gray	1.25
37+	PYROMORPHITE. Pb chloride and phosphate, crystals, green.	.75
38*	MIMETITE. Pb arsenate and chloride, crystals, yellow	1.50
39*	VANADINITE. Pb vanadate and chloride, crystals, red.	1.00
40	CROCOITE. Pb chromate, prisms, brilliant fine red	1.00
41*	WULFENITE. Pb molybdate, perfect tabular crystals, brilliant orange-red	1.00
42+	CERUSSITE. Pb carbonate, compact, gray	.50
43*	ANGLESITE. Pb sulphate, crystallized, brilliant	1.50

Tin. Sn

44+	CASSITERITE, Stream Tin. Sn dioxide, grains, iron-black.	.50

Titanium. Ti

45	ILMENITE. Fe and Ti oxides, iron-black	.25
46*	RUTILE. Ti dioxide, sharp prismatic crystals, red	.50
47	OCTAHEDRITE, Anatase. Ti dioxide, crystallized, small.	1.50
48	BROOKITE, Arkansite. Ti dioxide, bright black crystals.	.75
49*	TITANITE, Sphene. Ti calcium titano-silicate, crystal	.50

Radium and Uranium. Ra, U

Highly radio-active minerals.

50	URANINITE, Pitchblende. Contains Ra, U etc., black	3.00
51	TORBERNITE. U and Cu hydrous phosphate with Ra, small crystals, green	1.50
52	AUTUNITE. U and Ca hydrous phosphate with Ra, small crystals, yellow	1.25

Iron. Fe

53	IRON. Native Fe with Ni and Co, Meteoric, etched to show Widmannstätten crystalline figures	2.00
54+	PYRRHOTITE, Magnetic Pyrites. Fe and Ni sulphide	.20
55+	PYRITE, Iron Pyrites. Fe sulphide, crystallized, isometric, splendent yellow	.50
56	massive	.20
57+	MARCASITE. Fe sulphide, crystallized, orthorhombic	.75
58	HEMATITE, Specular Iron. Fe sesquioxide, crystallized, splendent black	.60
59+	massive granular, red	.20

60 MAGNETITE. Fe protoxide and sesquioxide, octahedral crystals, iron-black.......................... $ .40
61+ Lodestone. Compact.......................... .50
62* FRANKLINITE. Fe, Zn and Mn ferrate and manganate... .40
63* CHROMITE, Chromic Iron. Fe chromate, granular....... .20
64+ LIMONITE, Brown Iron Ore. Fe hydrous sesquioxide..... .20
65+ SIDERITE, Chalybite or Spathic Iron. Fe protocarbonate, rhombic cleavage, brown...................... .20

Nickel. Ni (See also No. 54).

66 GENTHITE. Hydrous Ni and Mg basic silicate, green.. .50
67* GARNIERITE. Hydrated Ni and Mg silicate, green....... .50
68+ MILLERITE. Ni sulphide, fibrous crystalline, brass-yellow.................................... 1.00
69* NICCOLITE, Arsenical Nickel. Ni arsenide, reddish-gray. 1.00

Cobalt. Co

70 LINNÆITE. Co sulphide, small octahedral crystals, gray. 2.00
71 SMALTITE. Co arsenide, compact, gray................ 1.00
72 COBALTITE, Cobalt Glance. Co sulph-arsenide, crystals.. .60
73 ERYTHRITE, Cobalt Bloom. Co hydrous arsenate, red.... 1.00

Columbium and Tantalum. Cb, Ta

74* COLUMBITE. Ferrous Fe and Mn columbate and tantalate, crystalline, disseminated in greisen, iron-black.. 1.00

Tungsten. Wo

75 WOLFRAMITE. Fe and Mn tungstate, crystalline bladed. .75
76 SCHEELITE. Ca tungstate, massive, whitish............ .75

Lithium. Li

77* SPODUMENE. Li and Al Metasilicate, cleavage, whitish. .20
78 TRIPHYLITE. Li, Fe and Mn phosphate, brown......... .60
79 AMBLYGONITE. Li and Al fluo-phosphate, white........ .50
80* LEPIDOLITE, Lithia Mica. Basic Li, Al and K fluo-silicate, micaceous granular, lilac......................... .20

Manganese. Mn

81* PYROLUSITE. Mn dioxide, crystalline, black........... .20
82* MANGANITE. Hydrous Mn sesquioxide, fibrous crystalline, black.................................. 1.00
83+ RHODONITE, Fowlerite. Mn and Zn metasilicate, pink, crystalline.................................. .35
84* RHODOCHROSITE, Dialogite. Mn protocarbonate, cleavable, pink.................................. .75

Zinc. Zn

85+	SPHALERITE, Zinc Blende. Zn sulphide, crystallized, resinous	$ .50
86*	ZINCITE. Zn oxide, granular, red	.75
87*	WILLEMITE. Zn orthosilicate, massive, green	.60
88*	CALAMINE. Basic Zn silicate, crystallized drusy	.50
89+	SMITHSONITE. Zn carbonate	.40

Aluminium. Al

90+	CORUNDUM. Al sesquioxide, crystallized, gray	.50
91*	BAUXITE. Hydrous Al sesquioxide, yellowish-white	.20
92*	SPINEL. Mg aluminate, octahedral crystal	.75
93*	CRYOLITE. Al and Na fluoride, semitranslucent white	.30
94	TURQUOIS. Hydrous basic Al phosphate, blue	.75
95*	WAVELLITE. Hydrous basic Al phosphate, radiated, green	.40

Calcium. Ca

96	FLUORITE, Fluor Spar. Ca fluoride, cubic crystals, blue	.50
97+	cleavable-granular, greenish-white	.20
98+	CALCITE, Calc Spar. Ca carbonate, crystallized, scalenohedral	.50
99*	Iceland Spar. Doubly refracting rhombic cleavage	1.00
100+	Marble. Crystalline, white	.20
101*	Chalk. Amorphous, white	.20
102*	Travertine. Columnar-crystalline, indistinctly banded	.60
103+	ARAGONITE. Ca carbonate, pseudo-hexagonal twin crystals	.50
104+	APATITE. Ca phosphate, with Ca fluoride, crystalline, green	.20
105+	GYPSUM, Selenite. Hyd. Ca sulphate, cleavage, clear	.20
106	Alabaster. Compact, translucent white	.20
107*	ANHYDRITE. Ca anhydrous sulphate, bluish-gray	.20

Magnesium. Mg

108*	BRUCITE. Mg hydrate, cleavage, pearly whitish	1.00
109	MAGNESITE. Mg carbonate, porcelain-like, white	.20
110+	DOLOMITE, Pearl Spar. Ca and Mg carbonate, curved rhombs	.30

Boron. B

111	COLEMANITE. Hydrous Ca borate, crystalline, white	.50

112	BORAX. Hydrous Na borate, crystals	$ .40
113	BORACITE, Stassfurtite. Mg chloroborate	.30
	Barium. Ba	
114+	BARITE, Barytes or Heavy Spar. Ba sulphate, lamellar, white	.20
115*	WITHERITE. Ba carbonate, crystalline	.20
	Strontium. Sr	
116+	CELESTITE. Sr sulphate, blue cleavage	.20
117*	STRONTIANITE. Sr carbonate, crystalline columnar	.20
	Sodium. Na	
118+	HALITE, Rock Salt. Na chloride, cleavage, clear	.20
119	SODA NITER. Na nitrate, crystalline, white	.40
	Potassium. K	
120	SYLVITE. K chloride, cleavage	.30
	Rare Elements	
121*	ZIRCON. Zr silicate, loose perfect crystals, brown	.40
122	MONAZITE SAND. Ce, La, Di phosphate, with Th	.40
	Silicon. Si	
123+	QUARTZ, Rock Crystal. Si dioxide, prism, clear glassy	.50
124*	Smoky. Crystal	.25
125*	Amethyst. Crystallized, transparent	.50
126+	Chalcedony. Mammillary, translucent	.40
127*	Agate. Banded, polished	.75
128*	Flint. Nodule, gray	.20
129+	Jasper. Red	.30
130+	OPAL, Precious. Si dioxide with water, play of colors	1.00
131	Fire. Translucent fiery red	.75
132	Wood-opal. Petrified cellular, radial and concentric structure well marked, yellowish-brown	.40
	Silicates—The Feldspars	
133+	ORTHOCLASE. Al and K polysilicate, crystals, grayish	.50
134	MICROCLINE, Amazonstone. Al and K polysilicate, large crystal, green	.50
135+	ALBITE, Cleavelandite. Al and Na polysilicate, lamellar, white	.20
136	ANORTHITE. Al and Ca polysilicate, crystallized	1.00
137*	OLIGOCLASE, Sunstone, Aventurine. Al, Na and Ca polysilicate, cleavage, with twinning striæ and internal fiery reflections	.75

138* LABRADORITE. Al, Na and Ca polysilicate, cleavage, with twinning striæ, chatoyant, bluish-gray........ $ .30

Silcates—Various

139* PYROXENE, Diopside. Ca and Mg metasilicate, crystalline, green.. .50
140* Diallage. Ca, Fe and Mg metasilicate, lamellar .... .30
141 Salite. Ca, Mg and Fe metasilicate, crystalline........ .50
142+ PYROXENE, Augite. Ca, Mg, Fe and Al metasilicate, crystals.. .40
143 ENSTATITE, Bronzite. Mg metasilicate, sublamellar ... .30
144* Amphibole, Tremolite. Ca and Mg metasilicate, crystalline, whitish.............................. .40
145* Actinolite. Ca, Fe and Mg metasilicate, bladed crystals in talc, green.......................... .30
146* Asbestus. Ca, Fe and Mg metasilicate, fibrous, white .20
147+ Hornblende. Ca, Al and Mg metasilicate, cleavable, black.. .20
148+ BERYL. Be and Al metasilicate, green................... .35
149 GARNET, Grossularite, Cinnamon Stone. Ca and Al orthosilicate, dodecahedron truncated by trapezohedron, bright, brown.................................. .60
150+ Almandite. Fe and Al orthosilicate, large symmetrical dodecahedron.......................... .30
151+ MUSCOVITE, Potash or Common Mica. Hydrous K and Al metasilicate, cleavage sheet, gray........... .20
152+ BIOTITE, Magnesium-iron Mica. Mg, Fe, K and Al orthosilicate, cleavage sheet, black................. .20
153 PHLOGOPITE, Magnesia Mica. Mg, K and Al fluosilicate, cleavage sheet, bronze, asteriated............ .20
154* CLINOCHLORE. A hydromica, basic Mg and Al silicate, cleavage, green.............................. .50
155* CHRYSOLITE, Olivine. Mg and Fe orthosilicate, granular, green...................................... .30
156* WERNERITE, Scapolite. Ca, Al and Na chloro-silicate, coarse crystalline granular, pinkish............... .20
157* VESUVIANITE. Basic Al and Ca silicate, crystalline..... .40
158+ EPIDOTE. Basic Fe, Al and Ca silicate, crystalline columnar, green...................................... .40
159* ZOISITE, Thulite. Basic Al and Ca silicate, fine pink... .40
160* TOURMALINE. Complex Al, B silicate, black crystals .40

161 Rubellite. Slender delicate pink crystals in pale lilac lepidolite . . . . $ .50
162* Topaz. Al fluo-silicate, perfect crystals, clear, precious. .35
163* Andalusite. Al silicate, grayish 75
164* Cyanite. Al silicate, crystalline bladed, blue 30
165 Sillimanite. Al silicate, embedded prisms, gray 40
166 Pyrophyllite. Basic Al silicate, radio-fibrous, pearly . .75
167+ Staurolite. Basic Fe, Al and Mg silicate, twin crystal .40
168+ Talc, Steatite. Acid Mg metasilicate, schistose, gray. . .20
169+ Serpentine. Basic Mg silicate, green 20
170 Kaolinite. Basic Al silicate, earthy, white 20
171* Datolite. Ca and B orthosilicate, glassy crystals 60
172+ Prehnite. Acid Ca and Al orthosilicate, drusy globular, green 50
173+ Apophyllite. Ca and K silicate, crystallized, pearly transparent whitish 75
174* Pectolite. Ca and Na metasilicate, radiated, white. . . .50

Silicates—The Zeolites

175 Thomsonite. Hydrous Na, Ca and Al silicate 50
176+ Natrolite. Hydrous Na and Al silicate, radio-fibrous, white 75
177* Analcite. Hydrous Na and Al silicate, crystals, white .75
178+ Chabazite. Hydrous Na, Ca and Al silicate, cuboid rhombs, whitish 50
179+ Stilbite. Hydrous Na, Ca and Al silicate, crystallized, pearly 40
180* Heulandite. Hydrous Na, Ca and Al silicate. crystals .75

PART V

Economic Mineralogy

Mining Sets of Industrial Minerals and Ores

Economic Mineralogy

Mining Sets of Industrial Minerals and Ores

No. 24A. School of Mines Collection

Four hundred museum size specimens, averaging 12 x 9 cm. (4¾ x 3½ in.). Designed to illustrate as fully as possible the occurrence of the useful minerals. The more striking differences of form are included, as well as important variations in quality of ore, structure, color and mode of occurrence.

The School of Mines List, on the following pages, includes all the common economic minerals, while a few which are rarer and of less immediate commercial interest, are added because valuable if found in marketable quantity.

The commoner species are shown in much wider variety than is possible in shorter collections. Additional varieties and types of the commoner and more important species, will be found in the list of the Complete Type Collection in Part II. The School of Mines Collection will serve every purpose of a high grade reference or working collection for the mining man or prospector, or for the use of mining schools or other institutions offering advanced courses in economic mineralogy. Apart from its utility, it makes an attractive and imposing display, when properly cased, whether in the mining office or public museum.

Individual museum specimens may be purchased at double the hand size prices in the School of Mines List. The sum of these individual values in the museum size is $1009.20. The "collection price" for all the specimens is $800.00, delivered to any address. This includes pasteboard trays (or blocks if requested) and two mahogany 10-drawer cabinets. Without cabinets, 10 per cent. less.

Purchase in Parts. Free delivery, with trays (or blocks if requested) and one 10-drawer cabinet with each part. Without cabinets, 10 per cent. less.

PART I. 200 specimens in Mining List (Mining Collection No. 27A), totaling $404.60 .... $340.00

PART II. 200 remaining specimens, totaling $604.60 460.00

PURCHASE IN SECTIONS. Listed as collections Nos. 51A to 65A.

No. 24. Expert's or Prospector's School of Mines Collection

Four hundred hand size specimens, averaging 10 x 7 cm. (4 x 2¾ in.). Same as preceding, but smaller size. Individual hand specimens may be purchased at the prices in the School of Mines List. These total $504.60. The "collection price" is $400.00, delivered to any address. This includes trays and mahogany 10-drawer cabinet. Without cabinet, 10 per cent. less.

PURCHASE IN PARTS. Free delivery, with trays.

PART I. 200 specimens in Mining List (Expert's or Prospector's Mining Collection No. 27), totaling $202.30, in 10-drawer cabinet....................................$190.00

Without cabinet, $153.00

PART II. 200 remaining specimens, totaling $302.30 without cabinet 210.00

Total.................................. 400.00

PURCHASE IN SECTIONS. Listed as collections Nos. 51 to 65.

No. 27A. Mining Collection

Two hundred museum size specimens, averaging 12 x 9 cm. (4¾ x 3½ in.). The demand for a reasonably complete series of economic minerals is met by this well arranged collection. As will be seen in the following "Mining List," which is one of the most popular we publish, no attempt is made to represent two varieties of the same mineral, except with very important species. It contains a large proportion of valuable ores, including practically all of those mentioned in the principal mining hand-books. For the work of the prospector or practical man seeking acquaintance with the actual ores themselves, this collection meets every requirement possible within the limitations of two hundred specimens. Furthermore it makes a very satisfactory showing in the office, laboratory, classroom or public museum.

Individual museum size specimens may be purchased at double the hand size prices given in the Mining List. The sum of such individual values in the museum size is $404.60. The "collection price" for all the specimens is $340.00, delivered to any address. This price includes pasteboard trays (or blocks if requested) and 10-drawer cabinet, or four No. 3 oak chests. Without cabinet or chests, 10 per cent. less.

PURCHASE IN SECTIONS. Listed as collections Nos. 52A, 54A, 56A, 58A, 60A, 62A, 64A, and 66A.

No. 27. Expert's or Prospector's Mining Collection

Two hundred hand size specimens, averaging 10 x 7 cm. (4 x 2¾ in.). Same as preceding but smaller size. Individual specimens, totaling $202.30 sold as listed. The "collection price" for all the specimens, with pasteboard trays and 6-drawer cabinet or two No. 3 oak chests, is $170.00. Without cabinet or chests, 10 per cent. less.

PURCHASE IN SECTIONS. Listed as collections Nos. 52, 54, 56, 58, 60, 62, 64 and 66.

Sectional Series

of the School of Mines and Mining Lists

The following collections form successive sections of Nos. 24A, 24, 27A and 27. When sections valued at $20.00 or over are purchased they are accompanied by the chests mentioned. Without the chests they are 10 per cent. less. If a sufficient number of sections are purchased to fill a drawer cabinet, the latter will be delivered, if requested, instead of chests.

Any fifty-specimen section of the School of Mines List may be purchased in separate parts as shown under Nos. 51A and 51, by first getting a twenty-five specimen section and later completing it by paying the difference between the collection prices of the twenty-five and fifty-specimen sections.

Prices include delivery to any address.

Ores of Gold, Silver, Platinum, etc.

No. 51A. Fifty specimens, mostly small, but quality corresponding to the museum size. Total, $214.00. "Collection price," delivered with trays and No. 3 chest, $180.00.

PURCHASE IN PARTS. Trays and No. 2 chest with each part.

PART I. 25 specimens marked + (No. 52A), $80.00.

PART II. 25 remaining specimens, $100.00.

No. 51. Fifty specimens, mostly small, but quality corresponding to the hand size. Total, $107.00. "Collection price," delivered with trays and No. 2 chest, $90.00.

PURCHASE IN PARTS, at half the price of above 51A parts.

No. 52A. Twenty-five specimens marked +, mostly small, but quality corresponding to the museum size. Total, $91.50. "Collection price," delivered with trays and No. 2 chest, $80.00.

No. 52. Twenty-five specimens marked +, mostly small, but quality corresponding to the hand size. Total, $45.75. "Collection price," delivered with trays and No. 1 chest, $40.00.

Ores of Iron

No. 53A. Fifty museum specimens, averaging 12 x 9 cm. (4¾ x 3½ in.), totaling $55.40. "Collection price," delivered with trays and No. 3 chest, $40.00

No. 53. Fifty hand specimens, averaging 10 x 7 cm. (4 x 2¾ in.), totaling $27.70. "Collection price," delivered with trays and No. 2 chest, $20.00.

No. 54A. Twenty-five museum specimens marked +, averaging 12 x 9 cm. (4¾ x 3½ in.), totaling $23.50. "Collection price," delivered with trays and No. 2 chest, $20.00.

No. 54. Twenty-five hand specimens marked +, averaging 10 x 7 cm. (4 x 2¾ in.), totaling $11.75. "Collection price," delivered with trays, $10.00.

Lead, Antimony, Zinc and Cadmium Minerals

No. 55A. Fifty museum specimens, averaging 12 x 9 cm. (4¾ x 3½ in.), totaling $106.60. "Collection price," delivered with trays and No. 3 chest, $90.00.

No. 55. Fifty hand specimens, averaging 10 x 7 cm. (4 x 2¾ in.), totaling $53.30. "Collection price," delivered with trays and No. 2 chest, $45.00.

No. 56A. Twenty-five museum specimens marked +, averaging 12 x 9 cm. (4¾ x 3½ in.), totaling $49.80. "Collection price," delivered with trays and No. 2 chest, $40.00.

No. 56. Twenty-five hand specimens marked +, averaging 10 x 7 cm. (4 x 2¾ in.), totaling $24.90. "Collection price," delivered with trays and No. 1 chest, $20.00.

Copper Minerals

No. 57A. Fifty museum specimens, averaging 12 x 9 cm. (4¾ x 3½ in.), totaling $134.30. "Collection price," delivered with trays and No. 3 chest, $110.00.

No. 57. Fifty hand specimens, averaging 10 x 7 cm. (4 x 2¾ in.), totaling $67.15. "Collection price," delivered with trays and No. 2 chest, $55.00.

No. 58A. Twenty-five museum specimens marked +, averaging 12 x 9 cm. (4¾ x 3½ in.), totaling $45.60. "Collection price," delivered with trays and No. 2 chest, $40.00.

No. 58. Twenty-five hand specimens marked +, averaging 10 x 7 cm. (4 x 2¾ in.), totaling $22.80. "Collection price," delivered with trays and No. 1 chest, $20.00.

Lithium, Barium, Strontium, Sodium, Potassium, Magnesium, Calcium, Boron and Carbon Minerals

No. 59A. Fifty museum specimens, averaging 12 x 9 cm. (4¾ x 3½ in.), totaling $50.50. "Collection price," delivered with trays and No. 3 chest, $40.00.

No. 59. Fifty hand specimens, averaging 10 x 7 cm. (4 x 2¾ in.), totaling $25.25. "Collection price," delivered with trays and No. 2 chest, $20.00.

No. 60A. Twenty-five museum specimens marked +, averaging 12 x 9 cm. (4¾ x 3½ in.), totaling $17.80. "Collection price," delivered with trays, $15.00.

No. 60. Twenty-five hand specimens marked +, averaging 10 x 7 cm. (4 x 2¾ in.), totaling $8.90. "Collection price," delivered with trays, $7.50.

Nickel, Cobalt, Chromium, Manganese and Aluminium Minerals

No. 61A. Fifty museum specimens, averaging 12 x 9 cm. (4¾ x 3½ in.), totaling $87.20. "Collection price," delivered with trays and No. 3 chest, $70.00.

No. 61. Fifty hand specimens, averaging 10 x 7 cm. (4 x 2¾ in.), totaling $43.60. "Collection price," delivered with trays and No. 2 chest, $35.00.

No. 62A. Twenty-five museum specimens marked +, averaging 12 x 9 cm. (4¾ x 3½ in.), totaling $32.80. "Collection price," delivered with trays and No. 2 chest, $25.00.

No. 62. Twenty-five hand specimens marked +, averaging 10 x 7 cm. (4 x 2¾ in.), totaling $16.40. "Collection price," delivered with trays, $12.50.

Radio-active and Other Rare Element Minerals, including Uranium, Thorium, Yttrium, the Cerium Metals, Zirconium, Germanium and Caesium

No. 63A. Fifty museum specimens, standard of size 12 x 9 cm. (4¾x 3½ in.), but many are smaller. Total, $246.60. "Collection price," delivered with trays and No. 3 chest, $180.00.

No. 63. Fifty hand specimens, standard of size 10 x 7 cm. (4 x 2¾ in.), but many are smaller. Total, $123.30. "Collection price," delivered with trays and No. 2 chest, $90.00.

No. 64A. Twenty-five museum specimens marked +, standard of size 12 x 9 cm. (4¾ x 3½ in.), but many are smaller. Total, $95.80. "Collection price," delivered with trays and No. 2 chest, $80.00.

No. 64. Twenty-five hand specimens marked +, standard of size 10 x 7 cm. (4 x 2¾ in.), but many are smaller. Total, $47.90. "Collection price," delivered with trays and No. 1 chest, $40.00.

Tin, Tungsten, Titanium, Molybdenum, Vanadium, Tantalum, Columbium, Arsenic, Mercury, Bismuth, Selenium, Tellurium and Sulphur Minerals

No. 65A. Fifty museum specimens averaging 12 x 9 cm. (4¾ x 3½ in.), totaling $117.60. "Collection price," delivered with trays and No. 3 chest, $90.00.

No. 65. Fifty hand specimens averaging 10 x 7 cm. (4 x 2¾ in.), totaling $58.80. "Collection price," delivered with trays and No. 2 chest, $45.00.

No. 66A. Twenty-five museum specimens marked +, averaging 12 x 9 cm. (4¾ x 3½ in.), totaling $47.80. "Collection price," delivered with trays and No. 2 chest, $40.00.

No. 66. Twenty-five hand specimens marked +, averaging 10 x 7 cm.(4 x 2¾ in.), totaling $23.90. "Collection price," delivered with trays and No. 1 chest, $20.00.

School of Mines List

400 KINDS FORMING ENTIRE LIST.

Mining List

200 KINDS MARKED +.

The theoretical percentage of valuable element contained is given. Actually, it is often less. Where the amount is not stated, it is a relatively unimportant factor in the commercial value.

Nos. 51 and 52. Gold, Silver and Platinum Minerals

Gold, Au

1+ **Gold.** Native, crystallized, gold-yellow. 2.00
2 arborescent, crystallized. 7.00
3 spongiform. 3.00
4 filiform, "wire gold." 2.00
5 masses or "stringers," disseminated. 2.50
6+ grains disseminated in Quartz. 2.00
7 ditto, in altered pyrite crystals. 2.00
8+ "dust," grains. 1.50
9+ nugget. 1.50
10+ Electrum. Alloyed with much silver, crystallized, pale yellow. 2.00
11 ditto, "leaf gold," crystallized plate, pale yellow. 2.00
12 **Petzite.** Au 25·5, Ag 42·, *telluride*, iron-gray. 3.00
13+ **Sylvanite.** Au 24·5, Ag 13·4, telluride, crystals, silver-white. 2.00
14 "Graphic Tellurium," arborescent twinning. 2.00
15+ **Calaverite.** Au 39·5, Ag 3·1, telluride, pale bronze-yellow. 2.50
16+ **Nagyagite,** Foliated Tellurium. Au 8·1, Pb, sulphotelluride, crystalline plates, blackish lead-gray. 3.00

Silver, Ag

17 **Silver.** Native, crystallized, silver-white, tarnishing. 3.00
18+ "Leaf Silver." Bright crystalline plate. 1.50
19+ filiform, wire silver. 1.50
20 grains disseminated in matrix. 1.00

21 ditto, scales. 2.00
22+ **Dyscrasite.** Ag 78·6, antimonide, crystalline. 2.50
23 **Argentite,** Silver Glance. Ag 87·1, sulphide, crystallized. 2.00
24+ massive, sectile, blackish lead-gray. 1.25
25 **Amalgam.** Ag 27·—86. Hg 72·—13· Crystal, silver-white. 4.00
26+ **Hessite.** Ag 63·3, telluride, small crystals, dark-gray. 2.50
27+ **Galena.** 35· to 354· Troy oz. Ag to the ton, argentiferous, Pb sulphide, granular. .75
28 **Acanthite.** Ag 87·1, sulphide, acicular, iron-black. 2.00
29 **Stromeyerite.** Ag 53·1, Cu, sulphide, massive, steel-gray. 2.50
30+ **Bornite.** Argentiferous, granular bluish-brown, tarnishing. .75
31 **Andorite.** Ag 22·5 Sb 41·6 Pb 23·1, sulphantimonite, massive, steel-gray. 4.00
32 **Pyrargyrite,** Dark Ruby Silver. Ag 59·9, sulphantimonite, crystallized, reddish-black. 2.00
33+ massive, compact. 1.00
34 **Proustite,** Light Ruby Silver. Ag 65·4, sulpharsenite, crystallized, vermillion. 3.00
35+ massive compact, dark red. 1.25
36+ **Tetrahedrite,** Freibergite. 3·—31· Ag, Cu sulphantimonite, granular. 1.00
37+ **Stephanite,** Brittle Silver. Ag 68·5, sulphantimonite, crystallized. 2.00
38+ **Polybasite.** Ag 75·6, Cu sulphantimonite, iron-black. 2.00
39 **Cerargyrite,** Horn Silver. Ag 75·3, chloride, crystallized. 3.00
40 massive, highly sectile, grayish. 1.25
41+ coating on rock. 1.25
42 **Embolite.** Ag 64·3, chlorobromide, crystallized. 2.00
43+ massive, olive-green, darkening on exposure. 1.25
44 **Iodyrite.** Ag 46·, iodide, crystals. 1.00
45+ massive, sulphur-yellow. 2.00
46 **Boleite.** Ag .15, Pb and Cu oxychloride, cubic crystals, deep blue. .75

Platinum, Pt; Iridium, Ir and Osmium, Os

47 **Platinum.** Nugget, steel-gray. 4.00
48+ minute grains and scales. 1.50
49 **Sperrylite.** Pt 56·5, arsenide minute crystals, tin-white. 2.00
50+ **Iridosmine.** Native Ir 59·83, Os 32·4, Pt ·76, grains, tin-white. 2.00

Nos. 53 and 54. Iron Minerals

51 **Iron.** Meteoric, etched plate, crystalline, steel-gray. 2.00
52+ Native, Terrestrial, dark steel-gray, oxidizing. 1.00
53+ **Pyrite.** S 53·4, Fe 46·6, sulphide, cubic crystals. .50
54 octahedral crystals. .50
55+ pyritohedral crystals, splendent brass-yellow. .50
56 penetration or "iron-cross" twins. .75
57+ massive. .20
58+ ditto, auriferous, 2.5 oz Au per ton. .50
59 altered to Limonite, brownish. .50
60 **Pyrrhotite**, Magnetic Pyrites. Fe 61·6, S 38·4, sulphide, granular. .20
61+ **Marcasite.** S 53·4, Fe 46·6, sulphide, crystallized, orthorhombic, Cockscomb Pyrites. .75
62 globular. .50
63+ **Hematite**, Specular Iron. Fe 70·, sesquioxide, rhombic crystals splendent black. .60
64 Specular Iron. Tabular crystals. .60
65+ Pencil Ore. Columnar diverging. .60
66+ compact, red. .20
67 ditto with red jasper, Jaspilite. .40
68 parting, thick lamellar. .50
69+ micaceous, thin foliated. .40
70 Kidney Ore, short fibrous, reniform. .60
71+ red ocherous, Lenticular Fossil Ore (oölitic). .20
72 Martite. Fe 69·9, sesquioxide, octahedral crystals. .75
73+ dodecahedral crystals. 1.00
74+ **Ilmenite.** Menaccanite. Fe Ti oxide, compact, iron-black. .25
75+ **Magnetite.** Fe 72·4, protoxide and sesquioxide, octahedral crystals. .40
76 dodecahedral crystals, striated, splendent-black. 1.00
77+ granular massive, iron-black. .20
78 sand. .20
79+ Lodestone. Compact. .50
80+ **Turgite.** Fe 66·2, sesquioxide, earthy, red. .20
81 **Göthite.** Fe 62·9, sesquioxide, acicular crystals. 1.00
82+ fibrous, concentric radiated reniform. 1.00
83 Sammetblende, velvety druse, yellowish-brown. 1.25
84+ **Limonite**, Brown Iron Ore. Fe 59·8, hydrous sesquioxide, compactly fibro-columnar. .40

85 globular crust, iridescent bronze. .50
86+ mammillary subfibrous, shining black surface. .30
87 stalactitic, radio-fibrous. .40
88 pisolitic. .40
89+ Yellow Ochre. .20
90+ Bog Ore, porous. .50
91 Brown-clay-iron-stone, massive. .20
92+ **Xanthosiderite.** Fe 57·1, sesquioxide, long fibrous, brown. .75
93+ **Siderite.** Fe 62·1, carbonate, crystallized, obtuse rhombs. .50
94 acute rhombs, brown. .75
95 Black-band ore, highly carbonaceous. .40
96+ cleavable. .20
97 granular. .20
98 **Dufrenite.** Fe 45·, phosphate, crystalline fibro-columnar. .75
99 **Melanterite**, Green Vitriol. Fe 21·7, sulphate, fibrous, green. .50
100 **Coquimbite.** Fe 19·9, Al, sulphate, bluish-violet. 1.00

Nos. 55 and 56. Lead, Antimony, Zinc and Cadmium Minerals

Lead, Pb

101+ **Galena**, Lead Glance. Pb 86·6, sulphide, cubic crystal, lead-gray. .75
102 octahedral crystal. 1.00
103+ cubic cleavage, bright. .40
104 fine granular. .40
105+ **Jamesonite**, Feather Ore. Pb 50·8, Sb 29·5, sulphantimonite, crystalline granular, steel-gray. 1.00
106 capillary, matted. 1.25
107+ **Massicot**, Yellow Plumbic Ochre. Pb 92·8, oxide, earthy, orpiment-yellow. 2.00
108+ **Cerussite.** Pb 76·8, carbonate, crystallized aggregate, satiny white. 1.25
109 reticulated twinning. 2.00
110+ massive, gray. .50
111 **Phosgenite.** Pb 76·, chlorocarbonate, prismatic crystal. 1.25
112+ **Pyromorphite.** Pb 78·4, chlorophosphate, crystallized, green. .75
113 brown crystals. 1.00
114+ **Anglesite.** Pb 68·3, sulphate brilliant crystals. 1.50

115 compact massive, dull gray. 1.50

116 **Crocoite.** Pb 64·, Cr 16·1, chromate, prismatic crystals, brilliant crimson. 1.00

Antimony, Sb

117 **Allemontite.** Sb 34·8, As 65·2, alloy, crystalline, tin-white, tarnishing. 3.00

118+ **Antimony.** Native, granular crystalline, tin-white. 2.00

119+ **Stibnite,** Antimony Glance. Sb 71·4, sulphide, crystals. 1.00

120+ crystalline, columnar bladed, lead-gray. .35

121 crystalline granular. .35

122 partially oxidized crystals, yellow. 1.00

123+ **Zinkenite.** Sb 41·8, Pb 35·9, sulphantimonite, fibrous. 2.00

124+ **Berthierite.** Sb 56·6, Fe sulphantimonite, crystalline fibrous, steel-gray. 1.00

125 **Senarmontite.** Sb 83·3, trioxide, small octahedrons. .75

126+ **Cervantite,** Antimony Ochre. Sb 78·9, oxide, massive, yellowish-white. .40

127 **Bindheimite.** Sb 22·6, Pb 58·5, lead antimonate, pulverulent coating, yellow. 1.00

128 **Nadorite.** Sb 30·5, Pb 52·4, chlorantimonate, yellow and brown. 1.50

Zinc, Zn

129+ **Sphalerite,** Zinc Blende. Zn 67·, sulphide, crystallized, brownish. .50

130 "Ruby Blende," crystals, bright, transparent. .75

131+ "Black Jack," crystals, glistening. .50

132 dodecahedral cleavage. .75

133+ granular cleavable, resinous. .20

134 Christophite, granular cleavable, black. .40

135+ **Wurtzite,** Schalenblende. Zn 67·, sulphide, fibrous, brown. 1.00

136+ **Zincite.** Zn 80·3, oxide, crystalline, red, with franklinite. .75

137 **Franklinite.** Zn 11·9, Fe 30·8 and Mn oxide, octahedral crystal, black. 1.25

138+ massive granular, coarse. .40

139 **Chalcophanite.** Zn 21·1, Mn 46·2, oxide, botryoidal subfibrous. .75

140+ **Smithsonite.** Zn 52, carbonate, botryoidal, massive. .40

141 earthy, impure, "dry-bone," grayish. .40

142+ **Aurichalcite.** Zn 42·6, Cu. 16·8, carbonate, microscopic crystals forming capillary velvety crust, turquois-blue. .75

143 **Hydrozincite.** Zn 60·1, carbonate, reniform fibrous crust. 1.50
144 **Willemite.** Zn 42·, orthosilicate, crystallized, flesh-red. 1.50
145+ massive, apple-green, with franklinite. .60
146 **Calamine.** Zn 54·1, silicate, tabular crystals, grouped. 1.00
147+ crystalline mass. .50
148 **Adamite.** Zn 45·3, arsenate, crystallized, light yellow. 1.00

Cadmium, Cd

149+ **Greenockite**, Cadmium Blende. Cd 77·7, sulphide, coating on ore. 1.50
150 **Smithsonite.** Cadmiferous, "turkey-fat ore," yellow. 1.50

Nos. 57 and 58. Copper Minerals

151 **Copper.** Native, tetrahexahedral crystals. 1.00
152+ crystallized, arborescent. .50
153 plates or "leaf copper." .50
154+ massive. .75
155+ disseminated in conglomerate. .20
156+ **Domeykite.** Cu 76·1, arsenide, compact, iridescent-bronze. 1.25
157 argentiferous, granular. 2.50
158 **Algodonite.** Cu 83·5, arsenide, silver-white, tarnishing. 3.00
159 **Whitneyite.** Cu 88·4, arsenide, reddish-white, tarnishing. 5.00
160 **Chalcocite**, Copper Glance. Cu 79·8, sulphide. Redruthite, crystallized. 1.50
161+ compact, bright iron-black. 1.00
162 **Covellite**, Indigo Copper. Cu 66·4, sulphide, crystallized, thin hexagonal tables, indigo-blue. 3.00
163+ foliated, crystalline, bright. 2.00
164+ platiniferous, enclosing sperrylite, porous, dull. 2.00
165 **Bornite**, Peacock Ore. Cu 55·5, Fe, sulphide, crystallized. 2.50
166+ compact massive, bluish-coppery-brown, iridescent. .75
167+ **Chalcopyrite**, Copper Pyrites. Cu 34·5 and Fe sulphide, small tetrahedrons on pearl spar. .50
168 twin crystals. 1.00
169 reniform. 1.25
170+ massive compact, brass-yellow. .35
171 massive granular. .35
172 **Tetrahedrite**, Fahlerz or Gray Copper. Cu 52·1, Sb 24·8, sulphantimonite, perfect tetrahedrons, iron-black. 1.00
173+ massive compact, grayish iron-black. 1.00

174 **Enargite.** Cu 48·3, sulpharsenite, crystallized, black. 2.00
175+ cleavable granular. 1.00
176+ **Atacamite.** Cu 59·4, chloride, crystallized, emerald-green. 1.50
177 granular massive. 1.00
178 **Cuprite**, Ruby Copper. Cu 88·8, oxide, octahedral crytals. 2.00
179+ Chalcotrichite, capillary, ruby-red. .75
180+ massive compact, dark red. 1.50
181 partly altered to malachite, crystal, green. 1.50
182+ **Tenorite**, Melaconite. Cu 78·8, oxide, massive, dull black. 1.00
183+ **Malachite.** Cu 58·4, carbonate, capillary, green. .75
184 tuberose, compact. 2.00
185+ massive, bright green. 1.25
186+ **Azurite.** Cu 56·, carbonate, crystallized, deep blue. 1.00
187 tuberose, concentric, azure-blue. 1.25
188 altered to malachite, crystallized, green. 1.00
189+ massive. .75
190+ **Chrysocolla.** Cu 36·6, silicate, compact, turquois-blue. .50
191 **Olivenite.** Cu 38·8, arsenate, crystallized, olive-green. 1.50
192 **Pseudomalachite.** Cu 53·3, phosphate, radio-fibrous, dark green. 1.50
193+ **Tyrolite.** Cu 40·6, As 17·8, arsenate, foliated, green. .75
194+ **Conichalcite.** Cu 24·2, As 26·6 and Ca, arsenate, globular, green. 1.00
195+ **Brochantite.** Cu 56·2, sulphate, crystallized, dark green. .75
196 fibrous, green. 1.00
197 altered to cuprite (red oxide). 1.50
198 **Kröhnkite.** Cu 18·3 and Na, sulphate, fine blue. 2.00
199+ **Chalcanthite.** Cu 25·8, sulphate, deep blue. .50
200 **Natrochalcite.** Cu 33·4 and Na sulphate, pyramidal crystals, brilliant emerald-green. 3.00

Nos. 59 and 60. Lithium, Barium, Strontium, Sodium, Potassium, Magnesium, Calcium, Boron and Carbon Minerals

Lithium, Li

201 **Spodumene.** Li 2·, Al, silicate, cleavage, whitish. .20
202+ **Lepidolite**, Lithia Mica. Li 1·2, K, fluo-silicate, crystalline granular, lilac. .20
203 **Triphyllite.** Li 2·2, Fe and Mn phosphate, massive, brown. .60
204+ **Amblygonite.** Li 2·35, Al, fluo-phosphate, massive, white. .50

Barium, Ba

205+ **Witherite.** Ba 68·9, carbonate, grayish-white. .20
206 **Barite**, Barytes or Heavy Spar. Ba 58·9, sulphate, crystals. .50
207+ massive lamellar, white. .20

Strontium, Sr

208+ **Strontianite.** Sr 59·3, carbonate, columnar, whitish. .20
209 **Celestite.** Sr 47·3, sulphate, bright clear crystals. 1.00
210+ cleavage, pale bluish. .20

Sodium, Na and Potassium, K

211 **Halite**, Rock Salt. Na chloride, cubo-octahedral crystals, clear colorless. .50
212+ cubic cleavage. .20
213 **Trona.** Na acid carbonate, fibrous. .40
214+ **Soda Nitre**, Chili Saltpetre. N 16·4, Na nitrate, crystalline granular, white. .40
215 **Thenardite.** Na sulphate, crystallized, yellowish. .40
216+ **Sylvite.** K 52·4, chloride, cleavage. .20
217 **Orthoclase**, Potash Feldspar, K 6·6 and Al, silicate, crystal, grayish. .50
218+ **Microcline**, Potash Feldspar. K 6·6, Al, silicate, cleavage. .20
219 **Muscovite**, Potash Mica. K and Al silicate, cleavage sheet. .20

Calcium, Ca

220 **Fluorite**, Fluor Spar. F 48·9, Ca 51·1, cubic crystals, transparent. .50
221+ granular cleavable, greenish. .20
222 **Calcite**, Iceland Spar. CaO 56·, carbonate, transparent doubly refracting. 1.00
223+ Marble, crystalline, white. .20
224 Mexican Onyx, variegated bands, translucent. .60
225+ Hydraulic Limestone, Cement Rock, shaly, blackish. .30
226 **Apatite.** P 23·4, Ca, phosphate, large crystal, brown. .50
227+ granular, green. .20
228 Phosphate Rock, fossiliferous. .20
229 **Gypsum**, Selenite. Ca sulphate, large crystal. .75
230 Selenite, transparent cleavage. .20
231+ Alabaster, fine granular, white. .20
232 **Dolomite.** CO_2 47·8, MgO 21·7 and Ca, carbonate, granular, white. .20

Magnesium, Mg

233+ **Magnesite.** MgO 47·6, CO_2 52·4, carbonate, compact porcelain-like, white. .20

234+ **Serpentine**, Asbestus. Mg silicate, silky fibrous. .40

235 massive, green. .20

236+ **Talc**, Soapstone or Steatite. Mg silicate, schistose, grayish. .20

237+ **Kieserite.** Mg 17·4, sulphate. .40

238 **Blödite.** Mg 7·2, and Na, sulphate, crystallized. .50

Boron, B

239+ **Boracite**, Stassfurtite. B 11·8, Mg 18·8, chloroborate, massive. .30

240 **Colemanite.** B 16·1, Ca, borate, crystallized, white. .50

241 **Borax.** B 5·7, Na, borate, crystal. .40

Carbon, C

242+ **Diamond.** Pure C, small crystal (in tube), with large specimen of matrix, Kimberly "blue earth." 2.50

243 Carbonado, granular, black, small. 5.00

244+ **Graphite**, Black Lead or Plumbago. Pure C, foliated mass. .40

245+ PETROLEUM, Mineral Oil. Hydrocarbon. .20

246 ASPHALTUM, Wurtzilite, Mineral Pitch or Bitumen. Hydrocarbon, velvety black. .20

247+ MINERAL COAL, Anthracite or Hard Coal. .20

248 COPALITE. Congo Gum. Clear light yellow. .40

Silicon, Si

249+ **Quartz**, Rock Crystal. Si dioxide, clear colorless. .50

250 **Opal**, Tripolite. Infusorial Earth, Si dioxide, white. .40

Nos. 61 and 62. Nickel, Cobalt, Chromium, Manganese and Aluminium Minerals.

Nickel, Ni

251 **Josephinite.** Ni 30·45, alloyed with Fe, pebbles. 1.00

252+ **Pentlandite.** Ni 22· and Fe, sulphide, cleavages in pyrrhotite, bronze-yellow, tarnishing. 2.00

253+ **Niccolite**, Arsenical Nickel. Ni 43·1, As 56·1, arsenide, massive, reddish-gray. 1.00

254 **Millerite.** Ni 64·7, sulphide, acicular crystals. 2.00

255+ fibrous crust, brass-yellow. 1.00

256 **Breithauptite.** Ni 32·8, Sb 67·2, antimonide, massive, violet copper-red. 1.50

257+ **Pyrrhotite**, Magnetic Pyrites. Fe sulphide with Ni 1·8—4·6, compact, bronze-yellow, tarnishing. .20

258 **Polydymite.** Ni 59·4 and Fe, sulphide, cubic cleavage, steel-gray. 3.00

259+ **Gersdorffite**, Nickel Glance. Ni 34·5, As 45·3, sulph-arsenide, massive granular. 1.50

260+ **Ullmannite.** Ni 28·8, Sb 57·, sulphantimonide, massive granular, steel-gray. 1.00

261 **Rammelsbergite.** Ni 28·1, As 71·9, arsenide, massive, reddish tin-white. 1.00

262 **Zaratite**, Emerald Nickel. Ni 46·7, carbonate, massive. .60

263 **Genthite.** Ni 22·4, silicate, massive, bright green. .50

264+ **Garnierite.** Ni 20·7, silicate, massive, bright apple-green. .50

265 **Annabergite.** Ni 24·, arsenate, massive, apple-green. 1.00

Cobalt, Co

266+ **Linnaeite.** Co 75·9, sulphide, massive, steel-gray. 1.50

267 **Smaltite.** Co 28·2, As 71·8, arsenide, cubo-octahedrons. 1.50

268+ massive, steel-gray. 1.00

269 **Chloanthite.** Co 28·8, arsenide, massive, steel-gray. 1.25

270 **Cobaltite**, Cobalt Glance. Co 35·5, As 45·2, sulph-arsenide, crystals. 1.00

271+ massive, reddish-gray. .60

272 **Glaucodot.** Co 23·8, Fe, sulpharsenide, large crystal. 1.25

273+ massive crystalline, tin-white. 1.00

274+ **Asbolite**, Earthy Cobalt. Co 1·—23·5 and Mg, oxide. .30

275 **Erythrite**, Cobalt Bloom. Co 28·7, As 25·, arsenate, red. 1.00

Chromium, Cr

276+ **Chromite**, Chromic Iron. Cr 46·5 and Fe oxide, massive iron-black. .20

Manganese, Mn

277+ **Alabandite.** Mn 63·1, sulphide, crystalline, blackish. 1.00

278 **Hausmannite.** Mn 84·1, oxide, massive, iron-black. .75

279 **Braunite.** Mn 65·2, oxide and silicate, massive. 1.00

280+ **Pyrolusite.** Mn 63·4, dioxide, crystalline granular, black. .20

281 radio-fibrous. .75

282 **Manganite.** Mn 62·4, sesquioxide, crystallized. 1.50

283+ massive fibrous. 1.00

284+ **Psilomelane.** Mn 40·5, manganate, compact, black. .20

285+ Bog Manganese, Black Wad. Mn 1·—19·, impure oxide, earthy. .20

286 **Rhodochrosite**, Dialogite. Mn 47·8, carbonate, cleavable granular, light pink. .75

287 **Rhodonite**, Fowlerite. Mn 47·4 and Zn, silicate, cleavage, pink. .35

Aluminium, Al

288 **Cryolite.** Al 12·8, Na 32·8, fluoride, cuboid prismatic crystals, clear colorless. 1.50

289+ massive, translucent white. .30

290 **Corundum.** Al oxide, gray, crystals altered on surface. .50

291+ broad cleavage, bronze-gray. .50

292 Ruby, gem-sand, clear red. 1.00

293 Sapphire, broken crystals, deep blue. 1.00

294+ Emery, black, granular. .20

295+ **Bauxite.** Al 39·6, hyd. oxide, yellowish, earthy. .20

296+ **Garnet**, Almandite. Al and Fe silicate, large dodecahedral crystal. .30

297+ **Kaolinite.** Al silicate, earthy, white. .20

298 **Pyrophyllite.** Al silicate, radiated. .75

299 **Alunogen.** Al 3·97, sulphate, silky fibrous, whitish. .75

300+ **Alunite.** Al 9·8, K, sulphate. .30

Nos. 63 and 64. Radio-active and Other Rare Element Minerals, including Uranium, Thorium, Yttrium, Cerium metals, Zirconium, Beryllium, Germanium and Caesium.

Radium, Ra and Uranium, U

301+ **Uranophane.** U 58·, with Ra, He, etc., hydrous silicate. 2.00

302+ **Fergusonite.** U 3·4, Y 18·2, Cb 28·3, Ta 8·6, U and Y columbate and tantalate with Ra, etc., pyramidal crystals, dull grayish-brown. 1.50

303 massive, brilliant vitreous brownish-black. 1.50

304 **Sipylite.** U 3· Cb 28·8, columbate with Ra, etc., brownish-black. 3.00

305+ **Samarskite.** U 11·7, Y 8·8, Cb 35·, Ta 13·1, U and Y columbate and tantalate, with Ra, etc., massive, splendent velvet-black. 2.50

306 **Ånnerödite.** U 14·5, Cb 16·5, U, Y, etc., pyrocolumbate, massive, black. 4.00

307+ **Euxenite.** U 7·2, Y 14, Cb 24·, Ti 12·9, U and Y columbate and titanate, with Ra, etc., massive, vitreous black. 1.50

308+ **Torbernite**, Copper-uranite. U 53·1, Cu 8·4, phosphate with Ra, green. 1.50

309+ **Autunite**, Lime-uranite. U 53·6 and Ca, phosphate with Ra, yellow. 1.25

310+ **Uraninite**, Pitchblende. U 71·, Uranate of Uranyl with Ra, etc., massive. 3.00

311+ Bröggerite. U 70·, cubo-octahedral crystals, dull black. 3.00

312 Cleveite. U 55·, with Ra, He, etc., black. 3.00

313 **Thorogummite.** U 17·, Th 39·5, silicate, rough prisms, yellowish-brown. 2.00

314 **Gummite.** U 55·7, resinous yellow. 2.00

315 **Carnotite.** U 54·8, V 10·2, Ra, etc., compact, yellow. 4.00

316+ disseminated in sandstone. 1.00

Thorium, Th

317 **Tritomite.** Th 7·4, Ce metals 47·9, massive, resinous dark brown. 5.00

318 **Thorite.** Th 65·2, etc., silicate, crystal, brownish-black. 2.50

319+ massive. 2.50

320+ Orangite, massive, brownish-yellow. 3.00

321 **Yttrialite.** Th 10·5, Y 36·8, silicate, massive, vitreous greenish-black. 8.00

322 **Pyrochlore.** Th 7·, columbate of Ce metals, octahedral crystal, brown. 1.25

323+ **Æschynite.** Th 12·5, Ce 14·2, Cb 12·5, thorate niobate and titanate of Ce metals, massive, brownish-black. 1.50

324 **Polymignite.** Th 3·, columbate and titanate (zirconate) of Ce metals, crystallized, black. 6.00

325+ **Monazite.** Sand, Ce 24·1, phosphate of Ce metals with 1·—6· Th, yellowish-brown. .40

326+ **Thorianite.** Th 60·9, Ce 6·2, U 10·2, with He, etc., oxide, cubic crystals, iron-black. 2.50

Yttrium, Y and Cerium, Ce Metals

327 **Yttrocerite.** Y 14·5, Ce 4·26, Ca, fluoride, violet-blue. .75

328+ **Gadolinite.** Y 40·4, silicate of Ce and Y metals, large coarse crystal. 5.00

329 massive, vitreous black. 2.50

330+ **Thalenite.** Y 51·6, silicate, massive, flesh-red. 3.00
331 **Yttrotantalite.** Y 18·5, Ta 18·7, tantalate and columbate, crystallized. 3.00
332 **Hielmite.** Y 31·7, Cb 6·6, Ta 51·3, Y, etc., stanno-tantalate and columbate, crystallized, black. 2.00
333+ **Xenotime.** Y 47·8, Ce metals, phosphate, pyramids. 2.00
334 massive, dull brown. 1.50
335 **Tysonite.** Ce 40·1, fluoride of Ce metals, massive, yellowish. 3.00
336+ **Fluocerite.** Ce 39·53, fluoride of Ce metals, yellowish. 1.50
337 **Parisite.** Ce 37·7, fluocarbonate of Ce metals, crystallized, brownish-yellow. 6.00
338 **Bastnäsite.** Ce 28·9, fluo-carbonate of Ce metals, massive, brown. 4.00
339+ **Allanite.** Ce 13.8, Ce metals, etc., silicate, massive, black. .50
340+ **Cerite.** Ce 30·8, silicate of Ce metals, etc., massive, purplish-gray. 1.50
341+ **Monazite.** Ce 22·1, phosphate of Ce metals, etc., broken crystals, dull brown. 1.00

Zirconium, Zr and Beryllium, Be

342 **Baddeleyite.** Zr 70·4, oxide, fibrous globular, greenish. 4.00
343+ **Zircon.** Zr 49·7, silicate, crystals, brown. .40
344 Hyacinth, water-worn crystals, transparent red. .40
345 CYRTOLITE. Zr 35·5, Ce metals, silicate, crystals, brown. 1.00
346+ **Beryl.** Be 38·4, Al, silicate, massive, brownish-yellow. .35
347 **Phenacite.** Be 16·1, silicate, broken crystals, white. 4.00
348 **Beryllonite.** Be 72·7, Na, phosphate, transparent. 1.00

Germanium, Ge and Caesium, Cs

349+ **Argyrodite.** Ge 6·9, Ag 74·7, sulphide, massive, gray. 2.50
350+ **Pollucite.** Cs 28·5 Al, silicate, massive, glassy white. 3.00

No. 43. Tin, Tungsten, Titanium, Molybdenum, Vanadium, Tantalum, Columbium, Arsenic, Mercury, Bismuth, Selenium, Tellurium and Sulphur Minerals

Tin, Sn

351 **Franckeite.** Sn 12·3, Pb 50·5, sulphostannide, radio-foliate, blackish-gray. 1.50
352+ **Cylindrite.** Sn 26·3, Pb 35·4, sulphostannide, cylindrically foliated, lead-gray. 1.25

353+ **Cassiterite**, Tin Stone. Sn 78·6, oxide, prismatic crystals. 1.50
354 twin crystals, splendent brown. 2.50
355+ massive, dark brown. 1.00
356+ Stream Tin, water-worn grains. .50
357 disseminated in gangue. .30
358+ **Stannite**, Tin Pyrites. Sn 27·5, Cu 29·5, sulphide, massive greenish-iron-black. .75

Tungsten, W

359+ **Wolframite.** W 67·1, Fe tungstate with Mn, crystallized. 1.00
360 bladed crystalline, bright iron-black. .75
361+ **Hubnerite.** W 60·7, Mn, tungstate with Fe, bladed crystals, brown. 1.00
362 **Scheelite.** W 72·, Ca tungstate, crystallized. 1.50
363+ massive, whitish. .75

Titanium, Ti

364+ **Ilmenite**, Menaccanite. Ti 36·1, Fe 36·8, oxide, black. .25
365+ **Rutile.** Ti 60·, oxide. Prismatic crystals, red. .50
366 Nigrine, with Fe as impurity, crystallized, black. .50

Molybdenum, Mo

367+ **Molybdenite.** Mo 60·, sulphide, crystallized, lead-gray. .40
368 cleavages, loose. .75
369 **Molybdite.** Mo 65.6, Fe, oxide, pulverulent, yellow. 1.00
370 **Wulfenite.** Mo 25·9, Pb 56·2, molybdate, crystal aggregate yellow. 1.00
371+ tabular crystals, bright orange-red. 1.00

Vanadium, V

372 **Roscoelite.** V 14·, silicate, small scales, dark brown. 3.00
373 **Descloizite.** V 12·7, Pb 51·3, vanadate, crystalline, brownish-red. 1.00
374 **Endlichite.** V 9·9, Pb 67·4, chloro-vanadate, massive, orange. 1.50
375+ **Vanadinite.** V 9·9, Pb 67·4, chloro-vanadate, crystallized, red. 1.00

Tantalum, Ta and Columbium, Cb

376 **Columbite.** Cb 59·9, Fe, columbate (and tantalate), crystallized. 2.00
377+ massive, iron-black. 1.00
378 **Tantalite.** Ta 69·9, Fe and Mn tantalate (and columbate), iron-black. 1.50

379+ Manganotantalite, massive, brownish-black. 1.50

380 **Stibiotantalite.** Ta 21·1, Sb 16·7, tantalate, water-worn pebbles, yellowish. 2.50

Arsenic, As

381 **Arsenic.** Native, spherical crystal aggregates. .75

382+ massive, fine granular, tin-white, tarnishing. .75

383 **Realgar.** As 70·1, monosulphide, red, crystallized. 1.25

384+ massive compact, light red. 1.00

385+ **Orpiment.** As 61·, trisulphide, foliated mass, yellow. 1.00

386 **Arsenopyrite,** Mispickel. As 46·, Fe 34·4, sulph-arsenide crystallized. 1.00

387+ massive, silver-white. .25

388 **Löllingite,** Leucopyrite. As 59·9, Fe, sulpharsenide, massive, tin-white. .35

Mercury, Hg

389+ **Mercury.** Native, minute tin-white globules in gangue. 1.00

390 **Metacinnabarite.** Hg 86·2, sulphide, disseminated masses, black. 1.00

391+ **Cinnabar.** Hg 86·2, sulphide, crystallized. 1.25

392 massive, fine granular, cochineal-red. 2.50

393 **Livingstonite.** Hg 24.8, Sb 53.1, sulphantimonite, columnar massive, blackish lead-gray. 2.50

Bismuth, Bi; Tellurium, Te; Selenium, Se and Sulphur, S

394+ **Bismuth.** Native, crystalline disseminated, reddish-silver-white, tarnishing. 1.00

395 **Bismuthinite,** Bismuth Glance. Bi 81.2, sulphide, crystalline, lead-gray. 1.00

396 **Emplectite.** Bi 62·, Cu 18·9, sulphobismuthite, crystallized, grayish. 1.25

397+ **Tetradymite.** Te 33·—49·, Bi 67·—51·, foliated, steel-gray. 1.50

398+ **Guanajuatite.** Se 36·3, Bi 63·7, selenide, bluish-gray. 2.00

399 **Clausthalite.** Se 27·7, Pb 72·3, selenide, massive, gray. 2.00

400+ **Sulphur.** Native, crystallized, yellow. .75

PART VI

Crystallography

Crystals for Measurement and Study

Crystallography

Loose Crystals for Measurement and Study

Advanced Collections

In the five years since the first publication of the Complete Crystal List, our advanced collections of crystals have met with a wider acceptance than was anticipated. A number of prominent teachers of crystallography, well known as writers on the subject, after examining in detail the Complete Crystal Collection, expressed surprise at finding such a unique and excellent series on sale.

While reduced in price, the advanced collections are superior to those originally distributed by us, both in the planning of the list and in the quality of material furnished. The arrangement and definitions in Dana's "Text-book of Mineralogy" have been carefully followed, making the sets especially valuable to those using this work or Penfield's "Determinative Mineralogy," most of the crystal forms described therein being included in the collection. An arrangement according to any other author, will, on request, be prepared without extra cost. The aim has been to accurately represent as large a number of forms as possible. A duplication of any combination has been avoided, even though occurring in different minerals. Variety of form is the primary object, while as many species and crystal groups have been introduced as was practicable. Out of thirty-two possible groups in the six systems, only twenty-three are known in nature. Of these, every one is represented. In revising the list, the Miller symbols have been added.

The individual crystals selected are the best our extensive facilities afford, and have been measured where necessary. They range generally from 1 to 4 cm. in length, and nearly all are sufficiently sharp and bright for the reflecting goniometer. The majority are large enough for contact measurement.

The mahogany cabinets holding the crystals are made according to our own designs, especially for these collections. The

4 x 3 cm. white glazed pasteboard trays display the crystals in an excellent manner. The crystals in each collection are numbered to correspond to the following list, besides having on each tray one of our small printed labels, giving name, composition and locality, as shown in Plate IV.

No. 73A. Complete Crystal Collection

Three hundred measurable crystals. As described above and in the Complete Crystal list, this set evenly covers the whole field of crystallography. Many of these collections have been sold at the former price of $150.00. The total value of the crystals is $153.85, and the present "collection price," delivered to any address, with trays in cabinet, is $120.00.

Without cabinet, 10 per cent. less.

PURCHASE IN PARTS. Delivered to any address, with trays.

PART I. 150 Crystals marked * (No. 75A), with 300 trays, in drawer cabinet, $57.00.

(Part I, without cabinet, $45.00).

PART II. 150 remaining crystals without cabinet, $63.00.

PURCHASE IN SECTIONS. Delivered to any address:

SECTION A. 200 Simple Crystals numbered 1—200, totaling $110.30, with 300 trays, in drawer cabinet, $90.00. Without cabinet, $78.00.

SECTION B. 50 Twin Crystals numbered 201—250, totaling $26.95, without cabinet, $18.00. Cabinet $5.00 extra.

SECTION C. 50 specimens Illustrating Irregularities of Crystals and Pseudomorphs, numbered 251—300, totaling $16.60, without cabinet, $12.00. Cabinet $1.50 extra.

No. 75A. Abridged Crystal Collection

One hundred and fifty measurable crystals, marked *, comprising the Abridged Crystal List. A careful elimination of rare and less important forms is here effected. With trays, in mahogany cabinet similar to that in Plate VIII. The total value of the crystals is $63.75 and the "collection price," delivered to any address, is $50.00. Without cabinet, 10 per cent. less.

Complete Crystal Collection

No. 73A. 300 Numbers Comprising Entire List

Abridged Crystal Collection

No. 75A. 150 Numbers Marked *

The Figures Mentioned Are in Part II.

I. Isometric System

The forms in this system can be referred to three axes, which are at right angles to one another and of equal lengths.

Normal Group—Galena Type

1* Cube *a* (100) .... Galena .30
2* Octahedron *o* (111) .... Magnetite .20
3* Dodecahedron *d* (110) .... Garnet .30
4* Tetrahexahedron *e* (210) modifying cube *a* (100), fig. 523 .... Fluorite .50
5* Trapezohedron *n* (211), fig. 1579 .... Garnet .30
6 Hexoctahedron *t* (421) modifying cube *a* (100), fig. 521 .... Fluorite 1.25
7* Cube *a* (100) modified by octahedron *o* (111) ...... Galena .30
8* Cube *a* (100) modified by trapezohedron *m* (311) .. Fluorite 1.50
9 Octahedron *o* (111) modified by cube *a* (100) ...... Galena .50
10* Octahedron *o* (111) modified by dodecahedron *d* (110) .... Franklinite .75
11* Octahedron *o* (111) modified by dodecahedron *d* (110) and trapezohedron *m* (311) .... Microlite 1.00
12 Octahedron *o* (111) modified by dodecahedron *d* (110), trapezohedron *m* (311) and cube *a* (100), similar to fig. 2141 .... Microlite 1.50
13* Dodecahedron *d* (110) modified by cube *a* (100) ... Fluorite .75
14 Dodecahedron *d* (110) modified by octahedron *o* (111) .... Cuprite 1.25
15* Dodecahedron *d* (110) modified by trapezohedron *n* (211), fig. 1578 .... Garnet .40
16 Trapezohedron *n* (211) modified by dodecahedron *d* (110), fig. 1580 .... Garnet .50

Pyritohedral Group—Pyrite Type

17* Pyritohedron *e* (210), fig. 289 .... Pyrite .20
18* Cube *a* (100), fig. 290 .... Pyrite .20
19* Octahedron *o* (111) .... Pyrite .30
20 Pyritohedron *e* (210) modified by cube *a* (100), fig. 295 .... Pyrite .30

21* Pyritohedron *e* (210) modified by octahedron *o* (111), fig. 297 .... Pyrite .40
22 Pyritohedron *e* (210) modified by cube *a* (100) and octahedron *o* (111) .... Pyrite .40
23 Pyritohedron *e* (210) modified by octahedron *o* (111) and diploid *s* (321) .... Pyrite .75
24* Cube *a* (100) modified by pyritohedron *e* (210) .... Pyrite .50
25* Cube *a* (100) modified by pyritohedron *e* (210) and octahedron *o* (111) .... Pyrite .40
26 Cube *a* (100) modified by diploid *s* (321) .... Pyrite .75
27 Octahedron *o* (111) modified by pyritohedron *e* (210), fig. 294 .... Pyrite .40
28* Octahedron *o* (111) modified by trisoctahedron *p* (221) .... Pyrite .50
29* Octahedron *o* (111) modified by diploid *s* (321) .... Pyrite, alt. .40

Tetrahedral Group—Tetrahedrite Type

30* Tetrahedron *o* (111) modified by dodecahedron *d* (110) and tristetrahedron *n* (211), fig. 434 ...... Tetrahedrite .50
31 Tetrahedron *o* (111) modified by cube *a* (100) ..... Boracite .50
32* Cube *a* (100) modified by tetrahedron *o* (111) and dodecahedron *d* (110), fig. 2387 .... Boracite .50
33* Tetrahedron plus *o* (111) and minus o_1, $(1\bar{1}1)$, tetrahedral symmetry .... Zunyite .20

Gyroidal or Plagihedral Group—Cuprite Type

34* Trapezohedral symmetry .... Sal-ammoniac .40

Tetartohedral Group—Ullmannite Type

35* Cubic Symmetry .... Ullmannite 1.00

Groups Unidentified

36* Cubic symmetry .... Boléite .75
37 Octahedral symmetry .... Dysanalyte .25
38* Trapezohedral symmetry, fig. 1356 .... Leucite .30
39 Cubo-octahedral symmetry, fig. 2135 .... Dysanalyte .25

II. Tetragonal System

The forms in this system are referred to three axes, all at right angles to one another. The two lateral axes *a* and *b* are equal and interchangeable, while the vertical axis *c* differs from these in length and in character.

Normal Group—Zircon Type

40* Unit pyramid *p* (111), similar to fig. 1680 .... Zircon .40
41 Unit pyramid *p* (111) and base *c* (001) .... Octahedrite .75

42* Unit prism *m* (110) and unit pyramid *p* (111), fig. 1681 . . . . Zircon .20
43* Unit prism *m* (110) and two unit pyramids *p* (111) and *u* (331), fig. 1682 . . . . Zircon .40
44 Unit and diametral prisms *m* (110) and *a* (100) and two unit pyramids *p* (111) and *u* (331), similar to fig. 1682 . . . . Zircon .40
45* Unit and diametral prisms *m* (110) and *a* (100) and base *c* (001) . . . . Vesuvianite .75
46 Unit and diametral prisms *m* (110) and *a* (100), unit and diametral pyramids *p* (111) and *e* (101) and base *c* (001), similar to fig. 1667 . . . . Vesuvianite .50
47 Diametral prism *a* (100) and unit pyramid *p* (111), similar to fig. 1687 . . . . Hyacinth .75
48 Unit and diametral prisms *m* (110) and *a* (100) and unit pyramid *p* (111), fig. 1690 . . . . Malacon .50
49* Unit and diametral prisms *m* (110) and *a* (100) and diametral pyramid *e* (101), fig. 934 . . . . Rutile .50
50 Unit, diametral and ditetragonal prisms *m* (110), *a* (100) and *l* (310), unit and diametral pyramids *e* (101) and *s* (111) . . . . Rutile .50
51 Unit and diametral prisms *m* (110) and *a* (100), unit pyramid *p* (111) and ditetragonal pyramid or zirconoid *x* (311) . . . . Zircon .40
52 Diametral prism *a* (100) and base *c* (001) . . . . Apophyllite .50
53* Diametral prism *a* (100) and unit pyramid *p* (111), fig. 1874 . . . . Apophyllite .50
54* Diametral prism *a* (100), unit pyramid *p* (111) and base *c* (001), fig. 1871 . . . . Apophyllite .40
55 Diametral prism *a* (100), two unit pyramids *p* (111) and *z* (113) and diametral pyramid *e* (101), similar to fig. 955 . . . . Octahedrite 1.00

Pyramidal Group—Scheelite Type

56 Unit pyramid *p* (111) . . . . Scheelite 1.00
57 Unit and diametral pyramids *n* (111) and *e* (101) and base *c* (001) . . . . Stolzite .75
58* Unit and diametral prisms *m* (110) and *a* (100) and unit pyramid *r* (111), fig. 1649 . . . . Wernerite .50

Pyramidal-Hemimorphic Group—Wulfenite Type

59 Unit prism *m* (110) rounded, and base *c* (001) . . . . . Wulfenite .40
60* Unit pyramid *u* (102) and base *c* (001) . . . . Wulfenite 1.25
61* Unit and diametral pyramids *u* (102) and *s* (113) and base *c* (001), similar to fig. 2604 . . . . Wulfenite .75

Sphenoidal Group—Chalcopyrite Type

62* Sphenoid of first order *p* (111) .... Chalcopyrite .30

63* Two sphenoids, plus *p* (111) and minus p_1 (1$\bar{1}$1), octahedral symmetry, similar to fig. 274 .... Chalcopyrite .50

64 Acute sphenoid φ (772) and scalenohedron *x* (122), fig. 278 .... Chalcopyrite 1.00

III. Hexagonal System

The forms in this system are referred to four axes. The three lateral axes, a_1, a_2 and a_3 are equal and interchangeable and cross at angles of 60° and 120°, while the vertical axis *c* is of different length and at right angles to them.

Normal Group—Beryl Type

65* Unit prism *m* (10$\bar{1}$0) and base *c* (0001), fig. 1508 . Beryl .30
66* Unit prism *m* (10$\bar{1}$0), unit pyramid *o* (10$\bar{1}$1) and base *c* (0001), fig. 2480 .... Hanksite .30
67 Unit prism *m* (10$\bar{1}$0), unit and diametral pyramids *s* (11$\bar{2}$1) and *p* (11$\bar{2}$2) and base *c* (0001), similar to fig. 1505 .... Beryl 1.00

Hemimorphic Group—Iodyrite Type

68* Unit prism *m* (10$\bar{1}$0), pyramid *i* (20$\bar{2}$1) and base *c* (0001), fig. 507 .... Iodyrite .50

Pyramidal Group—Apatite Type

69* Unit prism *m* (10$\bar{1}$0) and base *c* (0001), similar to fig. 2219 .... Pyromorphite .30
70* Unit prism *m* (10$\bar{1}$0) and unit pyramid *x* (10$\bar{1}$1), fig. 2193 .... Apatite .40
71 Unit prism *m* (10$\bar{1}$0), unit pyramids *x* (10$\bar{1}$1) and *y* (20$\bar{2}$1) and base *c* (0001), similar to fig. 2194 ... Apatite .40
72* Unit and diametral prisms *m* (10$\bar{1}$0) and *a* (11$\bar{2}$0), two unit pyramids *x* (10$\bar{1}$1) and *r* (10$\bar{1}$2), diametral pyramid *s* (11$\bar{2}$1) and base *c* (0001), similar to fig. 2197 .... Apatite .75

Pyramidal-Hemimorphic Group—Nephelite Type

73* Unit prism *m* (10$\bar{1}$0) and base *c* (0001), similar to fig. 1537 .... Nephelite .30

Rhombohedral Division

Normal Group—Calcite Type

74* Rhombohedron *r* (10$\bar{1}$1), 74° 55′, fig. 1035 .... Calcite .40

75 Rhombohedron r $(10\bar{1}1)$, 73°....................Siderite .30
76 Rhombohedron $r(10\bar{1}1)$, about 85°...............Chabazite .20
77* Obtuse rhombohedron e $(01\bar{1}2)$, fig. 1037..........Calcite .30
78* Acute rhombohedron f $(02\bar{2}1)$, fig. 1070...........Calcite .50
79 Acute rhombohedron d $(08\bar{8}1)$ and base c (0001)...Siderite .50
80* Positive and negative rhombohedrons............Calcite .40
81* Scalenohedron v $(21\bar{3}1)$, fig. 1049................Calcite .20
82 Scalenohedron v $(21\bar{3}1)$ and base c (0001).........Calcite .75
83* Scalenohedron v $(21\bar{3}1)$ and one rhombohedron r $(10\bar{1}1)$, fig. 1051.............................Calcite .20
84 Scalenohedron v $(21\bar{3}1)$ and prism m $(40\bar{4}1)$.......Calcite .20
85 Unit prism m $(10\bar{1}0)$ and base c (0001), fig. 1045... Calcite .30
86* Unit prism m $(10\bar{1}0)$ and rhombohedron e $(01\bar{1}2)$, fig. 1039..................................Calcite .40
87* Unit prism m $(10\bar{1}0)$, rhombohedron e $(01\bar{1}2)$ and scalenohedron v $(21\bar{3}1)$, similar to fig. 1053......Calcite .20
88 Three scalenohedrons and two rhombohedrons, similar to fig. 1057..........................Calcite .40
89 Unit prism m $(10\bar{1}0)$, three rhombohedrons and two scalenohedrons..........................Calcite .50
90* Acute pyramid γ $(8\cdot8\cdot\overline{16}\cdot3)$, second order........ Calcite .20
91 Pyramid of second order n $(22\bar{4}3)$ and base c (0001), Corundum .40
92 Prism of second order a $(11\bar{2}0)$ and pyramid v $(44\bar{8}3)$.......................................Corundum .50
93 Unit prism m $(10\bar{1}0)$, rhombohedron d $(01\bar{1}2)$ and base c (0001)...............................Hematite .75
94* Pyramid of second order n $(22\bar{4}3)$, rhombohedron r $(10\bar{1}1)$ and curved rhombohedron u $(10\bar{1}4)$, fig. 822...............................Hematite .30

Hemimorphic Group—Tourmaline Type

95* Unit and second order prisms m $(10\bar{1}0)$ and a $(11\bar{2}0)$ and rhombohedron r $(10\bar{1}1)$, fig. 1839...Tourmaline .40
96* Unit and second order prisms m $(10\bar{1}0)$ and a $(11\bar{2}0)$ and two rhombohedrons r $(10\bar{1}1)$ and o $(02\bar{2}1)$, fig. 1848..........................Tourmaline .40
97 Striated rounded prisms m $(10\bar{1}0)$ and a $(11\bar{2}0)$ and steep rhombohedron y $(40\bar{4}1)$.............Tourmaline 1.00

Tri-rhombohedral Group—Phenacite Type

98 Unit and second order prisms m $(10\bar{1}0)$ and a $(11\bar{2}0)$ and third order rhombohedron x $(213\bar{2})$, fig. 1639.................................Phenacite .40
99 Unit and second order prisms m $(10\bar{1}0)$ and a $(11\bar{2}0)$ and two rhombohedrons r $(10\bar{1}1)$ and e $(01\bar{1}2)$, similar to fig. 1637 ....Willemite .50

100* Rhombohedron r $(10\bar{1}1)$, 73° 45′ .... Dolomite .20
101 Acute rhombohedron M $(40\bar{4}1)$ .... Dolomite .30

Trapezohedral Group—Quartz Type

102* Two rhombohedrons r $(10\bar{1}1)$ and z $(01\bar{1}1)$, fig. 589 .... Quartz .20
103* Unit prism m $(10\bar{1}0)$ and rhombohedrons r $(10\bar{1}1)$ and z $(01\bar{1}1)$, fig. 584 .... Quartz .20
104* Unit prism m $(10\bar{1}0)$, rhombohedrons r $(10\bar{1}1)$ and z $(01\bar{1}1)$ and trigonal pyramid s $(11\bar{2}1)$, fig. 593 .... Quartz .40
105 Unit prism m $(10\bar{1}0)$, rhombohedrons r $(10\bar{1}1)$ and z $(01\bar{1}1)$ and acute rhombohedron M $(30\bar{3}1)$, fig. 594 .... Quartz .30
106* Unit prism m $(10\bar{1}0)$, rhombohedrons r $(10\bar{1}1)$ and z $(01\bar{1}1)$, trigonal pyramid s $(11\bar{2}1)$ and trigonal trapezohedron x $(51\bar{6}1)$. Right-handed crystal, fig, 595 .... Quartz 1.00
107* Unit prism m $(10\bar{1}0)$, rhombohedrons r $(10\bar{1}1)$ and z $(01\bar{1}1)$, trigonal pyramid s $(11\bar{2}1)$ and trigonal trapezohedron x $(5\cdot1\bar{6}1)$. Left-handed crystal, fig. 596 .... Quartz 1.00
108 Acute rhombohedron n $(20\bar{2}1)$ striated, and base c (0001) .... Cinnabar .50

IV. Orthorhombic System

In this system the forms are referred to three axes a, b, and c at right angles to one another and of unequal lengths.

Normal Group—Barite Type

109* Unit prism m (110) and base c (001), fig. 2418 .... Barite .30
110 Macrodome d (102) and brachydome o (011) ..... Barite .30
111 Unit prism m (110), macrodome d (102) and base c (001), similar to fig. 2420 .... Barite .30
112 Unit prism m (110), macrodome d (102), brachypinacoid b (010), pyramid z (111) and base c (001), similar to fig. 2425 .... Barite .50
113 Macrodome d (102), brachydome o (011), macropinacoid a (100) and base c (001) .... Barite .30
114* Unit prism m (110), macrodome d (102), brachydome o (011), brachypinacoid b (010) and base c (001), similar to fig. 2426 .... Barite .30
115 Unit prism m (110), macrodome d (102), brachydome o (011) and base c (001), similar to fig. 2439 .... Celestite .40
116 Unit prism m (110), macrodome d (102), brachydome o (011), pyramid y (122) and base c (001). Celestite .75

117* Unit and obtuse pyramids *p* (111) and *s* (113) and base *c* (001), sphenoidal type, similar to fig. 20. . Sulphur .60
118 Unit and obtuse pyramids *p* (111) and *s* (113) and brachydome *n* (011), similar to fig. 17 . . . . . . Sulphur .60
119* Unit and obtuse pyramids *p* (111) and *s* (113), brachydome *n* (011) and base *c* (001), fig. 15. Sulphur .40
120 Unit prism *m* (110), brachypinacoid *b* (010) and three pyramids *p* (111), *s* (113) and *r* (343), similar to fig. 113 . . . . Stibnite .40
121 Unit prism *m* (110) and brachydome *u* (014), fig. 360 . . . . Arsenopyrite .75
122* Unit prism *m* (110), pyramid *o* (111) and brachypinacoid *b* (010) . . . . Natrolite .40
123* Unit prism *m* (110), macrodome *t* (106) and base *c* (001) striated, similar to fig. 2412 . . . . Thenardite .20
124* Unit prism *m* (110), brachydome *s* (011) and base *c* (001), fig. 1717 . . . . Andalusite .50
125 Unit prism *m* (110), macrodome *d* (102), macropinacoid *a* (100) and base *c* (001) . . . . Anglesite 1.00
126 Unit prism *m* (110), macrodomes *d* (102) and *l* (104), brachydome *o* (011), macropinacoid *a* (100), pyramids and base *c* (001) . . . . Anglesite .75
127 Unit prism *m* (110) and pyramid *z* (112), fig. 960 . Brookite, alt. .50
128* Unit prism *m* (110), pyramids *e* (122) and *z* (112), similar to fig. 958 . . . . Brookite .40
129 Unit prism *m* (110), pyramids *e* (122) and *z* (112) and brachydome *t* (021) . . . . Brookite 1.00
130 Macrodome *r* (101) and brachydome *s* (011) striated, similar to fig. 2458 . . . . Anhydrite .40
131 Unit and brachyprisms *m* (110) and *l* (120) and two brachydomes *f* (021) and *y* (041) . . . . Topaz .75
132 Unit and brachyprisms *m* (110) and *l* (120), brachydome *y* (041) and base *c* (001) . . . . Topaz .50
133* Unit and brachyprisms *m* (110) and *l* (120), unit and obtuse pyramids *u* (111) and *i* (221), brachydome *s* (041), pyramid *x* (243) and base *c* (001), similar to fig. 1706 . . . . Topaz .20
134 Unit and brachyprisms *m* (110) and *l* (120), two brachydomes *f* (021) and *y* (041), pyramids *o* (221), *u* (111), *i* (223) and base *c* (001) . . . . Topaz .40
135* Unit and brachyprisms *m* (110) and *l* (120), unit and obtuse pyramids *u* (111) and *o* (221), brachydome *y* (041), macrodome *d* (201) and base *c* (001), similar to fig. 1703 . . . . Topaz .20
136 Unit and brachyprisms *m* (110) and *l* (120), unit and obtuse pyramids *u* (111), *o* (221) and *i* (223),

brachydome *y* (041), brachypinacoid *b* (010), macrodome *d* (201) and base *c* (001), similar to fig. 1709. . . . . .Topaz .40

137* Unit prism *m* (110), brachypinacoid *b* (010) and base *c* (001), similar to fig. 1857. . . . . .Staurolite .40

138* Unit prism *m* (110), brachypinacoid *b* (010), one set of macrodomes *r* (101) and base *c* (001). Staurolite .30

139 Unit prism *m* (110), brachypinacoid *b* (010) two sets of macrodomes *r* (101) and base *c* (001), fig. 1857. . . . . .Staurolite .50

140 Unit prism *m* (110), brachydome *i* (021), brachypinacoid *b* (010) and pyramid *p* (111), similar to fig. 1218. . . . . .Cerussite .50

141 Unit prism *m* (110) and brachydome *e* (011), similar to fig. 2259. . . . . .Libethenite 1.00

142 Unit prism *m* (110) and pyramid *r* (131) striated. . Childrenite 1.00

143 Macropinacoid *a* (100), brachypinacoid *b* (010), macrodome *k* (103), pyramids *o* (111) and *u* (133) and base *c* (001), similar to fig. 2146. . . . . Columbite .75

144 Unit prism *m* (110), prism *g* (130), macropinacoid *a* (100), macrodomes *h* ($\bar{2}$01), *k* (103) and *l* (106), pyramids and base *c* (001), similar to fig. 2147. . Columbite 2.00

145* Unit prism *m* (110), prism *s* (120), brachypinacoid *b* (010), brachydome *k* (103) and macrodome *d* (101), similar to fig. 1612. Chrysolite .75

Hemimorphic Group—Calamine Type

146* Unit prism *m* (110), macropinacoid *a* (100), brachypinacoid *b* (010), two macrodomes and brachydome *i* (031) . . . . Calamine .50

147 Unit prism *m* (110), brachypinacoid *b* (010), brachydome *d* (021) and base *c* (001). . . . . .Stephanite .50

148* Macrodome *s* (101), brachypinacoid *b* (010) and base *c* (001), similar to fig. 2287. . . . . Struvite .30

149 Unit prism *m* (110), macrodome *s* (101) and base *c* (001). . . . . .Struvite .40

Sphenoidal Group—Epsomite Type

150 Unit prism *m* (110), sphenoid *z*, plus and minus (111). . . . . .Epsomite .50

V. Monoclinic System

In this system the forms are referred to three axes, *a*, *b* and *c*, of unequal lengths, with *a* and *c* intersecting at an acute angle behind, while *b* is at right angles to *a* and *c*.

Normal Group—Gypsum Type

151* Unit prism *m* (110), clinopinacoid *b* (010) and unit pyramid *l* (111), fig. 2501 .... Gypsum .20
152* Unit prism *m* (110), clinopinacoid *b* (010), unit pyramid *l* (111) and orthodome *e* ($\bar{1}03$), fig. 2504 .... Gypsum .20
153 Unit and clinoprisms *m* (110) and *k* (130), clinopinacoid *b* (010), unit pyramid *l* (111) and orthodome *e* ($\bar{1}03$) .... Gypsum .20
154 Unit prism *m* (110), clinopinacoid *b* (010) and base *c* (001), similar to fig. 1291 .... Orthoclase .40
155* Unit prism *m* (110), clinopinacoid *b* (010), orthodome *y* ($\bar{2}01$) and base *c* (001), fig. 1297 .... Orthoclase .20
156* Unit prism *m* (110), prism *z* (130), clinopinacoid *b* (010), orthodome *y* ($\bar{2}01$) and base *c* (001) .... Orthoclase .20
157 Unit prism *m* (110), clinopinacoid *b* (010), orthodome *y* ($\bar{2}01$), pyramid *o* ($\bar{1}11$) and base *c* (001). Orthoclase .40
158 Unit prism *m* (110), prism *z* (130), clinopinacoid *b* (010), orthodome *y* ($\bar{2}01$), pyramid *o* ($\bar{1}11$) and base *c* (001), similar to fig. 1301 .... Orthoclase .40
159* Unit prism *m* (110), orthodome *x* ($\bar{1}01$) and base *c* (001) .... Adularia .30
160 Unit prism *m* (110), prism *z* (130), clinopinacoid *b* (010), orthodome *x* ($\bar{1}01$) and base *c* (001) ..... Adularia .30
161 Unit prism *m* (110), orthopinacoid *a* (100), orthodome *w* (101) and pyramid *r* (111) .... Monazite .50
162* Unit prism *m* (110), orthopinacoid *a* (100), clinopinacoid *b* (010), orthodome *p* ($\bar{1}01$), pyramids *u* (111), *s* ($\bar{1}11$), *λ* ($\bar{3}31$) and base *c* (001), similar to fig. 1325 .... Diopside .60
163* Unit prism *m* (110), orthopinacoid *a* (100), clinopinacoid *b* (010) and pyramid *s* ($\bar{1}11$), fig. 1400 . Augite .30
164* Unit prism *m* (110), orthopinacoid *a* (100), clinopinacoid *b* (010), pyramids *u* (111) and *o* ($\bar{2}21$) . Augite .30
165 Unit prism *m* (110), brachypinacoid *b* (010), brachydome *t* (032), macrodome *e* (302), pyramids *n* (331) and *q* (332) and base *c* (001) ...... Herderite 4.00
166* Unit prism *m* (110), clinopinacoid *b* (010), clinodome *r* (011) and orthodome *p* (101), similar to fig. 1485 .... Hornblende .30
167* Unit prism *m* (110) and pyramid *q* ($\bar{1}11$), fig. 2555 .... Kröhnkite 1.00
168* Unit prism *m* (110), pyramid *n* (111) and base *c* (001), fig. 2113 .... Titanite .40
169 Unit prism *m* (110), orthodome *x* (102) and base *c* (001) .... Titanite .75
170* Unit pyramids *p* (111) and *e* ($\bar{1}11$) .... Lazulite .40

171 Unit prism *m* (110), macrodomes *v* (101) and *k* ($\bar{1}$01), brachydome *r* (011) and base *c* (001), similar to fig. 546 . . . . Cryolite .50

172* Unit prism *m* (110), orthopinacoid *a* (100), orthodomes *r* ($\bar{1}$01) and *i* ($\bar{1}$02), pyramid *n* ($\bar{1}$11) and base *c* (001) . . . . Epidote .40

173 Prism *M* (221) and base *c* (001) . . . . Muscovite .20

174* Prism *M* (221), clinopinacoid *b* (010) and base *c* (001), similar to fig. 1957 . . . . Muscovite .20

175 Unit prism *m* (110), pyramid *h* (221), orthodomes σ (101) and θ ($\bar{1}$01), clinodomes *l* (023) and *p* (021) and base *c* (001) . . . . Azurite .50

176* Unit prism *m* (110), orthopinacoid *a* (100), pyramid *h* (221) and two orthodomes . . . . Azurite .75

177 Unit prism *m* (110), pyramid, orthodome σ (101) and base *c* (001), similar to fig. 1252 . . . . Azurite .75

178 Unit prism *m* (110), clinopinacoid *b* (010), orthodomes *s* ($\bar{2}$01) and *t* (201) and base *c* (001), fig. 1881 . . . . Heulandite .40

179 Unit prism *m* (110), orthopinacoid *a* (100), orthodome *x* (102), clinodomes m_x (011), *g* (012) and *t* (013), pyramids *n* (111) and ε ($\bar{1}$12) and base *c* (001), similar to fig. 1733 . . . . Datolite .50

180 Unit prism *m* (110), clinodome *e* (011) and pyramid *r* ($\bar{1}$12) . . . . Gay-Lussite .40

181 Unit prism *m* (110), ortho- and clinopinacoids *a* (100) and *b* (010), pyramids *z* ($\bar{2}$21) and *o* ($\bar{1}$11) and base *c* (001), fig. 2402 . . . . Borax .40

182 Unit prism *m* (110), prism *f* (120) and pyramid *t* (111), similar to fig. 2465 . . . . Crocoite .75

183 Unit prism *m* (110), clinodomes *z* (011) and *w* (012), orthodome *k* (101) and base *c* (001), similar to fig. 2468 . . . . Crocoite .75

184 Long prism *m* (110) striated, and clinodome *z* (011) Crocoite .75

185* Long unit prism *m* (110) striated, clinodomes *z* (011) and *w* (012), pyramid *t* (111), orthodome *k* ($\bar{1}$01) and base *c* (001) . . . . Crocoite .75

186* Unit prism *m* (110), prism *t* (210), orthopinacoid *a* (100), clinodomes κ (011) and *a* (021), orthodome and pyramids β (111) and ω (131) . Colemanite .50

187 Unit prism *m* (110), prism *t* (210), orthopinacoid *a* (100), clinopinacoid *b* (010), orthodomes *h* ($\bar{2}$01) and *i* (101), clinodomes *k* (311) and *a* (100), pyramids β (111), *v* ($\bar{2}$21), *k* (311), *y* ($\bar{1}$11) and base *c* (001), similar to fig. 2395 . . . . Colemanite .7

Clinohedral Group—Clinohedrite Type

188 Prism *m* (110), pyramids *t* ($\bar{7}71$), *p* (111), *z* ($\bar{1}6\bar{1}$)? and *q* ($\bar{1}11$), similar to fig. 1819 . . . . Clinohedrite 4.00

VI. Triclinic System

In this system the forms are referred to three axes, *a*, *b*, and *c*, of unequal lengths, and which intersect at oblique angles.

Normal Group—Axinite Type

189* Unit prisms *M* ($1\bar{1}0$) and *m* (110), macropinacoid *a* (100), macrodome *s* (201) and pyramids *r* ($1\bar{1}1$) and *x* (111), fig. 1774 . . . . Axinite .50

190 Unit prisms *M* ($1\bar{1}0$) and *m* (110), macropinacoid *a* (100), brachyprism *w* ($1\bar{3}0$), brachydome *y* (021), pyramids *r* ($1\bar{1}1$) and *n* ($1\bar{3}1$) and base *c* (001), similar to fig. 1775 . . . . Axinite .75

191* Unit prisms *M* ($1\bar{1}0$) and *m* (110), brachypinacoid *b* (010), brachydome *o* ($\bar{1}\bar{1}1$), macrodome *x* ($\bar{1}01$) and base *c* (001), fig. 1338 . . . . Pericline .40

192* Unit prisms *M* ($1\bar{1}0$) and *m* (110), macrodome *x* ($\bar{1}01$) and base *c* (001) . . . . Albite .20

193 Unit prisms *M* ($1\bar{1}0$) and *m* (110), brachypinacoid *b* (010), brachydome *e* (021), macrodome *y* ($\bar{2}01$), pyramid *p* ($\bar{1}11$) and base *c* (001) . . . . Anorthite .50

194* Unit prisms *M* ($1\bar{1}0$) and *m* (110), macrodome *x* ($\bar{1}01$), brachypinacoid *b* (010) and base *c* (001) . Amazonstone .20

195 Unit prisms *M* ($1\bar{1}0$) and *m* (110), prisms *z* ($1\bar{3}0$) and *f* (130), brachypinacoid *b* (010), macrodome *x* ($\bar{1}01$), pyramid *o* ($\bar{1}\bar{1}1$) and base *c* (001) . Amazonstone .30

196 Unit prisms *M* ($1\bar{1}0$) and *m* (110), prisms *z* ($1\bar{3}0$) and *f* (130), brachypinacoid *b* (010), macrodomes *x* ($\bar{1}01$) and *y* ($\bar{2}01$) and base *c* (001) . . . . . Amazonstone .40

197* Prisms *M* ($1\bar{1}0$) and *m* (110), macropinacoid *a* (100), brachypinacoid *b* (010) and pyramid *q* (011) . . . . Cyanite 1.00

198* Prisms *M* ($1\bar{1}0$) and *m* (110), brachypinacoid *b* (010), pyramid *q* (221) and base *c* (001) . . . . Rhodonite .75

199 Prisms *M* ($1\bar{1}0$) and *m* (110), brachypinacoid *b* (010) and pyramid *k* ($\bar{2}21$), fig. 1434 . . . . Rhodonite 1.00

200 Prisms *M* ($1\bar{1}0$) and *m* (110), pyramids *h* (221), *g* ($\bar{1}\bar{1}1$), *f* ($\bar{4}\bar{4}3$), *d* ($2\bar{2}1$) and base *c* (001) . . . . Babingtonite 1.50

Twins

I. Isometric System

201 Octahedrons *o* (111), contact, tw. pl. parallel to octahedral face, fig. 859 . . . . Spinel .50
202* Cubes *a* (100), penetration, tw. pl. parallel to octahedral face, fig. 526 . . . . Fluorite .20
203* Pyritohedrons *e* (210) penetration, tw. axis normal to dodecahedral face, fig. 303 . . . . Pyrite .30
204 Tetrahedrons *o* (111), contact tw. pl. parallel to octahedral face, fig. 199 . . . . Sphalerite .30

II. Tetragonal System

205 Prismatic, tw. pl. parallel to pyramid *e* (101), fig. 1686 . . . . Zircon .50
206* Prismatic, tw. pl. parallel to pyramid *e* (101) . . . . . Rutile .50
207 Prismatic, tw. pl. parallel to pyramid *e* (101), repeated twinning . . . . Rutile .75
208* Prismatic, tw. pl. parallel to pyramid *e* (101), repeated twinning, eightling, fig. 947 . . . . Rutile .30
209 Contact twin, tw. pl. *p* (111), fig. 279 . . . . Chalcopyrite .75
210 Tw. pl. parallel to a pyramid face (trilling) . . . . Cumengéite .75
211 Tw. pl. parallel to a pyramid face (truncated trilling) . . . . Cumengéite .50

III. Hexagonal System

212 Contact, tw. pl. pyramid *e* (30$\bar{3}$4), fig. 508 . . . . Iodyrite .40
213 Acute rhombohedrons, penetration. Vertical or *c* axis, tw. axis . . . . Cinnabar .20
214* Normal rhombohedrons *r* (10$\bar{1}$1), penetration, tw. axis *c*, fig. 1912 . . . . Chabazite .20
215* Scalenohedrons *v* (21$\bar{3}$1), contact, tw. pl. base *c* (0001), fig. 1060 . . . . Calcite .50
216* Scalenohedrons *v* (21$\bar{3}$1), contact, tw. pl. obtuse rhombohedron *e* (01$\bar{1}$2), fig. 1061 . . . . Calcite .40
217 Prismatic, contact, tw. pl. the rhombohedron *r* (10$\bar{1}$1), "butterfly twin," fig. 1062 . . . . Calcite 1.00
218* Hexagonal type, tw. axis *c* . . . . Phacolite .75
219 Hexagonal type, tw. axis *c*, composite penetration twin, fig. 1916 . . . . Phacolite 1.00
220* Penetration, tw. axis *c*, fig. 598 . . . . Quartz .50
221 Penetration, tw. pl. *a* (1120), *Brazil Law*, fig. 599 . Quartz 1.50
222* Contact, tw. pl. *ε* (1122), fig. 600 . . . . Quartz 1.00

IV. Orthorhombic System

223* Prismatic, pseudo-hexagonal repeated twins, tw. pl. prism *m* (110), about 60°, fig. 1194 . . . . . . Aragonite .50

224 Prismatic, contact, tw. pl. prism *m* ($\bar{1}$10) .... Aragonite .30
225 Pyramidal, pseudo-hexagonal symmetry, tw. pl. prism *m* (110) .... Witherite .75
226* Fiveling law, tw. pl. prism *m* (110), about 70°50′ .. Marcasite .30
227 Penetration, tw. pl. ρ (031) .... Chrysoberyl .50
228 Repeated twinning, tw. pl. *m* (110), "Wheel Ore," fig. 415 .... Bournonite 1.50
229 Penetration, tw. pl. parallel to macrodome *e* (101), Arsenopyrite .25
230 Cruciform, tw. pl. brachydome *x* (032), fig. 1859. Staurolite .75
231* Cruciform, tw. pl. pyramid *z* (232), fig. 1860 ..... Staurolite .50
232 Cruciform, tw. pl. brachydome *e* (011), fig. 2414 .. Thenardite .20
233* Contact, tw. pl. prism *m* (110), "Spear head" twin .... Cerussite .50
234 Contact, tw. pl. prism *m* (110), stellate twin, fig. 1223 .... Cerussite .75
235* Contact, tw. pl. prism *m* (110), reticulated twinning .... Cerussite .50

V. Monoclinic System

236* Contact, tw. pl. orthopinacoid *a* (100), fig. 1402 .. Augite .30
237 Contact, tw. axis *c*, similar to fig. 2280 ..... Lazulite .50
238 Contact, tw. axis *c*, *Carlsbad* twin .... Orthoclase .50
239* Penetration, tw. axis *c*, *Carlsbad* twin, fig. 1302 .. Orthoclase .30
240* Contact, tw. pl. clinodome *n* (021), *Baveno* twin, fig. 1305 .... Orthoclase .40
241 Penetration, tw. pl. orthopinacoid *a* (100) .... Gypsum .30
242* Contact, tw. pl. orthopinacoid *a* (100), "Swallow-tail" twin, fig. 2511 .... Gypsum .20
243 Contact, tw. pl. orthopinacoid *a* (100) .... Titanite .75
244* Contact, tw. pl. base *c* (001), fig. 2558 .... Kröhnkite 1.00
245* Cruciform-penetration, tw. pl. base *c* (001), compounded on *e* (011), then twinned on *m* (110), similar to fig. 1888 .... Harmotome .40
246* Cruciform-penetration, tw. pl. base *c* (001) simple form .... Phillipsite .75

VI. Triclinic System

247* *Albite Law*, tw. pl. brachypinacoid *b* (010), polysynthetic, cleavage .... Labradorite .20
248 *Pericline law*, tw. pl. parallel to *b* axis .... Pericline .30
249 Polysynthetic, composition face macropinacoid *a* (100) .... Cyanite .20

250 *Manebach law*, tw. pl. base *c* (001), similar to fig. 1306 .... Amazonstone .75

Regular Groupings of Crystals

251* Parallel growth of crystals of one species, arborescent, fig. 70 .... Copper .50
252 Parallel growth of crystals of one species, rosette, fig. 827 .... Hematite 1.50
253* Parallel growth of crystals of one species, capped. Amethyst .50
254* Parallel growth of crystals of two species .... Cyanite within Staurolite .50
255* Parallel growth of crystals of two species .... Chalcopyrite on Sphalerite .30

Irregularities of Crystals

Distortion:

256 Elongated cube *a* (100) .... Fluorite .50
257* Twisted or saddle-shaped cube *a* (100) .... Pyrite .20
258 Flattened dodecahedron *d* (110) .... Garnet .20
259* Elongated dodecahedron *d* (110) .... Copper .30
260 Flattened cubo-octahedron *a* (100), *o* (111) .... Halite .20
261 Elongated cubo-octahedron *a* (100), *o* (111) .... Dysanalyte .20
262 Elongated trapezohedron *n* (211) .... Garnet .50
263* Flattened rhombohedron .... Hematite .20
264* Abnormal development of one rhombohedron .... Quartz .30
265 Abnormal development of opposite rhombohedral faces .... Quartz .30
266 Elongated rhombohedron and flattened prism .... Quartz .30

Imperfections on the Surfaces of Crystals:

267 Striations due to oscillatory combination, on cube, fig. 290 .... Pyrite .20
268* Striations due to oscillatory combination, on prism .... Quartz .20
269 Striations due to oscillatory combination, on rhomb .... Calcite .20
270 Striations due to repeated twinning, cleavage .... Microcline .20
271* Markings from erosion, etc., on cube .... Fluorite .30
272 Markings from erosion, etc., on pyramid .... Corundum .30
273* Markings from vicinal prominences .... Fluorite .20
274 Pseudo-octahedral symmetry, parallel arrangement of minute cubo-tetrahexahedrons .... Fluorite .40
275* Pseudo-octahedral symmetry, parallel arrangement of small dodecahedrons .... Fluorite .40
276* Curved surfaces due to oscillatory combinations, prism and scalenohedron .... Calcite .40

277* Curved surfaces due to independent molecular conditions, rounded, saddle-shaped, fig. 1133... Dolomite .20
278* Curved surfaces due to independent molecular conditions, sheaf, fig. 1896.................. Stilbite .20
279* Curved surfaces due to mechanical origin, joined, fig. 1509.................................. Beryl .30
280 Curved surfaces due to mechanical origin, bent... Tourmaline .30
281 Hollowed cube, stepped, fig. 478................ Halite .25
282* Cavernous rhombohedron, with deep angular depressions.............................. Quartz .20

Internal Imperfections and Inclusions

283* Enclosing liquid with moving bubble............ Quartz .50
284 Microscopic inclusions of liquid................ Beryllonite .50
285* Enclosing capillary Tourmaline................ Quartz .30
286 Enclosing Bitumen.......................... Quartz .25
287 Enclosing Sulphur, cleavage.................. Gypsum .20
288 Enclosing microlites, crystallites, etc., cleavage . Oligoclase .20
289 Symmetrically included Chlorite, "phantom" ... Quartz .30
290* Symmetrically included carbonaceous impurities. fig. 1720.................................. Chiastolite .40

Pseudomorphs

By Substitution:

291* Quartz replacing............................ Calcite .30

By Deposition:

292 Incrustation of Quartz on..................... Fluorite .30
293* Incrustation of Anglesite on.................. Cerussite .40

By Alteration:

294* Paramorph of Rutile after.................... Brookite .30
295* Loss of Constituent by Azurite, forming......... Copper .30
296 Loss of constituent by fibrous Brochantite, forming.................................. Cuprite .40
297* Assumption of a foreign substance by Cuprite, forming.................................. Malachite .50
298* Partial exchange of constituents of Pyrite, forming.................................. Limonite .20
299 Partial exchange of constituents of Magnetite (?), forming.................................. Hematite .20
(Known as Martite)
300 Partial exchange of constituents of Muscovite, forming.................................. Iolite .30
(Known as Pinite)

Index to Complete Crystal List

Price List of Loose Crystals

As the same form or combination may sometimes be found in many species, the collection which does not duplicate forms, necessarily omits some important minerals. The following can generally be furnished as individual crystals when desired.

The Roman numeral before each name indicates the system of crystallization: I. Isometric; II. Tetragonal; III. Hexagonal or Rhombohedral; IV. Orthorhombic; V. Monoclinic; VI. Triclinic.

The number or numbers after the names, indicate their position in the preceding Descriptive List of the Complete Crystal Collection.

V.	Adularia, 159, 160	$ .30
VI.	Albite, 192	.20
VI.	Albite, twin, 248	.60
IV.	Alexandrite, twin	2.50
VI.	Amazonstone, 194–196	.20— .40
VI.	Amazonstone, twin, 250	.75
III.	Amethyst, 253	.50
V.	Amphibole, 163, 164	.30
I.	Analcite	.40
II.	Anatase, Octahedrite, 41, 55	.75– 1.00
IV.	Andalusite, 124	.50
IV.	Anglesite, 125, 126	.75– 1.00
IV.	Anhydrite, 130	.40
VI.	Anorthite, 193	.50
VI.	Anorthite, twin	1.00
III.	Apatite, 70–72	.40— .75
II.	Apophyllite, 52–54	.40— .50
IV.	Aragonite twin, 223, 224	.30— .50
IV.	Arsenopyrite, 121	.75
IV.	Arsenopyrite, twin, 229	.25
V.	Augite, 163, 164	.30
V.	Augite, twin, 236	.30
VI.	Axinite, 189, 190	.50— .75
V.	Azurite, 175–177	.50— .75
VI.	Babingtonite, 200	1.50
IV.	Barite, 109–114	.30— .50
III.	Beryl, 65, 67, 279	.30— 1.00
IV.	Beryllonite, 284	.50
V.	Blödite	1.50
I.	Boléite, 36	$ .75
I.	Boracite, 31, 32	.50
V.	Borax, 181	.40
IV.	Bournonite, twin, 228	1.50
IV.	Brochantite	.50
IV.	Bromlite	.50
IV.	Brookite, 128, 129	.40 —1.00
IV.	Brookite, alt., 127	.50
IV.	Calamine, 146	.50
III.	Calcite, 74, 77, 78, 80–90, 269, 276, 291	.20— .75
III.	Calcite twin, 215—217	.40— 1.00
II.	Cassiterite	1.00
II.	Cassiterite, twin	.50— 1.00
IV.	Celestite, 115, 116	.40— .75
IV.	Cerussite, 140, 293	.40— .50
IV.	Cerussite, twin, 233–235	.50— .75
III.	Chabazite, 76	.20
III.	Chabazite, twin, 214	.20
IV.	Chalcocite, twin	1.00
II.	Chalcopyrite, 62–64	.30— 1.00
II.	Chalcopyrite, twin, 209	.75
VI.	Chesterlite	.75
IV.	Chiastolite, 290	.40
IV.	Childrenite, 142	1.00
V.	Chondrodite	.75
IV.	Chrysoberyl, twin, 227	.50
IV.	Chrysolite, 145	.75
III.	Cinnabar, 108	.50

III.	Cinnabar, twin, 213	$ .20
V.	Clinohedrite, 188	4.00
I.	Cobaltite	.50
V.	Colemanite, 186, 187	.50— .75
IV.	Columbite, 143, 144	.75— 2.00
I.	Copper, 251, 259	.30— .50
III.	Corundum, 91, 92, 272	.30— .50
III.	Covellite	3.00
V.	Crocoite, 182–185	.75
V.	Cryolite, 171	.50
II.	Cuméngéite	.40
II.	Cuméngéite, twin, 210, 211	.50— .75
I.	Cuprite	.40
I.	Cuprite, alt., 14	1.25
VI.	Cyanite, 197	1.00
VI.	Cyanite, twin, 249	.20
IV.	Danburite	.20
V.	Datolite, 179	.50
I.	Diamond	1.00
IV.	Diaspore	.50
V.	Diopside, 162	.60
III.	Dioptase	1.00
III.	Dolomite, 100, 101, 277	.20— .30
V.	Durangite	.25
I.	Dysanalyte, 37, 39, 261	.20— .25
I.	Embolite	1.00
IV.	Enargite	.50
III.	Endlichite	.20
IV.	Enstatite	.40
V.	Epididymite	.50
V.	Epidote, 172	.40
V.	Epistilbite	.75
IV.	Epsomite, 150	.50
III.	Eudialyte	1.00
V.	Eudidymite	.50
V.	Eudidymite, twin	.20
I.	Fluorite, 4, 6, 8, 13, 256, 271, 273–275, 292	.20— 1.50
I.	Fluorite, twin, 202	.20
VI.	Fowlerite, Rhodonite, 198	.75
I.	Franklinite, 10	.75
I.	Gahnite	.50
I.	Galena, 1, 7, 9	.30— .50
I.	Garnet, 3, 5, 15, 16, 258, 262	.20— .50
V.	Gay-Lussite, 180	.40
V.	Glauberite	.40
IV.	Glaucodot	$1.00
III.	Gmelinite, twin	.75
V.	Gypsum, 151–153, 287	.20
V.	Gypsum, twin, 241, 242	.20— .30
I.	Halite, 260, 281	.20— .25
III.	Hanksite, 66	.30
V.	Harmotome, twin, 245	.40
I.	Hauerite	1.00
III.	Hematite, 93, 94, 252, 263, 299	.20— 1.50
V.	Herderite, 165	4.00
V.	Heulandite, 178	.40
V.	Hornblende, 166	.30
II.	Hyacinth, 47	.75
II.	Idocrase, Vesuvianite, 45, 46	.50— .75
III.	Iodyrite, 68	.50
III.	Iodyrite, twin, 212	.40
III.	Jarosite	1.00
V.	Kröhnkite, 167	1.00
V.	Kröhnkite, twin, 244	1.50
VI.	Labradorite, twinned cleavage 247	1.50
IV.	Laurionite	.40
V.	Lazulite, 170	.40
V.	Lazulite, twin, 237	.50
V.	Leadhillite, twin	2.50
I.	Leucite, 38	.30
IV.	Libethenite, 141	1.00
I.	Magnetite, 2	.20
II.	Malacon, 48	.50
IV.	Manganite	.50
IV.	Marcasite	.20
IV.	Marcasite, twin, 226	.30
I.	Martite, 299	.20
II.	Matlockite	2.00
II.	Meionite	1.50
II.	Melilite	.75
IV.	Meneghinite	.40
VI.	Microcline, 194–196	.20— 40
VI.	Microcline, twin, 250	.75
I.	Microlite, 11, 12	1.00— 1.50
III.	Mimetite	.75
III.	Molybdenite	.40
V.	Monazite, 161	.50
IV.	Monticellite	.75
V.	Muscovite, 173, 174	.20

Elementary

No. 77A. School Crystal Set

The crystals selected for this set, while essentially the same as those in the advanced collections, are generally over 1 cm. in length, many reaching 3 or 4 cm. Being intended for elementary work, they are sufficiently sharp for contact measurement, while many are bright enough for the reflecting goniometer. As far as practicable, the commoner forms and habits, of symmetrical and model-like aspect, have been used in planning the list and selecting the actual specimens.

On the back of the 3 x 4 cm. tray accompanying each crystal, is pasted our miniature label giving name, composition and locality. The light and neat mahogany cabinet holding the collection, is shown in Plate VIII.

Single crystals are sold at the prices in the School Crystal List. They total $18.35. The "collection price" for the fifty crystals, with trays, in mahogany cabinet, delivered to any address, is $15.00. Without cabinet, 10 per cent. less.

No. 77A. School Crystal List

I. Isometric System

1 Cube *a* (100), fig. 512 .... Fluorite .20
2 Octahedron *o* (111) .... Magnetite .20
3 Dodecahedron *d* (110) .... Garnet .30
4 Trapezohedron *n* (211), fig. 1356 .... Leucite .30
5 Cube *a* (100) modified by octahedron *o* (111) .... Galena .30
6 Octahedron *o* (111) and dodecahedron *d* (110) .. Franklinite .75
7 Dodecahedron *d* (110) modified by trapezohedron *n* (211), fig. 1578 .... Garnet .40
8 Dodecahedron *d* (110) modified by octahedron *o* (111) .... Malachite pseudomorph after Cuprite, .75
9 Pyritohedron *e* (210), fig. 289 .... Pyrite .20
10 Cube *a* (100), modified by pyritohedron *e* (210), fig. 295 .... Limonite pseudomorph after Pyrite .20
11 Twin, penetration, pyritohedrons *e* (210), tw. axis normal to dodecahedral face, fig. 303 .... Pyrite .30

II. Tetragonal System

12 Unit prism *m* (110) and unit pyramid *p* (111), fig. 1681 .... Zircon .20
13 Unit and diametral prisms *m* (110) and *a* (100) and diametral pyramid *e* (101), fig. 934 .... Rutile .50
14 Unit and diametral prisms *m* (110) and *a* (100) and base *c* (001) .... Vesuvianite .75

15 Diametral prism *a* (100), unit pyramid *p* (111) and base *c* (001), fig. 1871.......................... Apophyllite .40

16 Unit and diametral pyramids *u* (102) and *s* (113) and base *c* (001), similar to fig. 2604................ Wulfenite .75

17 Sphenoid of first order *p* (111) .... Chalcopyrite .30

18 Twin, prismatic, tw. pl. parallel to pyramid *e* (101) Rutile, .50

III. Hexagonal System

19 Unit prism *m* $(10\bar{1}0)$ and base *c* (0001), fig. 1508.... Beryl .30

20 Unit prism *m* $(10\bar{1}0)$ and unit pyramid *x* $(10\bar{1}1)$, fig. 2193.................................... Apatite .40

21 Unit prism *m* $(10\bar{1}0)$ and unit pyramids *x* $(10\bar{1}1)$ and *y* $(20\bar{2}1)$........................... Endlichite .20

22 Rhombohedron *r* $(10\bar{1}1)$, 73°...................... Siderite .40

23 Rhombohedron *r* $(10\bar{1}1)$, 73° 45′.................. Dolomite .20

24 Scalenohedron *v* $(21\bar{3}1)$, fig. 1049................. Calcite .20

25 Pyramid of second order *n* (2243), rhombohedron *r* $(10\bar{1}1)$ and curved rhombohedron *u* (1014), fig. 822.................................... Hematite .30

26 Unit and second order prisms *m* $(10\bar{1}0)$ and *a* $(11\bar{2}0)$ and two rhombohedrons *r* $(10\bar{1}1)$ and *o* $(02\bar{2}1)$, fig. 1848.................................... Tourmaline .40

27 Unit prism *m* $(10\bar{1}0)$ and rhombohedrons *r* $(10\bar{1}1)$ and *z* $(01\bar{1}1)$, fig. 584 .... Quartz .20

28 Twin, scalenohedrons *v* $(21\bar{3}1)$, contact, tw. pl. base *c* (0001), fig. 1060.......................... Calcite .50

29 Twin, penetration, normal rhombohedron *r* $(10\bar{1}1)$, tw. axis *c*, fig. 1912......................... Chabazite .20

IV. Orthorhombic System

30 Macrodome *d* (102), brachydome *o* (011), macropinacoid *a* (100) and base *c* (001)............... Barite .30

31 Unit prism *m* (110), pyramid *o* (111) and brachypinacoid *b* (010)........................... Natrolite .40

32 Unit and obtuse pyramids *p* (111) and *s* (113), brachydome *n* (011) and base *c* (001), fig. 15...... Sulphur .40

33 Unit prism *m* (110), brachydome *s* (011) and base *c* (001), fig. 1717............................ Andalusite .50

34 Unit and brachyprisms *m* (110) and *l* (120), unit and obtuse pyramids *u* (111) and *o* (221), brachydome *y* (041), macrodome *d* (201) and base *c* (001) Topaz .20

35 Unit prism *m* (110) and pyramids *e* (122) and *z* (112), similar to fig. 958............................ Brookite .40

36 Twin, cruciform, tw. pl. brachydome *e* (011), fig. 2414.................................... Thenardite .20

37 Twin, cruciform, tw. pl. pyramid *z* (232), fig. 1860 .. Staurolite .50

38 Twin, prismatic, contact-twin, tw. pl. *m* $(\bar{1}10)$...... Aragonite .30

V. Monoclinic System

39 Unit prism *m* (110), clinopinacoid *b* (010) and unit pyramid *l* (111), fig. 2501 .... Gypsum .20
40 Unit prism *m* (110), clinopinacoid *b* (010), orthodome *y* ($\bar{2}$01) and base *c* (001), fig. 1297 .... Orthoclase .20
41 Unit prism *m* (110), orthopinacoid *a* (100), clinopinacoid *b* (010) and pyramid *s* ($\bar{1}$11), fig. 1400.... Augite .30
42 Unit prism *m* (110), clinopinacoid *b* (010), clinodome *r* (011) and orthodome *p* (101), similar to fig. 1485 .... Hornblende .30
43 Unit prism *m* (110), pyramid *n* (111) and base *c* (001), fig. 2113 .... Titanite .40
44 Unit prism *m* (110), ortho- and clinopinacoids *a* (100) and *b* (010), pyramids *z* ($\bar{2}$21) and *e* ($\bar{1}$11) and base *c* (001), fig. 2402 .... Borax .40
45 Prism *M* (221), clinopinacoid *b* (010) and base *c* (001), similar to fig. 1957 .... Muscovite .20
46 Unit prism *m* (110), clinodomes *z* (011) and *w* (012), orthodome *k* (101) and base *c* (001), fig. 2468 .... Crocoite .75
47 Twin, penetration, tw. axis *c*, *Carlsbad twin* ...... Orthoclase .30

VI. Triclinic System

48 Unit prisms *M* (1$\bar{1}$0) and *m* (110), macropinacoid *a* (100), macrodome *s* (201) and pyramids *r* (1$\bar{1}$1) and *x* (111), fig. 1774 .... Axinite .50
49 Unit prisms *M* (1$\bar{1}$0) and *m* (110), prisms *z* (1$\bar{3}$0) and *f* (130), brachypinacoid *b* (010), macrodome *x* ($\bar{1}$01), pyramid *o* ($\bar{1}\bar{1}$1) and base *c* (001) .... Amazonstone .30
50 Unit prisms *M* (1$\bar{1}$0) and *m* (110), macrodome *x* (10$\bar{1}$) and base *c* (001) .... Albite .20

No. 80. Lecture Table Crystals

Twenty-five crystals, about 10 x 7 cm. (4 x 2¾ in.).

The number of these is limited by nature's supply, as few minerals occur in crystals large enough to be recognized across a room, or even when passed from hand to hand among the class. We have, however, arranged this incomplete series, embracing merely representative examples of the simpler forms. Some are a little rough in outline, but all are sufficiently well defined to illustrate the form, and are eminently adapted to this purpose. A number of these minerals are rarely found in such very large crystals, hence the total of the individual values exceeds $45.00 The "collection price," delivered to any address, in trays and No. 1 chest, is $40.00. Without chest 10 per cent. less. List sent on application.

PART VII

Physical Mineralogy

Hardness, Structure,
Color, Effect of Radium, Etc.

Physical Mineralogy

Series Illustrating Hardness, Structure, Specific Gravity, Color, Effect of Radium, etc.

With the exception of crystals, there are no collections prepared by us upon which are bestowed a greater amount of expert labor than in the selection of just the right specimens to illustrate the various physical characters of minerals. Thus, in the hardness sets, crystals or cleavages are selected; under structure, color and luster, a particular specimen from among many of its kind is carefully chosen with a view to exactly illustrating the required characteristic; the specimens selected for specific gravity tests are as pure and compact as they are found in nature, thus approximating the theoretical ratio; the cleavage series has been extended and illustrations of parting added. In general the definitions of Dana have been followed.

It should be borne in mind that the mere names of minerals opposite the different terms, do not indicate the nicety of variation shown by the individual specimens chosen. The same species often well represents different characters. As far as practicable, however, the duplication of species has been avoided.

The entire physical series, and notably the color section, makes one of our most showy and attractive collections.

Free Transportation to any address.

Prices include pasteboard trays, or blocks with museum specimens if requested; also oak chests (or without chests 10 per cent. less), where minerals total $20.00.

The following are according to the Complete Physical Series List.

No. 92A. Hardness Series

Ten museum specimens averaging 12 x 9 cm. (4¾ x 3½ in.), $8.00.

No. 92. Student's Hardness Series

Ten hand specimens averaging 10 x 7 cm. (4 x 2¾ in.), $4.00.

No. 93A. Fusibility Series

Six museum specimens averaging 12 x 9 cm. (4¾ x 3½ in.), $4.00.

No. 93. Student's Fusibility Series

Six hand specimens averaging 10 x 7 cm. (4 x 2¾ in.), $2.00.

No. 94A. Structure Series

Twenty-five museum specimens averaging 12 x 9 cm. (4¾ x 3½ in.), $25.00.

No. 94. Student's Structure Series

Twenty-five hand specimens averaging 10 x 7 cm. (4 x 2¾ in.), $12.50.

No. 95A. Cleavage, Fracture and Tenacity Series

Twenty-five museum specimens averaging 12 x 9 cm. (4¾ x 3½ in.), $18.00.

No. 95. Student's Cleavage, Fracture and Tenacity Series

Twenty-five hand specimens averaging 10 x 7 cm. (4 x 2¾ in.), $9.00.

No. 96A. Taste, Odor and Feel Series

Nine museum specimens averaging 12 x 9 cm. (4¾ x 3½ in.), $5.00.

No. 96. Student's Taste, Odor and Feel Series

Nine hand specimens averaging 10 x 7 cm. (4 x 2¾ in.), $2.50.

No. 97A. Specific Gravity Series

Twenty-five museum specimens averaging 12 x 9 cm. (4¾ x 3½ in.), $40.00.

No. 97. Student's Specific Gravity Series

Twenty-five hand specimens averaging 10 x 7 cm. (4 x 2¾ in.), $20.00.

No. 101A. Color Series

Fifty museum specimens averaging 12 x 9 cm. (4¾ x 3½ in.), $50.00.

No. 101. Student's Color Series

Fifty hand specimens averaging 10 x 7 cm. (4 x 2¾ in.), $25.00.

No. 102A. Luster Series

Twenty-five museum specimens averaging 12 x 9 cm. (4¾ x 3½ in.), $25.00.

No. 102. Student's Luster Series

Twenty-five hand specimens averaging 10 x 7 cm. (4 x 2¾ in.), $12.50.

No. 104A. Series Illustrating Effect of Radium, Etc.

Twenty-five museum specimens averaging 12 x 9 cm. (4¾ x 3½ in.), $25.00.

No. 104. Student's Series Illustrating Effect of Radium, Etc.

Twenty-five hand specimens averaging 10 x 7 cm. (4 x 2¾ in.), $12.50.

No. 111A. Complete Physical Series

Includes all of the foregoing "A" series. Two hundred museum size specimens averaging 12 x 9 cm. (4¾ x 3½ in.). The total of the individual museum specimen values in the Physical Series List exceeds $230.00. Delivered to any address, with trays (or blocks if requested), in four No. 3 chests, $200.00. Without chests 10 per cent. less.

No. 111. Student's Complete Physical Series

Includes all of the foregoing "Student's" Series. Two hundred hand size specimens averaging 10 x 7 cm. (4 x 2¾ in.). The total of the individual hand specimen values in the Physical Series List exceeds $115.00. Delivered to any address, with trays, in two No. 3 chests, $100.00. Without chests, 10 per cent. less.

Physical Series List

Entire List Constitutes Nos. 111A and 111.

Hardness, Nos. 92A and 92

1 *Hardness*	*1*..........Talc	6 *Hardness*	*6*.......Feldspar
2 *Hardness*	*2*.......Gypsum	7 *Hardness*	*7*.........Quartz
3 *Hardness*	*3*........ Calcite	8 *Hardness*	*8*.........Topaz
4 *Hardness*	*4*....... Fluorite	9 *Hardness*	*9*..... Corundum
5 *Hardness*	*5*........Apatite	10 *Hardness*	*10*.......Diamond

Fusibility, Nos. 93A and 93

11 *Fusibility*	*1*........ Stibnite	14 *Fusibility*	*4*.......Actinolite
12 *Fusibility*	*2*....... Natrolite	15 *Fusibility*	*5*......Orthoclase
13 *Fusibility*	*3*...... Almandite	16 *Fusibility*	*6*........Bronzite

Structure, Nos. 94A and 94

17 *Bladed*	.............Cyanite	30 *Mammillary*	.... Chalcedony
18 *Columnar*	.... Tremolite	31 *Globular*	.... Pisolite
19 *Fibrous*	.... Asbestus	32 *Nodular*	.... Menilite
20 *Reticulated*	.... Cerussite	33 *Amygdaloidal*	...Laumontite
21 *Stellated*	.... Wollastonite	34 *Coralloidal*	.... Flos Ferri
22 *Radiated*	.... Tourmaline	35 *Dendritic*	.... Wad
23 *Curved Folia*	.... Talc	36 *Mossy*	.... Calc Tufa
24 *Straight Folia*	.... Biotite	37 *Capillary*	.... Chalcotrichite
25 *Coarse Granular*	...Sandstone	38 *Acicular*	.... Aragonite
26 *Fine Granular*	.... Marble	39 *Drusy*	.... Quartz
27 *Compact*	.... Magnesite	40 *Stalactitic*	.... Stalactite
28 *Friable*	.... Bauxite	41 *Amorphous*	...... Deweylite
29 *Velvety*	.... Aurichalcite		

Cleavage, Parting, Fracture and Tenacity, Nos. 95A and 95

	Cleavage	
42	*Cubic*	Galena
43	*Octahedral*	Fluorite
44	*Dodecahedral*	Sphalerite
45	*Basal*	Apophyllite
46	*Prismatic*	Amphibole
47	*Clinodiagonal*	Orthoclase
48	*Rhombohedral*	Calcite
49	*Pinacoidal*	Gypsum

	Parting	
50	*Basal*	Pyroxene
51	*Pyramidal*	Corundum
52	*Octahedral*	Magnetite
53	*Hemi-orthodome*	Adularia

	Fracture	
54	*Conchoidal*	Smoky Quartz
55	*Even*	Lithographic Stone
56	*Uneven*	Rhodonite
57	*Hackly*	Franklinite
58	*Earthy*	Turgite
59	*Splintery*	Pectolite

	Tenacity	
60	*Brittle*	Siderite
61	*Tough*	Emery
62	*Imperfectly Sectile*	Alabaster
63	*Highly Sectile*	Embolite
64	*Malleable*	Copper
65	*Flexible*	Itacolumite
66	*Elastic*	Muscovite

Taste, Odor and Feel, Nos. 96A and 96

	Taste	
67	*Saline*	Halite
68	*Alkaline*	Natron
69	*Bitter*	Carnallite

	Odor	
70	*Alliaceous*	Mispickel
71	*Sulphurous*	Pyrite
72	*Bituminous*	Asphaltum
73	*Argillaceous*	Kaolinite
74	*Fetid*	Anthraconite

No.	Feel	Mineral
75	*Greasy*	Graphite

Specific Gravity, Nos. 97A and 97
(The ratios given are approximate.)

	Unmetallic Luster	
76	*Sp. Gr. 1.0*	Copalite
77	*Sp. Gr. 1.6*	Anthracite
78	*Sp. Gr. 1.9*	Thaumasite
79	*Sp. Gr. 2.1*	Opal
80	*Sp. Gr. 2.3*	Gypsum
81	*Sp. Gr. 2.6*	Albite
82	*Sp. Gr. 2.8*	Prochlorite
83	*Sp. Gr. 3.0*	Cryolite
84	*Sp. Gr. 3.2*	Apatite
85	*Sp. Gr. 3.5*	Titanite
86	*Sp. Gr. 3.8*	Limonite
87	*Sp. Gr. 4.0*	Sphalerite
88	*Sp. Gr. 4.3*	Witherite
89	*Sp. Gr. 4.7*	Zircon

	Metallic Luster	
90	*Sp. Gr. 5.0*	Pyrite
91	*Sp. Gr. 5.7*	Arsenic
92	*Sp. Gr. 6.0*	Arsenopyrite
93	*Sp. Gr. 6.2*	Smaltite
94	*Sp. Gr. 6.7*	Cassiterite
95	*Sp. Gr. 7.5*	Galena
96	*Sp. Gr. 8.0*	Cinnabar
97	*Sp. Gr. 8.9*	Copper
98	*Sp. Gr. 9.8*	Bismuth
99	*Sp. Gr. 13.6*	Mercury
100	*Sp. Gr. 18.0*	Gold

Color, Nos. 101A and 101

	RED	
101	*Flesh-Red*	Chabazite
102	*Rose-Red*	Rose Quartz
103	*Scarlet-Red*	Crocoite
104	*Orange-Red*	Wulfenite
105	*Purplish-Red*	Cinnabar
106	*Garnet-Red*	Almandite
107	*Brick-Red*	Jasper
108	*Blood-Red*	Zincite
	YELLOW	
109	*Sulphur-Yellow*	Sulphur
110	*Orange-Yellow*	Orpiment
111	*Ochre-Yellow*	Ochre
112	*Resin-Yellow*	Opal
113	*Honey-Yellow*	Calcite
114	*Brownish-Yellow*	Dolomite
	GREEN	
115	*Olive-Green*	Olivine
116	*Sage-Green*	Serpentine
117	*Verdigris-Green*	Amazonstone
118	*Sea-Green*	Fluorite
119	*Emerald-Green*	Brochantite
120	*Apple-Green*	Garnierite
121	*Grass-Green*	Malachite
122	*Leek-Green*	Williamsite
	VIOLET	
123	*Reddish-Violet*	Amethyst
124	*Bluish-Violet*	Sodalite
	BLUE	
125	*Indigo-Blue*	Covellite
126	*Prussian-Blue*	Chalcanthite
127	*Azure-Blue*	Lazurite
128	*Sky-Blue*	Cyanite
129	*Greenish-Blue*	Chrysocolla
	BLACK	
130	*Grayish-Black*	Basanite
131	*Bluish-Black*	Pyrolusite
132	*Greenish-Black*	Hornblende
133	*Velvet-Black*	Wurtzilite
	BROWN	
134	*Yellowish-Brown*	Wood-opal
135	*Golden-Brown*	Polyadelphite
136	*Chestnut-Brown*	Grossularite
137	*Clove-Brown*	Limonite
	GRAY	
138	*Bluish-Gray*	Anhydrite
139	*Ash-Gray*	Zoisite
140	*Smoke-Gray*	Limestone
141	*Greenish-Gray*	Byssolite
	WHITE	
142	*Snow-White*	Magnesite
143	*Milk-White*	Opal
144	*Reddish-White*	Barite
145	*Greenish-White*	Talc
	METALLIC COLORS	
146	*Lead-Gray*	Molybdenite
147	*Silver-White*	Arsenopyrite
148	*Bronze-Yellow*	Pyrrhotite
149	*Copper-Red*	Copper
150	*Brass-Yellow*	Chalcopyrite

Luster, Nos. 102A and 102.

	KINDS OF LUSTER	
151	*Metallic*	Jamesonite
152	*Adamantine*	Endlichite
153	*Vitreous*	Hyalite
154	*Resinous*	Sphalerite
155	*Greasy*	Elæolite
156	*Pearly*	Dolomite
157	*Silky*	Satin Spar
	DEGREES OF LUSTER	
158	*Splendent*	Hematite

159 *Shining*..........Dolomite
160 *Glistening*......Papierspath
161 *Glimmering*..........Flint

Luster Phenomena

162 *Play of Colors*..........Opal
163 *Change of Colors* Labradorite
164 *Opalescence*.....Moonstone
165 *Chatoyancy*......Tiger Eye
166 *Iridescence*...........Coal
167 *Tarnish*...........Bornite
168 *Dichroism*..........Epidote
169 *Asterism*.......Phlogopite
170 *Schiller*..........Sunstone

Diaphaneity

171 *Transparent*........Quartz
172 *Semi-Transparent*..Fluorite
173 *Translucent*......Alabaster
174 *Semi-Translucent*.....Onyx
175 *Double Refraction*.. Iceland Spar

Effect of Radium, Röntgen, and Ultra-Violet Rays, Heat, Friction and Magnetism. Nos. 104A and 104.

Radium

176 *Phosphorescent*...Diamond
177 *Fluorescent*......Willemite

Röntgen Rays

178 *Fluorescent, Blue*.. Fluorite
179 *Phosphorescent, White*..Aragonite
180 *Opaque*...........Sulphur
181 *Transparent*......Graphite

Ultra-Violet Rays

182 *Fluorescent, Red*....Calcite
183 *Fluorescent, Green*..Hyalite
184 *Phosphorescent, Blue*...Colemanite
185 *Phosphorescent, Green*...Selenite
186 *Opaque*..............Mica

Heat

187 *Pyro-Electric with Terminal Polarity*.....Tourmaline, rhombohedral
188 *Pyro-Electric with Lateral Polarity*...Quartz, hexagonal
189 *Thermo-Electric*.....Pyrite
190 *Phosphorescent, Blue*.Chlorophane
191 *Phosphorescent, Red*...Lepidolite

Friction

192 — *Electricity*........Amber
193 + *Electricity*.......Quartz
194 *Triboluminescent, Red*.Hexagonite
195 *Triboluminescent, Yellow*... Dolomite

Magnetism

196 *Polarity*.........Lodestone
197 *Strongly Magnetic*....Pyrrhotite
198 *Weakly Magnetic*....Garnet
199 *Paramagnetic*......Siderite
200 *Diamagnetic*.....Wulfenite

THE business of collecting mineral specimens and distributing them among institutions and individuals widely scattered throughout the world, belongs with those highly specialized lines of trade which are rarely encountered by the average person, and which interest him but little when he does stumble over them. Hence, we cannot use to advantage the ordinary advertising methods, such as the newspaper and magazine, to reach the few who are devoted to the science.

Heretofore our most effective advertising has been done for us by our customers, who confer a favor upon many an interested friend by telling him of our establishment and the work we are doing. Teachers and students, as well as collectors of minerals or miners, acknowledge that the mineral dealers play a not unimportant part in the progress of the science and render essential aid to teachers of mineralogy.

We believe that, among the very few dealers, we are offering the best service, both as to the extent and variety of our stock, the quality and price of our specimens, and the liberality of our terms in general. If you agree with us, you may be glad to send us the names of all whom you believe to be in any way interested, and we will send them our catalog prospectus. This furthering the distribution of specimens will be a definite way of advancing the science.

A blank for names is printed on the other side of this sheet. Its return will be greatly appreciated by the

FOOTE MINERAL CO.,
107 North 19th Street, Philadelphia, Pa.

FOOTE MINERAL CO.

Gentlemen:—I send you the following names of people whom I think would be interested in receiving a prospectus of your Complete Mineral Catalog.

Yours truly,

....

OVER]

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Address...
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(3) Name..
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Part VIII

Chemical Mineralogy

Collections of Specimens for Analysis

Laboratory List

of Minerals sold by Weight

Chemical Mineralogy

Specimens for Blowpipe and Wet Analysis

The material selected for these collections is as near chemically pure as the minerals usually occur in nature. All are clean, typical examples of distinct species. The list embraces those commonly covered in an elementary course, and includes most of the minerals recommended by Penfield, Dana, Toula, Plattner and other writers.

If a more extended collection is desired, it may be selected from the alphabetical Price List in Part III. or the School of Mines List in Part V. If the price there given is in any instance for impure material, a smaller but pure specimen will be supplied, provided the order mentions "for analysis." If instead of trimmed specimens, a more extensive set of pure lumps and fragments is preferred, they may be purchased by weight from the Laboratory List, pages 311 to 319.

No. 119A. Series for Chemical Analysis

One hundred museum size specimens of pure minerals, averaging 12 x 9 cm. (4¾ x 3½ in.). The average weight is about 1000 grams (2.2 pounds avd.), generally affording sufficient of each kind for 400 to 500 analyses. Individual museum specimens may be purchased at double the listed hand size prices. The sum of such individual values in the museum size is $129.20. The "collection price" for all the specimens is $100.00, delivered to any address. This price includes pasteboard trays, or blocks if requested, and two No. 3 Oak Chests. Without chests, 10 per cent. less. If preferred, an equal weight of fragments in boxes, instead of trays or blocks, is sold in chests at $100.00.

Purchase in Parts. Free delivery with trays and No. 3 Chest. Without chest, 10 per cent. less.

Part I. 50 names marked with *, totaling $59.70 . . .$50.00

Part II. 50 remaining names, totaling $69.50 . . . . . . 50.00

No. 119. Student's Series for Chemical Analysis

One hundred hand size specimens, averaging 10 x 7 cm. (4 x 2¾ in.). Like the preceding, but smaller. The average weight is about 450 grams (1 pound avd.), generally affording sufficient of each kind for 200 to 250 analyses. Individual specimens sold at listed prices. These total $64.60. The "collection price" for all the specimens is $50.00, delivered to any address. This includes pasteboard trays with one No. 3 Oak Chest. Without chest, 10 per cent. less. If preferred, an equal weight of fragments in boxes, instead of trays, is sold in chest at $50.00. According to the Chemical List.

PURCHASE IN PARTS. Free delivery with trays and No. 2 Chest, shown in Plate II. Without chest, 10 per cent. less.

PART I. 50 starred names *, totaling $29.85........$25.00

PART II. 50 remaining names, totaling $34.75...... 25.00

Chemical List

	Aluminium, Al	
1	CORUNDUM	$ .50
2*	BAUXITE	.20
3*	CRYOLITE	.30
4	WAVELLITE	.75
5	ALUNITE	.30
	Antimony, Sb	
6*	STIBNITE	.35
	Arsenic, As	
7*	REALGAR	1.00
8*	ARSENOPYRITE	.25
	Barium, Ba	
9	WITHERITE	.20
10*	BARITE	.20
	Beryllium, Be	
11	BERYL	.40
	Bismuth, Bi	
12*	BISMUTITE	1.00
	Boron, B	
13	BORAX	.40
14	COLEMANITE	.50
	Calcium, Ca	
15*	FLUORITE	.20
16*	CALCITE	.20
17	GYPSUM	.20
	Chromium, Cr	
18*	CHROMITE	.20
	Cobalt, Co	
19	SMALTITE	$1.00
20*	COBALTITE	.60
21*	GLAUCODOT	1.00
	Copper, Cu	
22	CHALCOCITE	1.00
23	BORNITE	.75
24*	CHALCOPYRITE	.35
25	TETRAHEDRITE	1.00
26	ENARGITE	1.00
27*	CUPRITE	1.50
28*	MALACHITE	1.25
29	CHRYSOCOLLA	.50
30*	CHALCANTHITE	.50
	Gold and Tellurium, Au, Te	
31*	SYLVANITE	2.00
	Iron, Fe	
32*	PYRITE	.20
33*	HEMATITE	.20
34	MAGNETITE	.20
35	FRANKLINITE	.40
36	LIMONITE	.20
37*	SIDERITE	.20
38	DUFRENITE	.75

Lead, Pb

39*	GALENA	$ .40
40*	JAMESONITE	1.00
41*	CERUSSITE	1.25
42	PYROMORPHITE	.75
43	WULFENITE	1.00
44	ANGLESITE	1.50
45	CROCOITE	1.00

Lithium, Li

46*	LEPIDOLITE	.20
47	AMBLYGONITE	.50

Magnesium, Mg

48*	MAGNESITE	.20
49*	DOLOMITE	.20
50	KIESERITE	.30

Manganese, Mn

51	ALABANDITE	1.00
52*	PYROLUSITE	.20
53	MANGANITE	1.00
54*	RHODOCHROSITE	.75
55	RHODONITE	.35

Mercury, Hg

56*	CINNABAR	1.25

Molybdenum, Mo

57*	MOLYBDENITE	.40

Nickel, Ni

58*	MILLERITE	1.00
59	NICCOLITE	1.00
60	PYRRHOTITE	.20
61*	GARNIERITE	.50

Phosphorus, P

62*	APATITE	.20

Potassium, K

63	SYLVITE	.30
64*	CARNALLITE	.30

Selenium, Se

65	GUANAJUATITE	2.00

Silver, Ag

66	ARGENTITE	1.25
67*	PYRARGYRITE	1.00

Sodium, Na

68*	HALITE	.20
69	SODA NITER	.40

Strontium, Sr

70	STRONTIANITE	.20
71*	CELESTITE	.20

Tantalum and Columbium, Ta, Cb

72	COLUMBITE	$ .50

Thorium, Th

73	THORIANITE	2.50

Tin, Sn

74	STANNITE	.75
75*	CASSITERITE	.50

Titanium, Ti

76*	RUTILE	.50
77	ILMENITE	.25

Tungsten, W

78*	WOLFRAMITE	.75
79	SCHEELITE	.75

Radium and Uranium, Ra, U

80*	URANINITE	3.00

Vanadium, V

81*	VANADINITE	1.00

Yttrium, Y (with Er, La, Di)

82	GADOLINITE	2.50

Zinc, Zn

83*	SPHALERITE	.20
84	ZINCITE	.75
85*	CALAMINE	.50
86*	SMITHSONITE	.40
87	WILLEMITE	.60

Zirconium, Z

88	ZIRCON	.40

Silicates, Insoluble

89	ALBITE	.20
90*	PYROXENE	.50
91*	AMPHIBOLE, Actinolite	.30
92*	GARNET, Almandite	.30
93	EPIDOTE	.40
94	SERPENTINE	.20
95*	KAOLINITE	.20
96	TOURMALINE	.40

Silicates, Soluble

97	WOLLASTONITE	.75
98	DATOLITE	.60
99*	NATROLITE	.75
100	STILBITE	.40

Laboratory List

Minerals Sold by Weight

TON LOTS of many rare minerals supplied to experimenters and manufacturers. Prices on request if quantity desired is stated. Correspondence solicited with producers and consumers of rare ores, also colored semi-precious stones, such as Azurite, Turquois Matrix, etc., etc.

QUALITY. Pieces usually consist of irregular lumps or fragments of about 3 to 9 cm (1¼ to 3½ in.) length, more or less. Specimens trimmed to uniform sizes cost more. The material furnished is about as pure as found in Nature. Where more than 5 per cent. of gangue rock or matrix is attached, the per cent. of pure mineral is noted.

FREE TRANSPORTATION to any address, with privilege of returning any unsatisfactory item at our expense.

EXTRA STRONG CARTONS (double-thick cylindrical cardboard boxes) hold each mineral conveniently and permanently.

A MINIMUM PRICE of $0.20 is charged for even the smallest quantity of any mineral sold by weight.

10 TO 50 KG. samples of one mineral cost proportionately less than listed. Thus 10 kg. or over, 10 per cent. less. 50 kg., 20 per cent. less.

LESS THAN THE LISTED QUANTITY is charged at a rate 25 per cent. higher proportionately than the list price. Thus Manganotantalite listed at $3.00 per kilo, costs $0.37 for one-tenth kilo; Glaucodot at $4.00 per kilo costs $1.25 for one-quarter kilo; Argyrodite at $2.50 D. costs $0.31 G.; Beryl at $0.40 K. costs $0.20 for ¼ K. (minimum charge), etc.

A METAL CLASSIFICATION of the economic minerals in this list, showing the minerals carrying each metal, will be found in Part V.

FOREIGN MONEY is, for convenience, accepted as follows: $1.00 = 4/- = M. 4. = Fcs. 5 = L. 5.

COMPARISON OF WEIGHTS

1000 grams	= 1 kilogram	(K.)	≅ about	2⅕ pounds	avoirdupois.
100 "	= 1 hectogram	(H.)	= "	3½ ounces	"
10 "	= 1 dekagram	(D.)	= "	⅓ ounce	"
	1 gram	(G.)	= "	15½ grains	

Laboratory List

Prices per kilo (2.2 lbs.)

Achroite, crystals, D., $1.50
Actinolite, crystalline.....$ .40
Adularia 2.00
Adularia, Moonstone, precious, H., $1.50
Aegyrite 2.00
Aeschynite, H., $1.00
Agalmatolite 1.00
Agate, banded or moss ... .50
Alabandite, 75 per cent. .. 2.00
Alabaster .... .20
Albertite................ .40
Albite, lamellar, white.... .20
Albite cleavage, striated. .20
Algodonite, H., $1.00
Allanite.................. .60
Allemontite, H., $1.00
Allophane, cupriferous ... 1.00
Almandite, large crystals . .40
Aluminite, H., $1.50
Alunite .... .40
Amazonstone, crystallized .40
Amber, H., $0.75
Amblygonite, cleavable,.. .70
Amethyst, deep colored... 3.00
Amethyst, light colored... 1.00
Amethyst, light with milky quartz .... .50
Amphibole. See following:
Actinolite, Asbestus, Byssolite, Hexagonite, Hornblende, Tremolite.
Analcite, H., $0.75
Anatase, crystals, G., $1.25
Andalusite.............. 3.00
Andorite, D., $0.60
Andradite, granular, pink, 50 per cent............1.00
Anglesite................ 4.00
Anhydrite...............$ .20
Anhydrite, vein in halite . .40
Annabergite 4.00
Annerödite, H., $2.00
Anorthite, xls., H., $1.50
Anthophyllite, radio-fibrous .40
Anthracite Coal .... .20
Anthraconite, Stinkstone . .20
Antimony, H., $1.25
Apatite, granular, brown . .20
granular, green .... .20
compact, whitish...... .20
See Phosphate Rock.
Apophyllite, H., $0.75
Aquamarine, D., $0.40
Aragonite, banded....... .30
Argentite, D., $0.75
Argyrodite, D., $2.50
Arkansite, xls., D., $1.00
Arkansite, paramorphosed to rutile, crystals....... 1.00
Arsenic.................. 1.25
Arsenopyrite............ .20
Asbestus, Amphibole, gray .40
Asbestus, Chrysotile, (Serpentine), green......... 1.00
Asbolite, Earthy Cobalt .. .50
Asphaltum.............. .20
See also: Elaterite, Wurtzilite, Albertite, Gilsonite.
Atacamite 4.00
Augite, crystals.......... 2.00
Aventurine, Oligoclase ... 2.00
Averturine, Perthite ..... .40
Awaruite, grains in magnetite sand, D., $2.50
Axinite, yellow or brown .. 1.00
Azurite 4.00

Prices per kilo (2.2 lbs.)

Barite, lamellar	$ .20
Basanite	.40
Bauxite, pisolitic, yellowish	.20
Bauxite, nodules in clay	.20
Berthierite, 50 per cent	4.00
Beryl, green or yellow	.40
(Ton Lots at Market Prices.)	
Beryl, Aquamarine, D., $0.40	
Beryllonite, D., $3.00	
Biotite	.60
Bismuth, H., $0.60	
Bismuthinite, H., $0.90	
Bismutite, H., $2.50	
Bituminous Coal, iridescent	.20
Blende, granular	.40
Blende, cleavable	.40
Blödite, crystals	1.00
Bog Iron Ore	.20
Boleite, crystals, D., $1.00	
Boracite, Stassfurtite	.50
Borax	1.00
Bornite, argentiferous	1.50
Bort, carat, $4.00	
Boulangerite, 50 per cent	1.50
Bournonite, H., $2.00	
Braunite	.75
Brochantite, massive	4.00
Brochantite, fibrous, 50 per cent	3.00
Bröggerite, D., $1.00	
Bronzite, sublamellar, gray	.40
Brookite, xls., D., $1.00	
Brookite, paramorphosed to rutile, crystals	1.00
Brown Coal	.20
Brucite, H., $0.75	
Byssolite	.50
Calamine	.75
Calcite, cleavages	.20
Calcite, rhombic cleavages	.40
Calcite, crystals, scalenohedrons	.40
Calcite, xl., Nail Head Spar	$1.00
See also: Calc Tufa, Chalk, Hydraulic Limestone, Iceland Spar, Limestone, Lithographic Stone, Marble, Onyx, Travertine.	
Cancrinite, H., $0.60	
Cancrinite, 5 per cent in nephelite-syenite	.40
Cannel Coal	.20
Carnallite	.25
Carnotite, 10 per cent	2.00
Cassiterite, massive	2.00
Cassiterite, in feldspar	.30
Cassiterite, Stream Tin	1.00
Celestite, cleavage	.40
Celestite, fibrous	.75
Cerargyrite, D., $1.00	
Cerite	1.50
Cerussite, massive, 75 per cent	.80
Cerussite, cryst'd, white	1.60
Cervantite	.50
Chabazite, H., $0.75	
Chalcanthite	2.00
Chalcedony, nodules	.50
Chalcedony, mammillary, with coral impressions	.50
Chalcocite	1.50
Chalcophanite	1.00
Chalcopyrite	.50
Chalcopyrite, 33 per cent	.20
Chalk	.20
Chert	.20
Chlorastrolite, H., $1.00	
Chlorite, Prochlorite	.40
Chloritoid, Masonite	.50
Chlorophyllite	.75
Chondrodite	2.00
Chromite	.30
Chrysocolla	.50
Chrysolite, Dunite	.30
Chrysolite, gem, D., $0.75	
Chrysotile, Asbestus	1.00
Cinnabar	4.00
Cinnabar, 10 per cent	1.00

Prices per kilo (2.2 lbs.)

Cinnamon Stone	$ .60
Citrine	1.50
Clinochlore	2.00
Coal. See following: Anthracite, Bituminous, Lignite, Cannel	
Cobaltite, pure, compact	2.50
Cobaltite, 10 per cent.	.50
Coccolite	.75
Colemanite	1.00
Colophonite	1.50
Columbite	2.00
Copiapite	2.50
Copper, native	2.00
Copper, native in conglomerate, 5 per cent.	.40
Copper Glance	1.50
Copper Pyrites	.50
Copper Pyrites, 33 per cent.	.20
Cordierite	3.00
Corundum, cleavages	1.00
Corundum, crystals	1.00
Corundum, Emery	.20
Corundum, Ruby, D., $2.50	
Corundum, Sapphire, crystals, D., $0.50	
Corundum, Sapphire, asteriated, water-worn crystals, H., $2.00	
Covellite, bright foliated	3.00
Covellite, with pyrite	2.00
Covellite, dull, platiniferous (sperrylite)	3.00
Crocidolite, altered to Quartz, Tiger-Eye, chatoyant	.50
Crocidolite, unaltered	1.00
Crocoite, crystals	2.00
Cryolite	.50
Cryolite with siderite	.30
Cuprite	2.00
Cuprite, 2 per cent.	.40
Cyanite, bladed, blue	.50
Cyanite, bladed, green	.75
Cyanite, clear blue crystals in paragonite	1.50
Cylindrite	$2.00
Datolite	2.00
Datolite, 25 per cent.	1.25
Descloizite, H., $1.50	
Deweylite	1.00
Diallage with saussurite	.50
Diaspore, lamellar	4.00
Diopside	1.00
Dolomite, fine, white	.20
Dolomite, coarse, yellow	.20
Dolomite, compact	.20
Dolomite, Pearl Spar	1.00
Domeykite	2.00
Domeykite, 40 per cent.	1.00
Dysanalyte cryst'ls, H. $1.50	
Dyscrasite, D., $1.50	
Elæolite	1.00
Elaterite	1.00
Embolite, D., $1.00	
Emery, granular	.20
Emplectite, H., $1.00	
Enargite, cleavable	2.00
Endlichite with wulfenite	4.00
Enstatite, sublamellar gray	.40
Epidote, nodules, compact	.50
Epidote, crystallized	.50
Epidote, gray	.50
Erythrite, H., $0.60	
Eudialyte	4.00
Euxenite, H., $0.75	
Feldspar, Calcium — see Anorthite	
Feldspar, Plagioclase—see Albite, Oligoclase, Labradorite.	
Feldspar, Potash—see Orthoclase and Microcline.	
Feldspar, Soda—see Albite	
Fergusonite, H., $1.50	
Fibrolite	.50
Fire Opal, H., $1.00	
Flexible Sandstone	.40
Fluorite, greenish	.20

Prices per kilo (2.2 lbs.)

Fluorite, cubes, clear emerald-green, H., $0.50	
Fluorite, cleavages, translucent, pink	$ .60
Fowlerite, crystalline	.60
Franckeite	2.00
Franklinite, granular	.40
Franklinite, granular, with zincite and willemite	.60
Freibergite	3.00
Fuchsite	2.00
Gadolinite	4.00
Galena, argentiferous	.75
Galena, argentif., 40 per cent.	.50
Galena, cleavable	.50
Garnet, Almandite, large crystals	.40
Garnet, Andradite, pink, granular, 50 per cent.	1.00
Garnet, Grossularite	.60
Garnet, Polyadelphite	.60
Garnierite, 75 per cent.	.75
Garnierite, 5 per cent.	.20
Gersdorffite, H., $0.60	
Gibbsite	.75
Gilsonite	.20
Glaucodot	4.00
Glauconite	.20
Gold, Rand Conglomerate	.50
Gold, native, G., $1.25	
Gold Pyrites	.75
Goslarite	2.00
Göthite	1.50
Graphite, lumps	.75
Graphite, powdered	.40
Gray Copper	2.00
Gray Copper, argentif.	3.00
Grossularite	.60
Guanajuatite, D., $2.50	
Guano	.25
Gummite, H., $2.00	
Gypsum, Alabaster	.20
Gypsum, coarsely fibrous	.20
Gypsum, granular	.20

Gypsum, Satin Spar	$ .50
Gypsum, Selenite, clear colorless cleavage	.30
Halite, clear cleavage	.40
Halite, granular	.20
Halloysite	2.00
Halotrichite	2.00
Hardystonite	.60
Hardystonite with willemite and franklinite	.75
Hausmannite	1.00
Heavy Spar, lamellar	.20
Heliotrope	1.50
Hematite, compact	.20
Hematite, crystallized	1.00
Hematite with jasper, "Jaspilite"	.40
Hematite, micaceous	.75
Hematite, oölitic	.20
Hematite, Pencil Ore	1.00
Hercynite	1.50
Hessite, D., $1.50	
Heulandite, H., $0.75	
Hexagonite	1.00
Hielmite, H., $2.00	
Hornblende	.20
Horn Silver, D., $1.00	
Hübnerite	2.00
Hyacinth, D., $0.75	
Hyalite, H., $1.50	
Hydrotalcite, Houghite	.75
Hypersthene, cleavage	3.00
Iceland Spar, colorless	4.00
Iceland Spar, good	2.00
Idocrase	1.00
Idrialite, H., $1.00	
Ilmenite	.25
Infusorial Earth	.20
Iolite, Chlorophyllite	.75
Iolite, Cordierite	3.00
Iridosmine, G., $2.00	
Iron, Meteoric, Aerolite (stone), D., $2.00	

Prices per kilo (2.2 lbs.)

Iron, Meteoric, altered to limonite-magnetite shale	$1.00
Iron, Meteoric, Siderite, plates, H., $4.00	
Iron, Meteoric, Siderolite iron and stone, H., $4.00	
Iron, Terrestrial, H., $3.00	
Iron Pyrites, crystallized	.40
Iron Pyrites, massive	.20
Itacolumite	.40
Jade (Jadeite)	2.00
Jamesonite	3.00
Jasper, red	.50
Jasper, variegated	.50
Jasper, yellow	.30
Jasperized Wood	.50
Jefferisite	.60
Jeffersonite	.40
Josephinite, D., $0.50	
Kainite	.50
Kaolinite	.20
Kaolinite containing pisolites of bauxite	.20
Keilhauite	2.50
Kieserite	.25
Kjerulfine, H., $0.75	
Kröhnkite, broken crystals H., $0.60	
Labradorite, chatoyant	.60
Labradorite, ordinary	.30
Lapis Lazuli, azure-blue	2.00
Laumontite	4.00
Laumontite amygdules in diabase, 5 per cent.	.40
Lazulite, H., $1.00	
Lazurite	2.00
Lepidolite, fine granular, pale lilac	.20
Lepidolite, coarse, scaly, deep bluish-violet	.20
Leucite, H., $1.00	
Lignite	.20
Limestone, compact, gray, blue, buff, white, etc.	.20
Limonite, Bog Iron Ore	$ .20
Limonite, fibrous	.20
Limonite, iridescent	.40
Limonite, Yellow Ochre	.20
Linnæite, H., $1.25	
Lodestone, extra strong	.75
Lodestone, strong	.25
Löllingite	1.00
Ludwigite	3.00
Magnesite, compact	.20
Magnesite, Pinolite, cleav.	.20
Magnetite, granular	.20
Magnetite, crystallized	.75
Magnetite, see Lodestone.	
Malachite	2.00
Manganite	1.00
Manganotantalite	3.00
Marble, fine, white	.20
Marble, coarse, red	.20
Marcasite	1.00
Margarite, lamellar, pink	1.25
Margarite, schistose, green	1.00
Margarodite	1.00
Margarodite, with brown tourmaline, dravite	1.50
Martite, crystallized	.50
Masonite	.50
Massicot, D., $0.30	
Meerschaum	3.00
Melaconite	2.50
Melanterite	2.00
Meliphanite, H., $3.00	
Mellite, D., $1.25	
Meneghinite, xls., D., $2.00	
Menilite	.40
Meteorites (see Iron)	
Mexican Onyx	.30
Mica: See Muscovite, Biotite, Phlogopite, etc.	
Microcline, cleavage	.20
Microcline, Amazonstone, crystal	.40
Microlite, xls., D., $3.00	
Milky Quartz, massive	.20

Milky Quartz, ideal by-pyramidal crystals	$4.00
Millerite	4.00
Mimetite, H., $0.75	
Mispickel	.20
Molybdenite, cleavages	2.00
(Ton Lots at Market Prices.)	
Molybdenite, in diopside	1.25
Molybdite, D., $1.00	
Monazite, broken crystals	2.50
Monazite, sand	1.25
Moonstone, H., $1.50	
Moss Agate, dendritic	.50
Muscovite	.40
Nadorite, H., $0.75	
Nagyagite, D., $1.00	
Natrolite, compact	3.00
Natrolite, radiated	3.00
Natron	1.00
Nephelite, Elæolite	1.00
Newberyite, H., $1.00	
Niccolite	2.50
Niter, Soda	.40
Niter, Soda, stained with chromic acid, high percentage of iodine	1.00
Northupite, xls., D., $0.50	
Ochre, yellow	.20
Oligoclase	.75
Oligoclase, Sunstone	2.00
Olivine, Chrysolite, Dunite	.30
Olivine, Chrysolite, gem pebbles, D., $0.75	
Onyx, Mexican	.30
Opal-Agate	1.50
Opal, Fire, H., $1.00	
Opal, Hyalite, H., $1.50	
Opal, Menilite	.40
Opal, Precious, according to play of colors, per D., $0.20 to $2.00	
Opal, Semi-opal, brick-red	.50
Opal, Semi-opal, brown	.50
Opal, Semi-opal, green	.75
Opal, Tripoli	$.20
Opal, Wood	.75
Orangite, H., $4.00	
Orpiment	3.00
Orthite	.60
Orthoclase	.20
Osmiridium, G., $2.00	
Ozocerite	.40
Paragonite, with cyanite	1.00
Pectolite	1.00
Pentlandite in pyrrhotite	1.00
Peridot, precious, D., $0.75	
Perthite, Sunstone	.40
Petalite	1.00
Petrified Wood	.50
Petroleum	.20
Phenacite, D., $1.00	
Phlogopite, asteriated	.40
Phosgenite, crystalline	4.00
Phosphate Rock, fossil	.20
Phosphate Rock, granular	.20
Piedmontite	1.50
Pitchblende, D., $0.60	
Platiniferous Covellite	3.00
Platinum, G., $1.50	
Plumbago, lump	.75
Plumbago, powder	.40
Pollucite, D., $1.50	
Polybasite, D., $1.00	
Polycrase, H., $4.00	
Polyhalite,	.75
Prehnite, drusy, green	.80
Prochlorite, with crystallized magnetite	.40
Proustite, D., $1.00	
Psilomelane	.20
Pyrargyrite, D., $0.60	
Pyrite, auriferous	.75
Pyrite, crystallized	.40
Pyrite, massive	.20
Pyrochlore, D., $1.00	
Pyrolusite	.30
Pyromorphite, crystal	4.00
Pyrophyllite	1.00

Prices per kilo (2.2 lbs.)

Pyroxene. See following:
Augite, Coccolite, Diopside, Hedenbergite, Jeffersonite.
Pyrrhotite, nickeliferous . . $ .20
Pyrrhotite with pyrite 20
Quartz. See following:
Agate, Amethyst, Basanite, Chalcedony, Chert, Citrine, Flint, Heliotrope, Itacolumite, Jasper, Jasperized Wood, Milky, Moss Agate, Rock Crystal, Rose, Smoky.
Rammelsbergite 3.00
Realgar 3.00
Realgar, 10 per cent 75
Rhodochrosite 1.00
Rhodonite 60
Rhodonite, Fowlerite with franklinite 40
Ripidolite 2.00
Rock Crystal, transparent 1.00
Roemerite 4.00
Rose Quartz, deep pink . . . 1.00
Rose Quartz, pale pink 40
Rubellite, crystals, H., $1.50
Rubellite in lepidolite, 10 per cent. 50
Ruby, D., $2.50
Ruby Silver, Dark, D., $0.60
Ruby Silver, Light, D., $1.00
Ruby Spinel, water-worn crystals, H., $1.50
Rutile, ordinary red, brown or black, containing iron .75
(Ton Lots at Market Prices.)
Rutile.—We keep in stock, for regular delivery to manufacturers, the best iron-free red grades, ground to fine yellows.
Sal-ammoniac, H., $0.75
Salt, Rock—see Halite.
Samarskite, H., $1.00
Sanidine 1.50
Sandstone, red, blue, gray, white, etc. 20
Sandstone, banded 60
Sandstone, flexible 40
Sapphire, asteriated, water-worn crystals, H., $2.00
Sapphire, crystals, D., $0.50
Satin Spar, fibrous, white . $ .50
Scapolite 50
Scheelite 2.00
Scheelite, 10 per cent. 50
Schorlomite 2.00
Scolecite, H., $0.75
Selenite, clear cleavages . . .30
Semi-opal, see Opal
Sepiolite, Meerschaum . . . 3.00
Serpentine, granular 20
Serpentine, Precious 60
See also Chrysotile (Asbestus), Ophicalcite, Verd-Antique, Williamsite.
Siderite 20
Sillimanite, 50 per cent. 40
Silver, native, D., $0.60
Silver, sulphide ore 50
Smaltite 2.50
Smithsonite 50
Smithsonite with limonite .30
Smoky Quartz 20
Smoky Quartz, enclosing tourmaline 1.00
Soapstone, talc 20
Sodalite 3.00
Soda Niter 40
Soda Niter, stained with chromic acid, high percentage of iodine 1.00
Sphalerite, cleavable 40
Sphalerite, granular 40
Sphalerite, 20 per cent 20
Spinel, Ruby, water-worn crystals, H., $1.50
Spodumene, cleavable 40
Staffelite 1.50
Stannite 1.50
Stannite with pyrite 75
Staurolite 4.00
Steatite 20
Stephanite, D., $1.00
Stibiotantalite, D., $1.00
Stibnite 40
Stilbite 1.50

Stinkstone, Anthraconite	$ .20
Stream Tin	1.00
Strontianite	.20
Succinite	4.00
Sulphur	.60
Sulphur, 30 per cent	.40
Sulvanite	4.00
Sunstone, Oligoclase	2.00
Sunstone, Perthite	.40
Sylvanite, G., $1.00	
Sylvite	.50
Tachhydrite	.50
Talc, foliated	.30
Talc, Steatite	.20
Tantalite	4.00
Tantalite, manganotantalite	3.00
(Ton Lots at Market Prices.)	
Tantalite with cassiterite	2.00
Tetrahedrite	2.00
Tetrahedrite, argentiferous	3.00
Thaumasite	1.00
Thomsenolite, H., $1.00	
Thorianite, xls., H., $3.00	
Thorite, H., $2.50	
Thorite, Orangite, H., $4.00	
Thulite, fine pink	.50
Tiger Eye, yellow	.50
Titanite, crystals, brown	.80
Titanium oxide—see Rutile.	
(Ton Lots at Market Prices.)	
Topaz, broken crystals	4.00
Topaz, massive	2.00
Tourmaline, black	.40
Tourmaline, brown	.60
Tourmaline, Rubellite, crystals, H., $1.50	
Tourmaline, Rubellite, 10 per cent. in lepidolite	.50
Tremolite	.60
Tremolite, 50 per cent.	.40
Triphylite	2.00
Triplite, H., $0.75	
Tripolite	.20
Turgite, with limonite	$ .20
Turgite, ocherous, red, loose	20
Turquois, H., $0.75	
Turquois, 10 per cent.	1.00
Ulexite	1.00
Ullmannite	2.50
Uraninite, D., $0.60	
Uraninite, Bröggerite, crystals, D., $1.00	
Uvarovite, green	1.50
Vanadinite, H., $0.75	
Verd-Antique	.40
Vesuvianite	1.00
Vivianite, H., $2.00	
Wad	.20
Wad, Asbolite	1.00
Wagnerite, H., $0.75	
Wavellite, 50 per cent.	1.00
Wernerite	.50
Willemite	1.00
Willemite with franklinite and zincite	.60
Williamsite	.40
Witherite	.20
Wolframite	2.00
Wollastonite, stellated	2.00
Wulfenite, crystallized	4.00
Wulfenite with endlichite	4.00
Wurtzilite	.20
Wurtzite	1.50
Xanthosiderite	1.00
Xenotime, H., $0.75	
Yellow Ochre	.20
Zincite	2.50
Zincite, 50 per cent	1.25
Zincite with franklinite, and willemite	.60
Zinc Blende, see Sphalerite.	
Zinkenite, H., $1.50	
Zinnwaldite	.75
Zircon	1.25
Zircon, Hyacinth, D., $0.75	
Zoisite, columnar, gray	.50
Zoisite, Thulite fine pink	.50

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