



FIG. 31.

some of the crystals. These markings are not due to etching, but are connected with the growth of the crystals. They are not depressed, but slightly stepped and do not affect the brilliancy of the base. The sides of the triangles are parallel to +1 faces while the angles point toward -1. These markings are sketched on the orthographic projection shown (Fig. 31). The forms present are $0(0001)$, $\infty 0(10\bar{1}0)$, $10(10\bar{1}1)$, $20(20\bar{2}1)$, $\pm 1(11\bar{2}1)$. The signals were sharp and the deviations in the measurements from those given in Goldschmidt's tables and those of Melzer¹ are so slight, amounting to almost perfect agreement, that it is evident that this hematite is essentially pure and free from any great amount of FeO , TiO_2 or other constitu-

ents in solid solution.

The zonal relations are brought out to better advantage in the hexagonal system, as well as in the other systems, with the Goldschmidt than the other symbols. Thus in the hematite measured, $\infty 0$, 0 , 10 , 20 , are in a zone, as shown by the common value for q (G_2), while the corresponding Bravais symbols $10\bar{1}0$, 0001 , $10\bar{1}1$, $20\bar{2}1$, do not show this relation so well.

TABLE OF ANGLES OF HEMATITE

Form	G_1	Gdt.	G_2	Bravais	Measured		Calculated	
					φ	ρ	φ	ρ
0	0	0	0001 0001		$0^\circ 00'$		$0^\circ 00'$	
a	∞	$\infty 0$	$11\bar{2}1$ $10\bar{1}0$	$0^\circ 00'$	90 00	$0^\circ 00'$	90 00	
π		10	$11\bar{2}3$ $10\bar{1}1$	0 00	42 10	0 00	42 14	
λ		20	$22\bar{4}3$ $20\bar{2}1$	0 00	61 8	0 00	61 10	
px	1 0	± 1	$10\bar{1}1$ $11\bar{2}1$	30 00	57 31	30 00	57 33	

LISTS OF THE HEXAGONAL AND TRIGONAL MINERALS INCLUDED IN GOLDSCHMIDT'S WINKELTABELLEN. EDGAR T. WHERRY. Washington, D. C.—This list follows the plan used with tetragonal minerals, altho it has seemed best to separate the hexagonal from the trigonal classes. In the event of the axial ratio obtained on an unknown crystal not fitting in the table, the factor by which it may be multiplied or divided is $\sqrt{3}$ or $\frac{1}{2}\sqrt{3}$. For example, a crystal of a mineral found to contain calcium and phosphorus may give on measurement $c = 0.73 \pm$. No corresponding mineral

¹ *Z. Kryst. Min.*, 37, 580, 1903.

can be found in the lists, but on multiplying by 1.732 the value 1.27 will be obtained, which will be found to correspond to apatite.

HEXAGONAL MINERALS

	c	Page		c	Page
Breithauptite	0.7471	78	Pyrrhotite (Magnetkies)	1.4291	227
Cancrinite	0.7637	87	Microsommite (Mikrosommit)	1.4490	241
Ettringite	0.8170	133	Nephelite (Nephelin)	1.4530	247
Beryl	0.8643	65	Molybdenite (Molybdänglanz)	1.5400	242
Stuetzite (Tellurblende)	1.0851	339	Trimerite	1.6321	349
Milarite	1.1466	241	Loanganbanite (Longbanit)	1.6437	211
Eremeyevite (Jeremeyewit)	1.1840	189	Covellite (Kupferindig)	1.7200	206
Tysonite	1.1893	353	Hanksite	1.7563	169
Hedyphanite	1.2234	173	Connellite	2.0031	102
Vanadinite	1.2335	357	Cappelenite	2.2349	88
Svabite	1.2372	333	Catapleüite (Katapleit)	2.3605	196
Mimetite (Mimetesit)	1.2600	242	Fluocerite	2.6804	148
Apatite	1.2708	50	Hessenbergite	2.7070	176
Pyromorphite	1.2750	280	Zincite (Rothzinkerz)	2.7846	307
Penfieldite	1.3450	260	Tridymite	2.8624	349
Greenockite	1.4061	166	Spangolite	3.0162	323
Wurtzite	1.4163	369	Chalcomorphite	3.3067	92
Nicolite (Rothnickelkies)	1.4193	306			
Iodyrite (Jodsilber)	1.4196	190			

REPRESENTATIVES OF CLASSES WITH DIMINISHED SYMMETRY

CLASS HEMIMORPHIC

Greenockite	1.41 -
Wurtzite	1.41 +
Iodyrite	1.42
Zincite	2.78 +

CLASS PYRAMIDAL

Vanadinite	1.23 +
Mimetite	1.26
Apatite	1.27
Pyromorphite	1.28 -

PERI-HEXAGONAL, (that is, really possessing lower symmetry, but approaching so close to the hexagonal system in angles and habit as to be profitably included here).

Eremeyevite	1.18
Catapleüite	2.36
Hessenbergite	2.71 -

SYN-HEXAGONAL (thru twinning)

Trimerite	1.63
Tridymite	2.86

TRIGONAL MINERALS

	c	Page		c	Page
(Beyrichite) [variety of millerite]	0.3277	68	Soda-niter (Natronsalpeter)	0.8266	247
Millerite	0.3295	242	Dolomite	0.8322	119
Tourmaline (Turmalin)	0.4477	352	Calcite	0.8543	83
Friedelite	0.5470	152	Martinite	0.8559	232
Ferronatrite	0.5528	145	Hematolite (Diadelphit)	0.8885	114
Phenacite (Phenakit)	0.6611	264	Diopasite	1.0622	118
Willemite, troostite	0.6695	363	Chabazite (Chabasit)	1.0860	91
Pyrrargyrite (Rothgiltigerz)	0.7880	302	Steenstrupite	1.1100	327
Proustite (Rothgiltigerz)	0.8034	299	Hamlinite	1.1353	169
Smithsonite (Zinkspath)	0.8062	374	Utahite	1.1389	356
Magnesite	0.8095	275	Beudantite	1.1842	68
Rhodochrosite (Manganspath)	0.8183	231	Caryocerite (Karyocerit)	1.1845	196
Siderite (Eisenspath)	0.8184	124	Svanbergite	1.2365	334
Nordenskiöldite	0.8221	250	Jarosite	1.2500	187
			Alumite	1.2523	35
			Melanocerite	1.2554	236

	c	Page		c	Page
Aphthitalite (Glaserit)	1.2839	158	Parisite	1.6822	257
Bismuth (Wismut)	1.3035	364	Pyrosmalite	1.8380	280
Antimony	1.3236	46	Tachydrile (Tachyhydrit)	1.9000	338
Tellurium	1.3300	338	Quartz (Quarz)	1.9051	288
Hematite, specularite (Eisenglanz)	1.3623	123	Cinnabarite (Zinnober)	1.9837	377
Corundum (Korund)	1.3636	200	Eudialyte	2.1116	134
Ilmenite (Titaneisen)	1.3846	343	Ice (Eis)	2.4294	122
Graphite	1.3860	165	Chalcophyllite (Kupfer- glimmer)	2.5540	206
Pyrochroite	1.4002	280	Coquimbite	2.7098	103
Arsenic	1.4013	54	Tetradymite	3.1730	340
Iridium, osmium (Os- miridium)	1.4105	256	Chlorite group (Chlorit- gruppe)	3.3890	95
Brucite	1.5208	81	Chalcophanite	3.5267	92

REPRESENTATIVES OF CLASSES WITH OTHER THAN RHOMBOHEDRAL SYMMETRY

CLASS TRIGONAL-HEMIMORPHIC		Dolomite	0.83
Tourmaline	0.45 -	Diopside	1.06
Pyrrargyrite	0.79	Ilmenite	1.38 +
Proustite	0.80	CLASS TRAPEZOHEDRAL	
Ice	2.43	Quartz	1.91 -
CLASS RHOMBOHEDRAL-TETARTO- HEDRAL		Cinnabarite	1.98
Phenacite	0.66	PERI-TRIGONAL	
Willemite, troostite	0.67	Chlorite (group)	3.39

BOOK REVIEW

MICROSCOPIC EXAMINATION OF THE ORE MINERALS. W. MYRON DAVY and C. MASON FARNHAM. 154 pages. McGraw-Hill Book Co., New York. \$2.50.

This book represents in a sense a new edition of Murdoch's "*Microscopical determination of the opaque minerals*" which was reviewed in this magazine in February, 1917. It represents, however, a great advance over that work, in that the methods originally proposed by Murdoch have been tried out by the two new authors on a large number of specimens, and modifications have been made in accordance with the experience obtained. The principal changes are these: The fine distinctions in color values have been found to be impracticable, and have been discarded as a basis of primary classification. Microchemical methods have been found to vary so much from one specimen to another of the same mineral, or even on different crystal faces on the same specimen, that little dependence is now placed upon their details. The number of reagents has been brought within practicable limits. And blowpipe reactions have been added, because they are of considerable confirmative value. It seems to the reviewer that all of these changes are distinct improvements.

There are also several valuable new features. The chapter on photomicrography of polished sections is unusually full and helpful. There are, in addition to the regular determinative tables, in which the minerals are one by one eliminated until the one under study is identified, a few tables of special properties. In one the colors of about 20 minerals showing others than shades