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Trial calculation of relating the equilibrium state of minerals to the descriptive mineralogy

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Statistical calculations have been carried out on the volumes of the asymmetric unit of minerals. This treatment is related to the origin of the symmetry and periodicity of the crystals, and to the equilibrium conditions of these crystals. From the view point of the cohesion energy, if the crystals were grown under the condition of nearly perfect equilibrium states, then all the volumes of the asymmetric unit of each crystal structure will be approximately equal, and if the volume of the asymmetric units of a certain mineral is larger than the average value, this mineral is considered to be grown in a metastable condition. The calculation of the cell dimensions of minerals have been carried out by the use of data from previous investigations. The statistical consideration of the volumes of the asymmetric unit of minerals is considered to be an appropriate criterion to relate the stability of minerals to their descriptive mineralogy.

Keywords: geneses of symmetry, symmetry, periodicity, equilibrium

1 Introduction

A crystalline substance is a state of matter with constituent atoms arranged in a structure so that the atoms have a minimum cohesion energy. Further, there can be only one arrangement of atoms of minimum cohesion energy for a given PTC (Pressure-Temperature-Composition) condition, provided that the crystal is grown in an equilibrium state. As a result, there arises in the crystal structure an innumerable repetition of this simular arrangement of atoms. This repetition of the groups of atoms corresponds to the symmetry and periodicity existing in the crystal structure.

If the way of arrangement of atoms having the minimum cohesion energy is only one, then the group of atoms must have a small volumes, approximately three to five times as large as the interatomic distances of the constituent atoms. The unit of these repetition is confined to one or two atoms in the case of very simple metals or oxide compounds. But in the case of rather complex compounds, such as rock forming minerals, the unit of these repetitions corresponds to some group of atoms. This group of atoms coincide with the asymmetric unit of the unit cell.

It is also considered that the volume of the asymmetric units of ordinary inorganic crystals, including minerals, must be approximately equal, on the assumption that these crystals have approximately the same complex compositions and were grown in equilibrium conditions.

In this case, if the volumes of asymmetric units are large, in spite of the fact that the inside of these volumes have minimum cohesion energy, then these large volumes must be split into smaller volumes having

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the same minimum cohesion energy, probably at the time of the formation of the crystal nucleus. Accordingly, in the case that there exists some asymmetric units having much larger volumes than ordinary crystals, these are considered to be grown under non-equilibrium conditions. In other words, these are thought to be grown in metastable states.

According to the idea mentioned above, the present author thought it is worth considering to examine statistically the volumes of the asymmetric unit of minerals. Silicates, phosphates, arsenates, vanadates, halogenides, oxides, and hydroxides have been examined accordingly and the results are presented in the following paragraphs.

2 Historical remarks on statistics on minerals

The statistical treatment of the data of crystal structures has been carried out by several authors, especially on the distribution of space groups among the structures both organic and inorganic structures. (Fujiwara, Itoh, Matsumoto and Takeda, 1993, 1994, 1996; Mackay (1967); Matsumoto, 1969); Nowacki, Matsumoto and Edenharter, 1967; Itoh (1986), Itoh and Matsumoto, 1991).

On the other hand, the volumes of unit cell dimensions were considered implicitly by many researchers, in that the volume of the unit cell of triclinic crystals are small, while on the other hand, the volume of crystals having higher symmetries, for instance, that of cubic symmetry have large unit cells. But the discussions were confined to the volume of unit cells and no consideration of the volume of the asymmetric units has been discussed so far.

Under these circumstances, the present author considered it worth carrying out a statistical treatment of the volumes of asymmetric units of minerals. Some significant results were obtained, and these will be discussed in the next paragraphs.

3 Sampling and Calculation

The data for each mineral specimen were taken from the text book by H. Strunz: "Mineralogische Tabellen" (1978). The samples are classified into the following: silicates, phosphates including arsenates and vanadates, halogenides, oxides and hydroxides. The data for phosphates are deficient in the case of minerals, so the synthetic specimens were also sampled from the text book by Corbridge: "The Structural chemistry of phosphorus" (1974). Each data were put into the computer files and used for the following calculations.

Firstly, the unit cell volumes of each mineral were calculated. These volumes were then divided by the numbers of the equivalent points of the space groups to which the samples belong. The results obtained were sorted according to the range of volumes. The results are shown in the folowing: Tables 1 (silicates), 2 (phosphates, arsenates and vanadates), 3 (sulphides and sulfosalts), 4 (halides) and 5 (oxides and hydroxides).

The data from these tables are graphically shown in Figs. 1 (silicates), 2 (phosphates, arsenates and vanadates), 3 (sulphides and sulfosalts), 4 (halides) and 5 (oxides and hydroxides) corresponding to the same numbers of Tables, respectively.

In the case of statistical treatment, there always arises a problem of weight assigned to each specimen. In this case, the minerals having the same crystal structures are considered to be a unit weight. For example, minerals having the range of same solid solutions are considered to be one mineral species and assigned to one unit weight in the calculation.

As shown in each of the Tables and Figures, the volumes of the asymmetric unit

are divided into the ranges of 40 Å^3 for each class and the central values were assigned to a class mark.

Each class is followed by the number of specimens belonging to these ranges (frequencies). Mean values, medians, modes and standard deviations of each groups are given below of each Table.

The mineral data used for these calculations are listed in the Appendix.

4 Discussions and Results

In the case of silicates, as shown in Table and Fig.1, the range of volumes from 40 to 80 corresponds to 32 frequencies, and from 80 to 120, 31 frequencies, which are the largest. The frequencies decrease slowly according to the augmentation of the volumes. Species having more than 400 Å^3 are rare.

In the case of phosphates and vanadates, (Table Fig. 2) the same tendencies as those of silicates are observed. The fact also reflects the rather complex chemical compositions of these species.

The group of sulphides and sulfosalts have a maximum frequency in $0 \sim 40$ Å^3. This tendency reflects the simple chemical compositions of these species.

The same tendency is observed in the case of halides (Table and Fig. 4), oxides and hydroxides (Table and Fig. 5), which also corresponds to minerals with simple chemical compositions.

These discussions on the distribution of the volumes of asymmetric units are considered to connect the equilibrium states of minerals to the descriptive mineralogy.

As for the microperiodicity principle and the problems of geneses of symmetries, these were discussed briefly by Vainshtein (1981). He discussed these problems on the basis of thermodynamics. The discussion on the interrelation between the mineral data and the stability problems were not carried out.

5 Conclusions

In the course of the studies mentioned above, the following conclusions have been obtained.

1. Mineral species having complex chemical compositions like silicates, phosphates and vanadates have maximum frequencies in the range $40 \sim 120$ Å^3, while sulphides, sulfosalts, halids, oxides and hydroxides, whose compositions are rather simple, have maximum values in the range $0 \sim 40$ Å^3.

2. As the volumes of the asymmetric units increase, the frequencies decrease rapidely in the first place and the small frequencies continue into larger volumes.

3. The small frequencies in larger volumes in each of the Tables and Figures are considered to correspond to the metastable phases of each mineral species.

4. Further studies including large numbers of synthetic inorganic compounds would be informative. In this case, the forms of curves are supposed to aproach to some significant statistical ones. Above all, in order to make the mean values, medians, modes and standard deviations statistically significant, the augmentation of the numbers of each species will be absolutely necessary. The calculations in this line are now in progress.

6 References

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7 Appendix

Contents of the file used for the present calculation are listed in the last pages.

From left to right: Serial numbers, names, numbers of equivalent positions in space groups, not used, numbers of Z, not used, a, b, c, α, β, γ.

Table 1. The frequency distribution of the volumes of asymmetric units of silicates. First, second and third columns indicate the classes (the range of the volumes), the class marks (central values) and the frequencies (Number of specimens).

Range($Å^3$) (Class	Center Class mark	Numbers Frequencies)
0.0 ~ 40.0	20.0	15
40.0 ~ 80.0	60.0	32
80.0 ~ 120.0	100.0	31
120.0 ~ 160.0	140.0	32
160.0 ~ 200.0	180.0	21
200.0 ~ 240.0	220.0	21
240.0 ~ 280.0	260.0	16
280.0 ~ 320.0	300.0	6
320.0 ~ 360.0	340.0	4
360.0 ~ 400.0	380.0	0
400.0 ~ 440.0	420.0	3
440.0 ~ 480.0	460.0	5

$\bar{x}$=156.3, M_e=240.0, M_o=100.0, σ=100.5

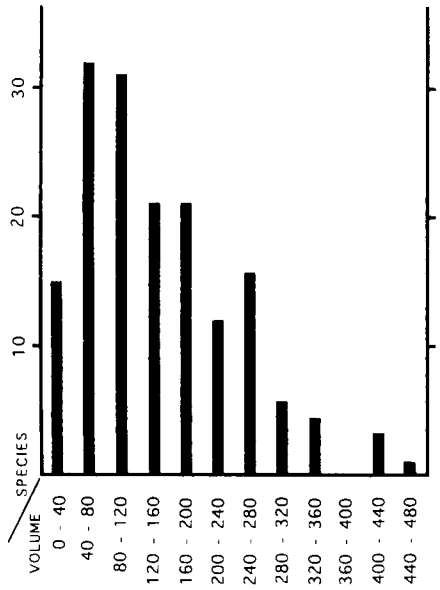

Fig.1 The graphic representation of the frequency distribution of the volumes of the asymmetric unit of silicates.

Table 2. The distribution of the volumes of asymmetric units of the unit cells of phosphates, arsenates and vanadates.

Range($Å^3$) (Class	Center Class mark	Numbers Frequencies)
0.0 ~ 40.0	20.0	26
40.0 ~ 80.0	60.0	42
80.0 ~ 120.0	100.0	45
120.0 ~ 160.0	140.0	33
160.0 ~ 200.0	180.0	27
200.0 ~ 240.0	220.0	16
240.0 ~ 280.0	260.0	15
280.0 ~ 320.0	300.0	9
320.0 ~ 360.0	340.0	3
360.0 ~ 400.0	380.0	9
400.0 ~ 440.0	420.0	3
440.0 ~ 480.0	460.0	2

$\bar{x}$=146.8, M_e=100.0, M_o=180.0, σ=101.6

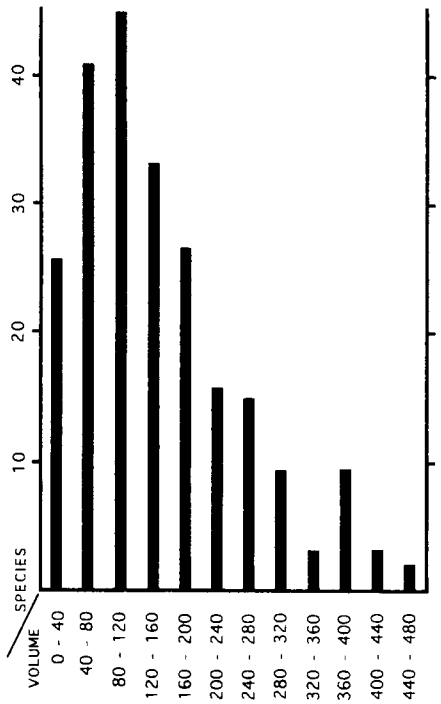

Fig.2 The graphic representation of the distribution of the volumes of the asymmetric unit of the unit cells of phosphates, arsenates and vana-

Table 3. The distribution of the volumes of asymmetric units of the unit cells of sulphides and sulfosalts.

Range($Å^3$) (Class	Center Class mark	Numbers Frequencies)
0.0 ~ 40.0	20.0	39
40.0 ~ 80.0	60.0	14
80.0 ~ 120.0	100.0	7
120.0 ~ 160.0	140.0	13
160.0 ~ 200.0	180.0	4
200.0 ~ 240.0	220.0	9
240.0 ~ 280.0	260.0	3
280.0 ~ 320.0	300.0	3
320.0 ~ 360.0	340.0	2
360.0 ~ 400.0	380.0	3
400.0 ~ 440.0	420.0	1
440.0 ~ 480.0	460.0	2

$\bar{x}$=116.8, M_e=240.0, M_o=20.0, σ=115.3

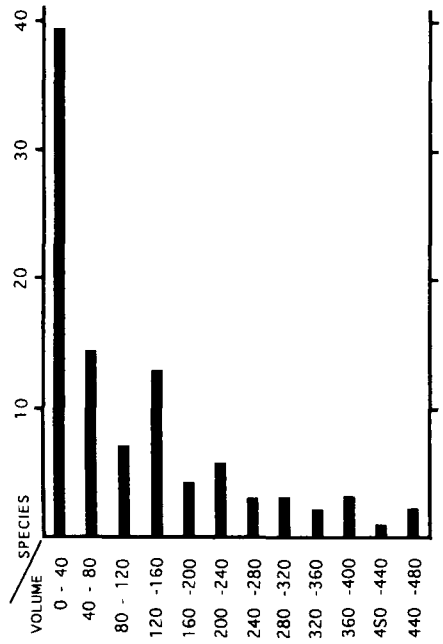

Fig.3 The graphic representation of the distribution of the volumes of the asymmetric unit inside of the each unit cell of sulphides and sulfosalts.

Table 4. The distribution of the volumes of asymmetric units inside of the unit cells of halides.

Range($Å^3$) (Class	Center Class mark	Numbers Frequencies)
0.0 ~ 40.0	20.0	29
40.0 ~ 80.0	60.0	9
80.0 ~ 120.0	100.0	5
120.0 ~ 160.0	140.0	1
160.0 ~ 200.0	180.0	2
200.0 ~ 240.0	220.0	1
240.0 ~ 280.0	260.0	1
280.0 ~ 320.0	300.0	0
320.0 ~ 360.0	340.0	0
360.0 ~ 400.0	380.0	0
400.0 ~ 440.0	420.0	1
440.0 ~ 480.0	460.0	1

$\bar{x}$=69.6, M_e=240.0, M_o=20.0, σ=93.8

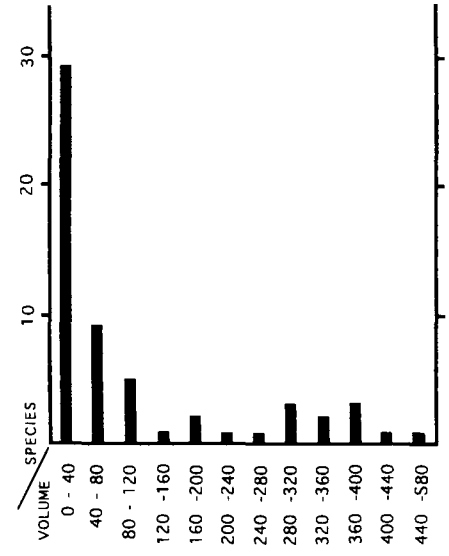

Fig.4 The graphic representation of the frequency distribution of the volumes of the asymmetric unit of halides.

Table 5. The distribution of the values of the volumes of asymmetric units of oxides and hydroxides.

Range($Å^3$) (Class	Center Class mark	Numbers Frequencies)
0.0 ~ 40.0	20.0	67
40.0 ~ 80.0	60.0	21
80.0 ~ 120.0	100.0	13
120.0 ~ 160.0	140.0	6
160.0 ~ 200.0	180.0	3
200.0 ~ 240.0	220.0	3
240.0 ~ 280.0	260.0	3
280.0 ~ 320.0	300.0	0
320.0 ~ 360.0	340.0	2
360.0 ~ 400.0	380.0	0
400.0 ~ 440.0	420.0	0
440.0 ~ 480.0	460.0	2

$\bar{x}$=69.3, M_e=240.0, M_o=20.0, σ=85.3

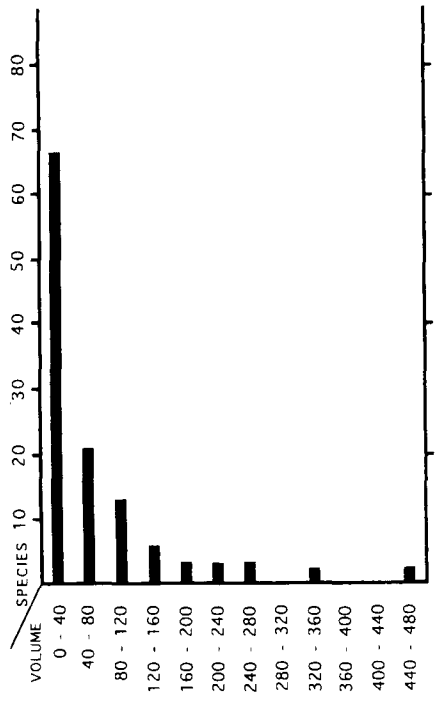

Fig.5 The graphic representation of the frequency distribution of the volumes of the asymmetric unit of oxides and hydroxides.

1001	PHENAKITE	18	0	18	4	12.45	12.45	8.23	90.00	90.00	120.00
1002	TRIMERITE	4	0	16	12	16.14	7.62	27.92	90.00	90.00	90.00
1003	FORSTERITE	8	0	4	4	6.00	4.78	10.28	90.00	90.00	90.00
1004	LARNITE	4	0	4	4	5.48	6.76	9.28	90.00	94.55	90.00
1005	BREDIGITE	8	0	16	4	10.93	6.75	18.41	90.00	90.00	90.00
1006	PYROPE	96	0	8	12	11.53	11.53	11.53	90.00	90.00	90.00
1007	EUCLASE	4	0	4	5	4.63	14.27	4.76	90.00	100.27	90.00
1008	SILLIMANITE	8	0	4	5	7.44	7.60	5.75	90.00	90.00	90.00
1009	ANDALUSITE	8	0	4	5	7.78	7.92	5.57	90.00	90.00	90.00
1010	CYANITE	2	0	4	5	7.10	7.74	5.57	90.08	101.03	105.73
1011	TOPAZ	8	0	4	4	4.65	8.80	8.40	90.00	90.00	90.00
1012	STAUROLITE	8	0	2	9	7.82	16.52	5.63	90.00	90.00	90.00
1013	SAPPHIRIN	4	0	8	10	11.26	14.46	9.95	90.00	125.33	90.00
1014	NORBERGITE	8	0	4	6	8.74	4.71	10.22	90.00	90.00	90.00
1015	CHONDRODITE	4	0	2	10	7.89	4.74	10.29	90.00	109.03	90.00
1016	HUMITE	8	0	4	10	20.90	4.75	10.25	90.00	90.00	90.00
1017	CLINOHUMITE	4	0	2	18	13.71	4.75	10.29	90.00	100.83	90.00
1018	ALLEGHANIT	4	0	2	10	8.30	4.86	10.46	90.00	109.15	90.00
1019	SONOLITH	4	0	2	18	14.33	4.88	10.66	90.00	100.57	90.00
1020	BRAUNITE	32	0	8	12	9.44	9.44	18.76	90.00	90.00	90.00
1021	LANGBANITE	24	0	6	12	11.56	11.56	11.11	90.00	90.00	120.00
1022	WELINITE	6	0	2	7	8.15	8.15	4.78	90.00	90.00	120.00
1023	DIXENITE	18	0	3	11	8.22	8.22	37.44	90.00	90.00	120.00
1024	YEATMANITE	2	0	1	29	5.53	11.58	9.05	92.80	101.75	76.18
1025	KATOPTRITE	8	0	2	29	5.65	22.92	9.06	90.00	101.50	90.00
1026	SYNTHETIC	4	0	8	5	9.34	9.22	10.61	90.00	90.00	90.00
1027	SPURRITE	4	0	4	11	10.49	6.70	14.16	90.00	101.32	90.00
1028	THAUMASITE	6	0	2	24	10.92	10.92	10.31	90.00	90.00	120.00
1029	HILLEBRAND	4	0	12	5	16.60	7.26	11.85	90.00	90.00	90.00
1030	AFWILLITE	4	0	4	10	16.27	5.63	13.23	90.00	134.80	90.00
1031	TITANITE	8	0	4	5	6.56	8.72	7.44	90.00	119.72	90.00
1032	CHLORITOID	2	0	2	14	9.50	5.48	9.16	96.88	101.82	92.03
1033	STILLWELLIT	3	0	3	5	6.85	6.85	6.70	90.00	90.00	120.00
1034	DATOLITH	4	0	4	5	9.66	7.64	4.83	90.00	90.15	90.00
1035	DUMORTIERIT	8	0	4	18	11.79	20.21	4.70	90.00	90.00	90.00
1036	HOWLITH	4	0	4	14	12.93	9.34	8.60	90.00	104.83	90.00
1037	ZIRCON	1	0	4	7	6.57	6.57	5.94	90.00	90.00	90.00
1038	HUTTONITE	1	0	4	4	6.80	6.96	6.54	90.00	104.92	90.00
1039	HODGHINSONI	1	0	4	6	8.17	5.31	11.76	90.00	100.27	90.00
2001	THORTVEITI	8	0	2	7	6.57	8.60	4.75	90.00	103.01	90.00
2002	AKERMANITE	8	0	2	7	7.84	7.84	5.01	90.00	90.00	90.00
2003	BARYLITH	4	0	4	7	4.64	11.63	9.81	90.00	90.00	90.00
2004	RANKINITE	4	0	4	7	10.55	8.88	7.85	90.00	120.01	90.00
2005	KILCHOANITE	16	0	8	7	11.42	5.09	21.95	90.00	90.00	90.00
2006	LAWSONITE	16	0	4	10	8.90	5.76	13.33	90.00	90.00	90.00
2007	ILVAITE	8	0	4	9	8.84	5.87	13.10	90.00	90.00	90.00
2008	CUSPIDINE	4	0	4	9	10.85	10.43	7.55	90.00	90.00	90.00
2009	RUSTUMITE	8	0	10	9	15.51	18.55	7.62	90.00	104.33	90.00
2010	TILLEYITE	4	4	4	13	15.02	10.27	7.63	90.00	105.33	90.00
2011	BERTRANDIT	8	0	4	9	15.22	8.69	4.54	90.00	90.00	90.00
2012	HEMIMORPHI	8	0	2	10	10.72	8.40	5.12	90.00	90.00	90.00
2013	WOHLERITE	4	0	4	9	10.82	10.28	7.27	90.00	108.71	90.00
2014	SEIDOZERITE	4	0	4	16	18.30	7.10	5.53	90.00	102.71	90.00
2015	KLINOZOISIT	4	0	2	13	8.94	5.61	10.23	90.00	115.00	90.00
2016	PERRIERITE	8	0	2	22	13.61	5.62	11.63	90.00	113.46	90.00
2017	VESUVIAN	16	0	4	38	15.66	15.66	11.85	90.00	90.00	90.00
2018	SORENSENIT	4	4	4	20	20.78	7.45	12.05	90.00	117.10	90.00
3001	BENITOIT	12	0	1	9	6.61	6.61	9.73	90.00	90.00	120.00
3002	WADEIT	12	0	2	9	6.88	6.88	10.16	90.00	90.00	120.00
3003	CYCLOWOLLAS	2	0	8	9	6.90	11.78	19.65	90.00	90.80	90.00
3004	KATAPLEIT	24	0	2	9	7.40	7.40	10.07	90.00	90.00	120.00
3005	EUDIAIYT	36	0	12	19	14.34	14.34	30.21	90.00	90.00	120.00
3006	PAPAGOIT	8	0	4	18	12.91	11.48	4.69	90.00	100.63	90.00
3007	UNBEKANNT	8	0	2	20	9.68	14.77	5.14	90.00	101.50	90.00
3008	TARAMELLITE	8	0	4	14	13.95	7.05	12.01	90.00	90.00	90.00
3009	KAINOSIT	8	0	4	16	12.93	14.30	6.73	90.00	90.00	90.00
3010	AXINIT	2	0	2	16	7.15	9.16	8.96	88.10	81.60	77.70
3011	BERYLL	24	0	4	18	9.23	9.23	9.19	90.00	90.00	120.00
3012	CORDIERITE	16	0	4	18	17.13	9.80	9.35	90.00	90.00	90.00
3013	DIOPTAS	6	0	3	19	14.61	14.61	7.80	90.00	90.00	120.00
3014	MILARIT	24	0	2	31	10.45	10.45	13.88	90.00	90.00	120.00
4001	KLINOENSTAT	4	0	4	6	9.62	8.83	5.19	90.00	108.40	90.00
4002	DIOPSID	8	0	4	6	9.73	8.91	5.25	90.00	105.80	90.00
4003	ENSTATITE	8	0	8	6	18.22	8.81	5.21	90.00	90.00	90.00
4004	KARPHOLITH	16	0	8	10	13.86	20.13	5.12	90.00	90.00	90.00

4005	JOESMITHIT	5	0	2	18	9.88	17.87	5.28	90.00	105.70	90.00
4006	SHATTUCKIT	8	0	4	14	9.88	19.82	5.40	90.00	90.00	90.00
4007	PLANCHEITE	8	0	4	25	19.04	20.01	5.27	90.00	90.00	90.00
4008	TREMOLIT	8	0	2	24	9.84	18.05	5.28	90.00	104.70	90.00
4009	ANTHOPHYL	8	0	4	24	18.56	18.08	5.28	90.00	90.00	90.00
4010	PROTOAMPHIB	8	0	2	22	9.33	17.87	5.29	90.00	90.00	90.00
4011	WOLLAS(1T)	2	0	2	9	7.94	7.32	7.07	90.00	95.40	103.40
4012	WOLLAS(2M)	4	0	4	9	15.36	7.29	7.08	90.00	95.00	90.00
4013	FOSHAGIT	2	0	2	11	10.32	7.36	7.04	90.00	106.40	90.00
4014	ROSENHANITE	2	0	6	10	6.95	9.47	6.81	108.70	94.80	95.70
4015	TOBERMORIT	8	0	4	19	11.30	7.33	20.60	90.00	90.00	90.00
4016	OKENIT	2	0	6	10	9.84	7.20	21.33	90.00	103.90	111.50
4017	NEKOIT	2	0	2	11	7.60	7.32	9.86	111.80	86.20	103.90
4018	SCAWTIT	4	0	2	23	6.61	15.22	10.98	90.00	115.40	90.00
4019	RHODONIT	2	0	2	15	7.79	12.47	6.75	85.20	94.10	111.50
4020	PYROXMANGIT	2	0	2	21	7.56	17.45	6.67	84.00	94.30	113.70
4021	BATISIT	8	0	4	14	10.43	13.89	8.08	90.00	90.00	90.00
4022	KRAUSKOPFIT	4	0	2	16	8.46	10.62	7.84	90.00	94.00	90.00
4023	STOKESIT	8	0	2	22	14.41	11.61	5.23	90.00	90.00	90.00
4024	ALAMOSIT	4	0	1	36	11.23	7.08	12.26	90.00	113.30	90.00
4025	NARSARSUKIT	16	0	2	22	10.80	10.80	8.01	90.00	90.00	120.00
4026	VLASOVIT	8	0	2	22	10.98	10.00	8.52	90.00	100.40	90.00
4027	LEMOYNIT	8	0	2	23	10.48	16.20	9.07	90.00	105.30	90.00
4028	NEPTUNIT	8	0	4	24	16.57	12.66	10.06	90.00	115.60	90.00
5001	MELINOPHAN	8	0	8	6	10.60	10.60	9.90	90.00	90.00	90.00
5002	LEUKOPHAN	8	0	4	6	7.40	7.42	9.94	90.00	90.00	90.00
5003	EPDIDYMIT	8	0	8	8	12.73	7.34	13.65	90.00	90.00	90.00
5004	EUDIDYMIT	8	0	8	8	12.64	7.38	14.02	90.00	90.00	90.00
5005	BAVENITE	16	0	4	28	4.95	11.53	9.67	90.00	90.00	90.00
5006	PREHNIT	4	0	2	12	4.61	5.47	18.48	90.00	90.00	90.00
5007	LEUKOSPHENI	4	8	1	60	9.76	16.69	7.10	90.00	93.40	90.00
6001	CUPRORIVAIT	16	0	4	10	7.30	7.30	15.12	90.00	90.00	120.00
6002	FENAKSIT	2	0	2	11	6.97	8.18	9.97	105.00	90.00	114.70
6003	APOPHYLLITE	16	0	2	28	9.02	9.02	15.80	90.00	90.00	90.00
6004	DALYIT	2	0	1	15	7.51	7.53	7.00	106.00	113.50	99.50
6005	SANBORNIT	8	0	2	10	7.69	4.63	13.53	90.00	90.00	90.00
6006	SYSTHETISCH	4	0	2	10	8.07	4.80	12.26	90.00	104.30	90.00
6007	SYNTHETISCH	8	0	2	10	6.41	15.42	4.90	90.00	90.00	90.00
6008	SEARLESIT	2	0	1	14	7.97	7.05	4.90	90.00	94.00	90.00
6009	PYROPHYLLIT	8	0	4	12	5.15	8.92	18.59	90.00	99.90	90.00
6010	MUSKINIT	8	0	4	12	5.19	9.04	20.08	90.00	95.50	90.00
6011	PHLOGOPIT	1	0	2	12	5.33	9.23	10.26	90.00	100.20	90.00
6012	LAOLINIT	2	0	1	18	5.14	8.93	7.37	91.80	104.50	90.00
6013	DICKIT	4	0	2	18	5.15	8.94	14.74	90.00	103.60	90.00
6014	ANTIGORIT	8	0	1	18	5.30	9.20	7.46	90.00	91.40	90.00
6015	HALLOYSIT	4	8	1	22	5.15	8.90	10.00	90.00	100.20	90.00
6016	PYROSMALITH	12	0	2	25	13.44	13.44	7.20	90.00	90.00	120.00
6017	SEPIOLITH	8	0	2	23	5.28	26.80	13.40	90.00	90.00	90.00
6018	MACDONALDIT	16	0	4	48	14.08	13.11	23.56	90.00	90.00	90.00
6019	WICKENBURGI	24	0	2	30	8.53	8.53	20.16	90.00	90.00	120.00
7001	NEPHELIN	6	0	2	16	10.01	10.41	8.41	90.00	90.00	120.00
7002	KALSILIT	6	0	2	4	5.18	5.18	8.69	90.00	90.00	120.00
7003	KALIOPHILIT	12	0	54	40	27.06	27.06	8.61	90.00	90.00	120.00
7004	SYNTHETISCH	4	0	12	40	9.01	15.67	8.57	90.00	90.00	90.00
7005	EUKRYPTIT	12	0	3	4	5.28	5.28	11.27	90.00	90.00	120.00
7006	BIKITAIT	4	0	2	7	8.63	4.95	7.64	90.00	114.60	90.00
7007	PETALIT	4	0	2	10	11.76	5.14	7.62	90.00	112.40	90.00
7008	ANALCIM	96	0	16	7	13.71	13.71	13.71	90.00	90.00	90.00
7009	LEUCIT(LOW)	32	0	16	6	13.04	13.04	13.09	90.00	90.00	90.00
7010	WAIRAKIT	16	0	8	13	13.69	13.69	13.56	90.00	90.50	90.00
7011	SANIDIN	16	0	4	8	8.56	13.03	7.18	90.00	91.00	90.00
7012	MICROKLIN	4	0	4	8	8.57	12.98	7.22	90.00	116.00	87.50
7013	CELSIAN	8	0	8	8	8.65	13.13	7.30	90.00	115.00	90.00
7014	ALBIT	4	0	4	8	8.14	12.79	7.16	94.30	116.60	87.70
7015	PARACELSIAN	4	0	4	8	8.58	9.58	9.08	90.00	90.00	90.00
7016	BANALSIT	16	0	4	16	8.52	9.99	16.76	90.00	90.00	90.00
7017	DANBURIT	8	0	4	8	8.77	8.03	7.74	90.00	90.00	90.00
7018	CANCRINIT	6	0	1	29	12.75	12.75	5.14	90.00	90.00	120.00
7019	DAVYN	12	0	1	33	12.70	12.70	5.33	90.00	90.00	120.00
7020	MIKROSOMMIT	12	0	3	33	22.08	22.08	5.33	90.00	90.00	120.00
7021	AFGHANIT	24	0	4	33	12.77	12.77	21.35	90.00	90.00	120.00
7022	WENKIT	24	24	1	54	13.53	13.53	7.47	90.00	90.00	90.00
7023	SODALITH	24	0	1	24	8.88	8.88	8.88	90.00	90.00	90.00
7024	MARIALITH	32	0	1	48	12.06	12.06	7.57	90.00	90.00	90.00
7025	NATROLITH	64	0	8	12	18.35	18.70	6.61	90.00	90.00	90.00

7026	SKOLEZIT	4	0	8	13	18.48	18.94	6.54	90.00	90.00	90.00
7027	MESOLITH	1	0	8	38	18.90	6.55	18.48	90.00	90.00	90.00
7028	THOMSONIT	4	0	4	26	13.07	13.09	13.25	90.00	90.00	90.00
7029	EDINGTONIT	8	0	2	13	9.60	9.60	6.54	90.00	90.00	90.00
7030	DACHIARDIT	8	0	1	60	18.73	7.54	10.30	90.00	107.90	90.00
7031	MORDENIT	8	0	4	30	18.29	20.39	7.52	90.00	90.00	90.00
7032	FERRIERIT	16	0	2	45	14.14	19.12	7.48	90.00	90.00	90.00
7033	LAUMONTIT	4	0	4	16	14.90	13.17	7.55	90.00	111.50	90.00
7034	HEULANDIT	8	0	4	24	17.71	17.84	7.46	90.00	116.30	90.00
7035	STILBIT	8	0	4	25	13.63	18.17	11.31	90.00	129.20	90.00
7036	BREWSTERIT	4	0	2	21	6.77	17.41	7.66	90.00	93.00	90.00
7037	GISMONIN	4	0	4	12	10.02	10.62	9.84	90.00	92.40	90.00
7038	PHILLIPSIT	4	0	2	22	10.02	14.28	8.64	90.00	125.70	90.00
7039	HARMOTOM	2	4	2	22	9.82	14.13	8.68	90.00	124.80	90.00
7040	YOGAWARALIT	2	4	4	20	6.73	13.95	10.03	90.00	111.50	90.00
7041	OFFRETIT	12	0	3	16	13.31	13.31	7.59	90.00	90.00	90.00
7042	GMELINIT	12	0	4	18	13.72	13.72	9.95	90.00	90.00	120.00
7043	CHABASIT	36	0	6	18	13.78	13.78	14.97	90.00	90.00	120.00
7044	ERIONIT	24	0	3	33	13.26	13.26	15.12	90.00	90.00	120.00
7045	FAUJASIT	192	0	16	40	24.65	24.65	24.65	90.00	90.00	90.00
7046	PAULINGIT	192	0	48	40	35.10	35.10	35.10	90.00	90.00	90.00
10001		4	4	4	4	5.78	4.84	11.65	90.00	95.50	90.00
10002		4	4	8	4	7.92	12.99	7.47	90.00	109.90	90.00
10003		8	0	4	4	6.12	10.53	4.93	90.00	90.00	90.00
10004		4	0	2	4	6.11	5.24	4.86	90.00	90.00	90.00
10005		8	0	4	4	6.07	10.42	4.74	90.00	90.00	90.00
10006		12	0	4	16	11.98	11.98	12.67	90.00	90.00	120.00
10007		4	0	4	11	9.26	11.01	10.44	90.00	95.60	90.00
10008		4	0	16	6	10.34	13.64	16.98	90.00	90.00	90.00
10009		4	0	4	7	6.69	6.22	22.35	90.00	94.10	90.00
10010		4	0	4	4	10.72	6.68	8.03	90.00	109.70	90.00
10011		16	0	8	4	10.53	10.53	6.96	90.00	90.00	90.00
10012		16	0	8	4	10.45	10.53	6.91	90.00	90.00	90.00
10013		16	0	4	4	7.50	7.50	7.58	90.00	90.00	90.00
10014		4	0	4	4	7.49	7.51	7.48	90.00	90.00	90.00
10015		2	0	8	4	7.38	14.76	7.18	90.00	92.00	90.00
10016		8	0	4	4	4.80	6.25	14.65	90.00	90.00	90.00
10017		4	0	4	8	7.85	10.69	9.56	90.00	114.30	90.00
10018		8	0	4	8	10.34	7.72	9.63	90.00	100.30	90.00
10019		4	0	4	8	10.85	7.74	9.50	90.00	96.60	90.00
10020		8	0	4	4	8.85	8.72	5.14	90.00	90.00	90.00
10021		4	0	4	4	8.63	8.58	5.01	90.00	90.00	90.00
10022		4	0	12	4	8.16	7.79	14.07	90.00	90.00	90.00
10023		4	0	4	4	4.58	13.55	5.78	90.00	98.70	90.00
10024		4	0	8	8	12.86	9.11	15.23	90.00	125.30	90.00
10025		36	0	21	8	10.34	10.34	36.90	90.00	90.00	120.00
10026		4	0	2	8	7.60	8.23	5.08	90.00	94.10	90.00
10027		36	0	3	8	5.59	5.59	20.96	90.00	90.00	120.00
10028		2	0	4	4	6.90	6.65	7.00	96.30	103.90	88.70
10029		4	0	4	6	5.81	15.18	6.24	90.00	116.40	90.00
10030		2	0	2	8	5.55	7.60	9.07	121.90	108.80	87.50
10031		2	0	2	9	5.61	11.89	6.46	98.60	118.00	83.30
10032		12	0	1	26	9.43	9.43	6.88	90.00	90.00	120.00
10033		1	2	1	24	19.87	9.63	6.87	80.30	92.20	109.00
10034		8	0	2	8	9.93	5.72	7.44	90.00	92.30	90.00
10035		8	0	4	18	5.76	17.14	6.41	90.00	119.00	90.00
10036		1	2	1	18	5.72	12.13	6.46	98.70	118.00	95.90
10037		2	0	1	5	5.79	12.52	6.50	98.00	119.00	98.00
10038		8	0	4	4	6.18	6.98	10.82	90.00	90.00	90.00
10039		4	0	4	9	11.99	9.48	6.97	90.00	90.00	90.00
10040		4	0	4	24	9.63	19.26	6.76	90.00	120.00	90.00
10040		8	0	4	12	6.74	15.51	10.13	90.00	90.00	90.00
10041		8	0	8	7	10.22	10.68	10.01	90.00	90.00	90.00
10042		4	0	8	11	11.35	25.36	6.60	90.00	95.00	90.00
10043		4	0	2	10	6.92	11.19	6.13	90.00	90.00	90.00
10044		2	0	1	24	7.70	11.51	6.70	76.00	99.80	115.80
10045		8	0	8	12	11.47	23.62	8.62	90.00	90.00	90.00
10046		4	0	2	5	5.62	4.81	8.87	90.00	90.00	90.00
10047		8	0	12	4	4.62	17.13	14.11	90.00	90.00	90.00
10048		4	0	2	4	4.66	6.64	5.77	90.00	82.80	90.00
10049		12	0	2	4	5.36	5.36	7.33	90.00	90.00	120.00
10050		8	0	4	4	5.68	9.92	7.47	90.00	90.00	90.00
10051		12	0	2	10	6.94	6.94	11.99	90.00	90.00	120.00
10052		96	0	4	10	10.02	10.02	10.02	90.00	90.00	90.00
10053		48	0	4	12	10.26	10.26	10.26	90.00	90.00	90.00

10054		4	0	2	26	9.42	18.84	6.88	90.00	120.00	90.00
10055		12	0	1	26	9.42	9.42	6.88	90.00	90.00	120.00
10056		8	0	4	8	8.14	5.63	15.04	90.00	105.10	90.00
10057		1	0	2	16	10.55	10.66	8.80	90.00	106.70	90.00
10058		4	8	4	12	17.37	6.81	8.13	90.00	101.30	90.00
10059		8	8	4	12	17.57	6.86	8.14	90.00	101.80	90.00
10060		36	0	6	12	8.72	8.72	22.72	90.00	90.00	120.00
10061		2	0	2	8	7.45	9.45	5.68	90.00	112.00	101.40
10062		4	0	4	4	11.36	8.10	4.90	90.00	90.00	90.00
10063		8	0	8	4	13.41	6.51	10.09	90.00	90.00	120.00
10064		36	0	6	12	8.80	8.80	22.76	90.00	90.00	120.00
10065		4	0	4	9	9.08	5.30	16.22	90.00	111.50	90.00
10066	TARANAKITE	36	0	6	50	8.71	8.71	96.10	90.00	90.00	120.00
10067		4	0	8	9	10.22	9.23	16.56	90.00	99.30	90.00
10068		1	2	3	8	9.26	9.49	7.20	110.20	117.10	97.90
10069		4	0	4	11	9.76	9.65	9.70	90.00	102.90	90.00
10070		24	24	2	30	8.90	8.90	16.50	90.00	90.00	120.00
10071		6	0	3	4	4.47	4.47	9.93	90.00	90.00	120.00
10072		8	0	4	4	7.10	7.10	7.10	90.00	90.00	90.00
10073		8	0	2	4	5.06	5.06	7.14	90.00	90.00	90.00
10074		24	0	2	4	5.99	5.99	5.99	90.00	90.00	90.00
10075		4	0	2	4	5.09	6.76	4.72	90.00	94.70	90.00
10076		1	0	2	4	4.88	7.06	4.71	90.00	96.30	90.00
10077		1	0	4	4	8.42	7.21	5.02	90.00	90.00	90.00
10078		1	0	4	4	6.80	6.80	5.96	90.00	90.00	90.00
10079	MONAZITE	4	0	4	4	6.77	7.01	6.45	90.00	103.60	90.00
10080		24	0	3	4	7.08	7.08	6.47	90.00	90.00	120.00
10081		1	0	3	4	6.97	6.97	6.46	90.00	90.00	120.00
10082		12	0	3	4	7.03	7.03	6.39	90.00	90.00	120.00
10083		16	0	4	4	5.39	8.01	7.07	90.00	90.00	90.00
10084		8	0	8	6	10.39	8.87	10.31	90.00	90.00	90.00
10085		4	0	4	6	9.77	9.64	9.68	90.00	102.70	90.00
10086	VARISCITE	8	0	8	6	9.87	9.57	8.52	90.00	90.00	90.00
10087		4	0	4	6	5.16	9.47	8.47	90.00	90.00	90.00
10088		8	0	4	6	5.61	15.14	6.19	90.00	115.00	90.00
10089		8	0	2	5	6.18	6.18	4.29	90.00	90.00	90.00
10090		4	0	4	11	7.83	12.48	7.76	90.00	91.90	90.00
10091		4	0	2	7	6.73	6.32	7.03	90.00	110.20	90.00
10092		4	0	4	6	12.08	11.96	6.36	90.00	91.20	90.00
10093		16	0	2	25	15.60	15.60	3.83	90.00	90.00	90.00
11001		48	0	2	45	12.17	12.17	12.17	90.00	90.00	90.00
11002		2	0	8	54	20.48	22.48	19.32	95.60	90.30	95.90
11003		192	0	8	69	23.33	23.33	23.33	90.00	90.00	90.00
11004		36	0	6	64	15.60	15.60	39.78	90.00	90.00	120.00
11005		8	0	4	61	18.95	20.84	13.07	90.00	90.00	90.00
11006		192	0	4	138	23.11	23.11	23.11	90.00	90.00	90.00
12001	WAGNERITE	4	0	16	4	9.63	12.51	11.90	90.00	108.10	90.00
12002	TRIPLITE	8	0	8	4	12.06	6.45	9.94	90.00	107.10	90.00
12003	TRIPLOIDITE	4	0	16	5	12.37	13.28	9.94	90.00	108.20	90.00
12004	ARROGADITE	4	0	4	5	5.41	14.49	4.73	90.00	102.70	90.00
12005	ALLUADITE	8	0	12	4	11.03	12.53	6.40	90.00	97.60	90.00
12006	ANAPATITE	2	0	1	12	6.41	6.88	5.86	101.60	104.00	103.00
12007	BOGGELDITE	4	0	4	8	17.66	10.48	5.24	90.00	91.30	90.00
12008	CACOXENITE	24	0	12	17	27.66	27.66	10.65	90.00	90.00	120.00
12009	CHILDRENITE	16	0	8	7	10.35	13.34	6.94	90.00	90.00	90.00
12010	CHLOROSPODI	8	0	4	4	6.99	10.82	6.20	90.00	90.00	90.00
12011	COLLINSITE	2	0	1	10	5.70	6.72	5.38	96.80	107.30	104.50
12012	DELTALITE	18	0	6	7	6.98	6.98	16.10	90.00	90.00	120.00
12013	DICKINSONIT	1	0	4	48	24.69	9.95	16.70	90.00	104.70	90.00
12014	FRONDELITE	1	0	4	17	13.89	17.01	5.21	90.00	90.00	90.00
12015	GORDONITE	1	0	1	8	6.97	10.19	5.25	101.60	111.00	96.90
12016	GRIPHITE	1	0	8	28	12.28	12.28	12.28	90.00	90.00	90.00
12017	HARTITE	1	0	3	36	6.98	6.98	16.55	90.00	90.00	120.00
12018	HERDERITE	1	0	4	4	9.80	7.68	4.80	90.00	91.10	90.00
12019	BOBIERITE	8	0	4	16	9.90	27.65	4.64	90.00	103.00	90.00
12020	HURLBUTTITE	4	0	4	8	8.29	8.80	7.81	90.00	90.00	90.00
12021	HUREAULITE	4	0	4	20	17.40	9.06	9.49	90.00	96.70	90.00
12022	ISOKITE	8	0	4	5	6.91	8.75	6.52	90.00	112.10	90.00
12023	LEUCOPHOSPH	4	0	4	11	9.73	9.60	9.69	90.00	102.30	90.00
12024	METAVAUXITE	4	0	2	18	10.21	9.57	6.93	90.00	98.00	90.00
12025	MONTGOMERYI	8	0	2	40	9.99	24.10	6.25	90.00	91.50	90.00
12026	MORAESITE	8	0	12	9	8.55	36.90	7.13	90.00	97.70	90.00
12027	MINYLULITE	4	0	2	12	9.35	9.74	5.52	90.00	90.00	90.00
12028		4	0	2	11	9.46	10.69	5.44	90.00	105.40	90.00
12029	OVERITE	8	0	2	53	14.75	18.74	7.12	90.00	90.00	90.00

12030	PALERMOITE	16	0	2	33	11.53	15.79	7.31	90.00	90.00	90.00
12031	PARAVAUXITE	2	0	1	18	6.95	10.24	5.23	101.60	111.40	96.80
12032	ROSCHERITE	8	0	4	17	15.95	11.95	6.62	90.00	94.30	90.00
12033	SCHOLZITE	8	0	12	10	17.14	22.19	6.61	90.00	90.00	90.00
12034	SEAMANITE	8	0	4	10	9.49	10.07	8.70	90.00	90.00	90.00
12035	STERRETITE	4	0	1	27	8.92	10.22	5.44	90.00	90.00	90.00
12036	SVANBERGIYE	36	0	3	14	6.99	6.99	16.75	90.00	90.00	120.00
13001	BERLINIT	6	0	3	4	4.93	4.93	10.92	90.00	90.00	120.00
13002	LITHIOPHOS	8	0	4	4	6.08	4.87	10.28	90.00	90.00	90.00
13003	BERYLLONIT	4	0	12	4	8.16	7.79	14.08	90.00	90.00	90.00
13004	NURLBUTIT	8	0	4	8	8.29	8.80	7.81	90.00	90.00	90.00
13005	TRIPHYLIN	8	0	4	4	6.01	4.68	10.36	90.00	90.00	90.00
13006	GRAFTONIT	4	0	4	8	8.87	11.57	6.17	90.00	99.20	90.00
13007	STANFIELDIT	4	0	8	24	17.16	10.00	22.88	90.00	100.30	90.00
13008	HAGENDORFIT	8	0	4	12	11.92	12.59	6.52	90.00	114.80	90.00
13009	ARROJADIT	8	0	12	16	16.51	10.05	24.78	90.00	105.70	90.00
13010	GRIPHIT	96	0	8	9	12.28	12.28	12.28	90.00	90.00	90.00
13011	XANTHIOSIT	4	0	4	8	10.17	9.55	5.77	90.00	92.90	90.00
13012	MONETIT	2	0	4	4	6.90	6.65	7.00	96.40	103.90	88.70
13013	SCHULTENIT	4	0	2	4	5.83	6.76	4.85	90.00	95.40	90.00
13014	WHITLOCKIT	36	0	21	8	10.34	10.34	36.90	90.00	90.00	120.00
13015	NKNAZIT	4	0	4	4	6.79	7.04	6.47	90.00	104.40	90.00
13016	HERDERIT	4	0	4	5	9.82	7.70	4.81	90.00	90.00	90.00
13017	BABEFPHIT	32	0	4	5	4.89	4.89	16.74	90.00	90.00	90.00
13018	AMBLYGONIT	2	0	2	5	5.19	7.12	5.04	112.00	97.80	68.10
13019	WAGNERIT	4	0	16	5	11.92	12.53	9.65	90.00	108.00	90.00
13020	TRIPLIT	8	0	8	5	12.05	6.47	10.05	90.00	105.70	90.00
13021	LIBETHENIT	8	0	4	5	8.45	8.10	5.91	90.00	90.00	90.00
13022	TARBUTTIT	2	0	8	5	5.66	6.43	5.52	102.50	87.70	102.60
13023	LAZULITH	4	0	2	10	7.16	7.16	7.24	90.00	120.70	90.00
13024	DUFRENIT	4	0	4	28	24.60	5.14	13.87	90.00	100.40	90.00
13025	PSEUDOMALAC	4	0	2	12	17.06	5.76	4.49	90.00	91.00	90.00
13026	AUGELITH	8	0	4	7	13.13	7.98	5.07	90.00	112.50	90.00
13027	CORNETIT	8	0	8	7	10.88	14.08	7.12	90.00	90.00	90.00
13028	KLINOKLAS	4	0	4	7	12.38	6.46	7.24	90.00	99.50	90.00
13029	FLINKKT	8	0	4	8	9.55	13.11	5.25	90.00	90.00	90.00
13030	RETZIAN	8	0	2	8	5.67	12.03	4.86	90.00	90.00	90.00
13031	ALLAKTIT	4	0	2	16	11.03	12.12	5.51	90.00	114.00	90.00
13032	CHLOROPHOE	8	0	2	11	22.98	3.32	7.32	90.00	106.00	90.00
13033	HOLDENIT	16	0	2	11	11.99	31.21	8.60	90.00	90.00	90.00
13034	HAEMATOLITH	6	0	3	11	8.29	8.29	36.58	90.00	90.00	120.00
13035	ISOKIT	8	0	4	4	6.52	8.75	7.51	90.00	121.50	90.00
13036	ADELIT	4	0	4	5	5.89	8.87	7.44	90.00	90.00	90.00
13037	BRASILIANIT	4	0	4	12	11.19	10.08	7.06	90.00	97.40	90.00
13038	BOEGGILDIT	4	0	4	4	5.24	10.48	18.52	90.00	107.60	90.00
13039	CARMINIT	16	0	8	10	16.59	7.58	12.29	90.00	90.00	90.00
13040	MOUNANAIT	2	0	1	10	5.55	7.66	5.56	111.00	112.00	94.10
13041	CRANDALLIT	18	0	3	14	6.99	6.99	16.13	90.00	90.00	120.00
13042	APATIT	12	0	2	12	9.39	9.39	6.89	90.00	90.00	120.00
13043	ATELESTIT	4	0	4	6	7.01	7.46	11.03	90.00	109.90	90.00
13044	HUREAULITH	4	0	4	20	17.42	9.12	9.50	90.00	96.70	90.00
13045	SAINFELDIT	8	0	4	20	18.64	9.81	10.12	90.00	97.00	90.00
13046	SCHOLZIT	8	0	12	10	17.14	22.19	6.61	90.00	90.00	90.00
13047	PHOSPHOFERR	8	0	4	11	8.66	10.02	9.41	90.00	90.00	90.00
13048	KLINOSTRENG	4	0	4	6	5.29	9.77	8.73	90.00	90.60	90.00
13049	VARISCIT	8	0	8	6	9.87	9.57	8.52	90.00	90.00	90.00
13050	PHOSPHOPHY	4	0	2	12	10.25	5.09	10.51	90.00	120.00	90.00
13051	HOPEIT	8	0	4	12	18.36	5.04	10.64	90.00	90.00	90.00
13052	PARAHOPEIT	2	0	1	12	5.77	7.55	5.30	93.30	91.90	91.30
13053	LUDLAMIT	4	0	2	12	9.25	4.65	10.45	90.00	100.50	90.00
13054	SWITZERIT	4	0	8	12	17.10	12.69	8.28	90.00	95.90	90.00
13055	ANAPAIT	2	0	1	12	6.42	6.89	5.87	101.60	104.10	71.10
13056	NEWBERYIT	8	0	8	7	10.22	10.68	10.01	90.00	90.00	90.00
13057	BOBIERRIT	4	0	7	16	9.97	27.71	4.65	90.00	104.00	90.00
13058	VIVIANIT	8	0	2	16	10.08	13.43	4.70	90.00	104.50	90.00
13059	SYMPLESIT	2	0	1	16	7.87	9.41	4.72	99.90	97.40	106.00
13060	PHOSPHORR	8	0	8	11	6.61	25.41	11.37	90.00	94.90	90.00
13061	COLLINSIT	2	0	1	10	5.71	6.73	5.39	96.80	107.30	104.50
13062	ROSELITH	4	0	2	10	5.61	12.83	5.61	90.00	100.75	90.00
13063	STRUVIT	4	0	2	10	6.98	6.10	11.20	90.00	90.00	90.00
13064	TARANAKIT	36	0	6	50	8.71	8.71	96.10	90.00	90.00	120.00
13065	NANNAYIT	2	0	1	24	7.70	11.51	6.70	70.00	99.80	115.80
13066	SCHERTELIT	8	0	8	12	11.47	23.63	8.62	90.00	90.00	90.00
13067	HAIDINGERIT	8	0	8	5	6.95	16.14	7.93	90.00	90.00	90.00
13068	WEINSCHENKI	8	0	4	6	5.47	15.15	6.29	90.00	113.40	90.00

13069	BRACKEBUSCH	4	0	2	9	8.94	6.17	7.71	90.00	111.80	90.00
13070	MORAESIT	8	0	1200		8.55	36.90	7.13	90.00	97.68	90.00
13071	ROSCHERIT	8	0	12	7	15.88	11.90	6.59	90.00	94.70	90.00
13072	STRANSHIMIR	4	0	2	11	9.71	18.85	8.94	90.00	97.20	90.00
13073	SPEMCERIT	4	0	4	6	10.54	5.33	11.30	90.00	116.80	90.00
13074	NISSONIT	8	0	8	7	22.58	5.03	10.51	90.00	99.30	90.00
13075	LEGRANDIT	4	0	8	6	12.72	7.92	10.20	90.00	104.42	90.00
13076	EUCHROIT	4	0	4	8	10.07	10.52	6.12	90.00	90.00	90.00
13077	VAUXIT	2	0	2	16	9.09	11.57	6.15	98.87	92.37	107.70
13078	METAVAUXIT	4	0	2	18	10.23	9.59	6.94	90.00	98.03	90.00
13079	SARMIENTIT	4	0	4	14	6.55	18.55	9.70	90.00	97.65	90.00
13080	GORDONIT	2	0	1	18	5.26	10.51	6.98	109.45	110.95	71.67
13081	STRUNZIT	8	0	4	16	9.80	18.06	7.34	90.00	100.17	90.00
13082	BERMANIT	8	0	4	14	6.26	8.94	19.65	90.00	90.00	90.00
13083	BERAUNIT	8	0	4	27	20.59	5.15	19.23	90.00	94.10	90.00
13084	WAVELLIT	8	0	4	16	9.62	17.34	6.99	90.00	90.00	90.00
13085	CHILDRENIT	8	0	8	7	10.38	13.36	6.91	90.00	90.00	90.00
13086	TUERKIS	2	0	1	28	7.48	9.95	7.69	111.65	115.38	69.43
13087	AKROCHORDIT	4	0	2	16	5.70	17.60	6.75	90.00	99.80	90.00
13088	TIROLIT	8	0	4	36	10.50	54.71	5.59	90.00	90.00	90.00
13089	VESZELYIT	4	0	4	9	9.84	10.17	7.48	90.00	103.42	90.00
13090	CHALKOPHYLL	36	0	18	14	10.77	10.77	57.51	90.00	90.00	120.00
13091	LIROKONIT	8	0	4	12	12.70	7.57	9.88	90.00	91.38	90.00
13092	MINYULIT	4	0	2	12	9.37	9.76	5.53	90.00	90.00	90.00
13093	OVERIT	16	0	2	53	14.78	18.78	7.13	90.00	90.00	90.00
13094	MONTGOMERYI	8	0	2	35	10.01	24.15	6.26	90.00	91.47	90.00
13095	MORINIT	4	0	2	15	9.46	10.69	5.45	90.00	105.45	90.00
13096	LEUKOPHOSPH	4	0	4	11	9.73	9.60	9.69	90.00	102.27	90.00
13097	PHARMAKISID	24	0	1	22	7.98	7.98	7.98	90.00	90.00	90.00
13098	CHLOROTIL	12	0	1	42	13.61	13.61	5.90	90.00	90.00	120.00
13099	HALLIMONDIT	2	0	2	10	7.12	10.47	6.84	100.57	94.80	91.27
13100	SABUGALIT	32	0	2	22	6.96	6.96	19.30	90.00	90.00	90.00
13101	META-TORBER	16	0	1	20	6.98	6.98	17.41	90.00	90.00	90.00
13102	DUMONTIT	4	0	2	21	8.16	16.73	7.02	90.00	110.00	90.00
13103	SENGIERIT	4	0	2	20	10.62	8.10	10.11	90.00	103.67	90.00
13104	CARNOTIT	4	0	2	15	10.47	8.41	6.91	90.00	103.67	90.00
13105	CURIENIT	8	0	4	17	10.40	8.45	16.34	90.00	90.00	90.00
13106	CHERVETIT	4	0	4	7	13.47	7.32	6.95	90.00	107.00	90.00
14001	CHALKOSIN	8	0	96	1	11.92	27.33	13.44	90.00	90.00	90.00
14002	CHALKOSIN	4	0	48	1	15.22	11.88	13.48	90.00	116.40	90.00
14003	CHALKOSIN	24	0	2	1	3.90	3.90	6.69	90.00	90.00	120.00
14004	DJURLEIT	8	0	16	8	26.92	15.71	13.56	90.00	90.00	90.00
14005	BERZELIANIT	192	0	4	1	5.74	5.74	5.74	90.00	90.00	90.00
14006	SYNTH	24	0	2	1	4.25	4.25	7.29	90.00	90.00	120.00
14007	ANILITH	8	0	4	4	7.89	7.84	11.01	90.00	90.00	90.00
14008	BORNIT	8	0	16	4	10.94	10.94	21.88	90.00	90.00	90.00
14009	BORNIT	192	0	1	4	5.50	5.50	5.50	90.00	90.00	90.00
14010	UMANGIT	4	0	4	2	4.28	6.40	12.46	90.00	90.00	90.00
14011	AKANTHIT	4	0	4	1	4.23	6.91	7.87	90.00	99.60	90.00
14012	ARGENTIT	96	0	2	1	4.89	4.89	4.89	90.00	90.00	90.00
14013	NAUMANNIT	4	0	4	1	7.05	7.85	4.33	90.00	90.00	90.00
14015	HESSIT	4	0	4	1	8.09	4.48	8.96	90.00	123.30	90.00
14016	HESSIT	96	0	2	1	5.29	5.29	5.29	90.00	90.00	90.00
14017	PETZIT	48	0	8	2	10.38	10.38	10.38	90.00	90.00	90.00
14018	STROMEYERI	16	16	2	2	4.06	6.66	7.99	90.00	90.00	90.00
14019	MCKINSTRYIT	8	8	32	1	14.04	15.68	7.80	90.00	90.00	90.00
14020	JALPAIT	32	32	8	2	8.63	8.63	11.74	90.00	90.00	90.00
14021	PARKERIT	4	8	1	2	4.03	5.53	5.73	90.00	90.00	90.00
14022	HEAZLEWOODI	18	18	1	2	5.74	5.74	7.14	90.00	90.00	120.00
14023	PENTLANDIT	192	192	4	8	10.04	10.04	10.04	90.00	90.00	90.00
14024	ZINKBLENDE	96	96	4	1	5.43	5.43	5.43	90.00	90.00	90.00
14025	LAUTIT	8	8	4	1	3.79	5.48	11.49	90.00	90.00	90.00
14026	CHALKOPYRIT	16	16	4	2	5.25	5.25	10.32	90.00	90.00	90.00
14027	LUZONIT	16	16	2	4	5.27	5.27	10.39	90.00	90.00	90.00
14028	RENIERIT	8	8	8	4	10.60	10.60	10.60	90.00	90.00	90.00
14029	SULVANIT	24	24	1	4	5.38	5.38	5.38	90.00	90.00	90.00
14030	TENNANTIT	48	48	8	3	10.21	10.21	10.21	90.00	90.00	90.00
14031	NOWACKIIT	9	18	3	12	13.44	13.44	9.17	90.00	90.00	120.00
14032	WURTZIT	12	24	2	1	3.85	3.85	6.29	90.00	90.00	120.00
14033	ENARGIT	8	8	2	4	6.47	7.44	6.19	90.00	90.00	90.00
14034	CUBANIT	8	8	4	3	6.46	11.12	6.23	90.00	90.00	90.00
14035	STERNBERGIT	16	16	8	3	6.62	11.66	12.70	90.00	90.00	90.00
14036	ARGENTOPYRI	8	8	4	3	6.64	11.47	6.45	90.00	90.00	90.00
14037	PYRRHOTIN	24	24	2	1	3.44	3.44	5.69	90.00	90.00	120.00
14038	ARSENEISEN	8	8	4	1	3.38	6.03	5.44	90.00	90.00	90.00

14039	MILLERIT	18	18	9	1	9.62	9.62	3.16	90.00	90.00	120.00
14040	GALENIT	192	192	4	1	5.94	5.94	5.94	90.00	90.00	90.00
14041	MIARGYRIT	8	8	8	2	13.20	4.40	12.86	90.00	98.50	90.00
14042	HERZENBERGI	8	8	4	1	3.99	4.34	11.20	90.00	90.00	90.00
14043	CINNABARIT	6	6	3	1	4.15	4.15	9.50	90.00	90.00	120.00
14044	COVELLIN	24	24	6	1	3.80	3.80	16.36	90.00	90.00	120.00
14045	VULCANIT	8	8	2	1	4.09	6.95	3.15	90.00	90.00	90.00
14046	GREIGIT	192	192	8	4	9.88	9.88	9.88	90.00	90.00	90.00
14047	ANTIMONIT	8	8	4	3	11.22	11.30	3.84	90.00	90.00	90.00
14048	KERMESIT	2	2	8	1	11.66	8.24	11.19	111.80	110.70	78.20
14049	OTTEMANNIT	8	8	4	3	8.86	14.02	3.75	90.00	90.00	90.00
14050	IKUNOLITH	36	36	3	3	4.15	4.15	39.19	90.00	90.00	120.00
14051	KRENNERIT	4	8	8	2	16.54	4.46	8.82	90.00	90.00	90.00
14052	CALAVERIT	8	8	2	2	7.19	4.41	5.08	90.00	90.00	90.00
14053	PYRIT	24	48	4	2	5.41	5.41	5.41	90.00	90.00	90.00
14054	ULLMANIT	12	24	4	1	5.92	5.92	5.92	90.00	90.00	90.00
14055	MARKASIT	8	8	2	2	3.39	4.45	5.42	90.00	90.00	90.00
14056	PARA-RAMMEL	8	8	8	2	11.43	5.75	5.82	90.00	90.00	90.00
14057	FROODIT	8	8	4	2	12.75	4.29	5.67	90.00	102.87	90.00
14058	ARSENOPYRIT	16	16	8	1	6.43	9.53	5.66	90.00	90.00	90.00
14059	MOLYBDAENIT	24	24	2	2	3.16	3.16	12.32	90.00	90.00	120.00
14060	BERNDIT	6	12	1	2	3.64	3.64	5.87	90.00	90.00	120.00
14061	CHATHAMIT	48	96	8	3	8.24	8.24	8.24	90.00	90.00	90.00
14062	PROUSTIT	18	36	2	3	10.76	10.76	8.66	90.00	90.00	120.00
14063	XANTHOKON	8	8	8	3	11.99	6.21	16.98	90.00	110.17	90.00
14064	PYROSTILPNI	4	4	4	3	6.84	15.84	6.24	90.00	90.00	90.00
14065	SAMSONIT	4	4	2	6	10.31	8.07	6.62	90.00	92.68	90.00
14066	CHALKOSTIBI	8	8	2	4	6.02	14.49	3.79	90.00	90.00	90.00
14067	CUPROBISMUT	8	8	6	4	17.65	3.93	15.24	90.00	90.00	90.00
14068	WITTICHENIT	4	8	2	12	7.68	10.33	6.70	90.00	90.00	90.00
14069	BERTHIERIT	8	8	4	4	11.44	14.12	3.76	90.00	90.00	90.00
14070	SMITHIT	8	8	8	6	17.23	7.78	15.19	90.00	101.20	90.00
14071	TRECHMANNIT	6	12	6	6	14.02	14.02	9.15	90.00	90.00	120.00
14072	STEPHANIT	8	16	2	8	7.72	12.34	8.50	90.00	90.00	90.00
14073	PEARCEIT	8	8	2	11	12.80	7.38	11.94	90.00	90.00	90.00
14074	LORANDIT	4	4	8	2	12.27	11.33	6.11	90.00	104.20	90.00
14075	HUTCHINSONI	8	8	8	9	10.80	35.35	8.16	90.00	90.00	90.00
14076	WALLISIT	2	2	2	5	8.94	7.76	7.98	65.55	65.50	73.92
14077	VRBAIT	16	16	4	20	13.38	23.37	11.25	90.00	90.00	90.00
14078	LIVINGSTONI	8	8	8	8	30.25	4.00	21.48	90.00	104.20	90.00
14079	SELIGMANNIT	4	8	2	6	8.08	8.75	7.64	90.00	90.00	90.00
14080	AIKINIT	8	8	2	6	11.32	11.66	4.01	90.00	90.00	90.00
14081	BEERYIT	4	4	6	11	12.72	4.02	58.07	90.00	102.50	90.00
14082	UNBENANNT	8	8	4	11	27.21	3.94	17.58	90.00	93.90	90.00
14083	NUFFIELDIT	8	8	1	27	14.61	21.38	4.03	90.00	90.00	90.00
14084	BETECHTINIT	16	16	2	15	11.40	14.67	3.86	90.00	90.00	90.00
14085	LENGENBACHI	4	4	12	13	34.80	5.70	18.40	90.00	94.30	90.00
14086	FIZELYIT	8	8	2	23	13.14	19.23	4.36	90.00	90.00	90.00
14087	ANDORIT	8	8	12	24	12.98	19.15	4.24	90.00	90.00	90.00
14088	MARRIT	4	4	4	3	7.29	12.68	6.00	90.00	91.21	90.00
14089	DIAPHORIT	4	4	4	16	15.85	32.09	5.90	90.00	90.17	90.00
14090	TEREMKOVIT	8	8	3	20	22.58	26.68	4.08	90.00	90.00	90.00
14091	SARTORIT	4	4	4	4	19.62	7.89	4.19	90.00	90.00	90.00
14092	BAUMHAUERIT	2	2	4	18	22.74	8.33	7.89	90.00	97.42	90.00
14093	RATHIT-I	4	4	2	20	25.16	7.94	8.47	90.00	100.47	90.00
14094	LIVEINGIT	2	4	4	28	8.43	70.90	7.91	90.00	90.00	90.00
14095	RATHIT-3	2	4	2	20	8.43	7.91	24.52	90.00	90.00	90.00
14096	JORDANIT	4	4	6	8	8.91	31.71	8.42	90.00	118.35	90.00
14097	GRATONIT	18	36	1	15	17.73	17.73	7.85	90.00	90.00	120.00
14098	FUELOEPPIT	8	8	4	15	13.39	11.69	16.90	90.00	94.70	90.00
14099	TINTINAIT	8	8	4	17	22.30	34.00	4.04	90.00	90.00	90.00
14100	JAMESONIT	4	4	2	14	15.57	18.98	4.03	90.00	90.00	90.00
14101	SEMSEYIT	8	8	4	21	13.51	11.89	24.53	90.00	105.75	90.00
14102	BOULANGERIT	4	4	8	11	21.56	23.51	8.09	90.00	100.80	90.00
14103	MENEGHINIT	8	8	1	7	11.36	24.06	4.13	90.00	90.00	90.00
14104	GALENOBISMT	8	8	4	4	11.75	14.50	4.08	90.00	90.00	90.00
14105	COSALIT	8	8	8	5	19.07	23.86	4.06	90.00	90.00	90.00
14106	KOBELLIT	8	8	4	17	22.60	34.08	4.02	90.00	90.00	90.00
14107	REALGAR	4	4	4	4	9.29	13.53	6.57	90.00	106.55	90.00
14108	AURIPIGMENT	4	4	4	3	11.49	9.59	4.25	90.00	90.45	90.00
14109	GETCHELLIT	4	4	8	3	11.85	8.99	10.16	90.00	116.45	90.00
15001	SALMIAK	24	24	1	1	3.87	3.87	3.87	90.00	90.00	90.00
15002	KALOMEL	32	32	2	2	4.46	4.46	10.91	90.00	90.00	90.00
15003	SELLAIT	16	16	2	2	4.65	4.65	3.07	90.00	90.00	90.00
15004	HYDROPHILIT	8	8	2	2	6.25	6.44	4.21	90.00	90.00	90.00

15005	CHLOROMAGNE	36	36	3	2	3.60	3.60	17.64	90.00	90.00	120.00
15006	FLUORIT	192	192	4	2	5.46	5.46	5.46	90.00	90.00	90.00
15007	GAGARINIT	6	6	1	6	5.99	5.99	3.53	90.00	90.00	120.00
15008	TYSONIT	24	24	6	3	7.13	7.13	7.29	90.00	90.00	120.00
15009	ALUMINIUMCH	8	8	4	3	5.92	10.26	6.17	90.00	108.65	90.00
15010	MOLYSIT	6	6	6	3	5.93	5.93	17.29	90.00	90.00	120.00
15011	ERIOCHALCIT	8	8	2	4	7.39	8.06	3.73	90.00	90.00	90.00
15012	BISCHOFIT	8	8	2	8	9.92	7.16	6.11	90.00	93.70	90.00
15013	FLUELLIT	32	32	28	4	8.54	11.42	21.18	90.00	90.00	90.00
15014	CHLOROALUMI	36	36	6	9	11.82	11.82	11.82	90.00	90.00	120.00
15015	FERRUCCIT	16	16	4	4	6.26	6.83	6.78	90.00	90.00	90.00
15016	AVOGADRIT	8	8	4	4	8.10	5.18	6.64	90.00	90.00	90.00
15017	MALLADIT	12	12	1	6	8.87	8.87	5.07	90.00	90.00	120.00
15018	HIERATIT	192	192	4	6	8.19	8.19	8.19	90.00	90.00	90.00
15019	KRYOLITHION	96	96	8	12	12.12	12.12	12.12	90.00	90.00	90.00
15020	KRYOLITH	4	4	2	6	5.47	5.62	7.82	90.00	90.00	90.00
15021	ELPASOLITH	24	24	4	6	8.11	8.11	8.11	90.00	90.00	90.00
15022	THOMSENOLIT	4	4	4	7	5.58	5.51	16.13	90.00	96.45	90.00
15023	PACHNOLITH	8	8	16	7	12.14	10.41	15.71	90.00	90.33	90.00
15024	PYROSOPIT	8	8	4	8	6.70	11.13	7.33	90.00	95.00	90.00
15025	CHIOLITH	16	16	4	14	6.70	11.13	7.33	90.00	95.00	90.00
15026	WEBERIT	16	16	4	7	7.31	7.06	9.99	90.00	90.00	90.00
15027	RALSTONIT	192	192	8	7	9.89	9.89	9.89	90.00	90.00	90.00
15028	NEIGHBORIT	8	8	4	3	5.36	7.68	5.50	90.00	90.00	90.00
15029	MITSCHERLIC	16	16	2	6	7.46	7.46	7.46	90.00	90.00	90.00
15030	ERYTHROSIDE	8	8	4	6	13.78	9.94	6.94	90.00	90.00	90.00
15031	CARNALLIT	8	8	12	9	9.56	16.05	22.56	90.00	90.00	90.00
15032	ATACAMIT	8	8	2	4	6.02	9.15	6.85	90.00	90.00	90.00
15033	BOTALLACKIT	4	4	2	4	5.63	6.12	5.71	90.00	92.75	90.00
15034	BUTTGENBACH	24	24	2	44	13.56	13.56	9.15	90.00	90.00	120.00
15035	TERLINGUAIT	8	8	4	4	19.53	5.92	9.48	90.00	144.00	90.00
15036	EGLESTINIT	96	96	2	1	8.04	8.04	8.04	90.00	90.00	90.00
15037	MOSESIT	96	96	8	2	9.52	9.52	9.52	90.00	90.00	90.00
15038	PERCYLITH	48	48	11	20	15.28	15.28	15.28	90.00	90.00	90.00
15039	BOLEIT	32	32	4	112	15.40	15.40	62.00	90.00	90.00	90.00
15040	CUMENGEIT	32	32	8	20	15.17	15.17	24.71	90.00	90.00	90.00
15041	DIABOLEIT	8	8	1	6	5.84	5.84	5.47	90.00	90.00	90.00
15042	CHLOROXIPHI	4	4	2	6	10.36	5.74	6.53	90.00	97.18	90.00
15043	HAEMATOPHAN	32	32	3	12	7.82	7.82	15.26	90.00	90.00	90.00
15044	FIEDLERIT	4	4	4	7	16.62	8.02	7.20	90.00	102.20	90.00
15045	PARALAURION	8	8	4	2	10.79	3.98	7.19	90.00	117.22	90.00
15046	LAURIONIT	8	8	4	2	9.62	4.03	7.12	90.00	90.00	90.00
15047	MATLOCKIT	16	16	2	2	4.10	4.10	7.22	90.00	90.00	90.00
15048	MENDIPIT	4	4	4	4	9.52	11.89	5.88	90.00	90.00	90.00
15049	BLIXIT	8	8	8	3	5.83	5.69	25.47	90.00	90.00	90.00
15050	NADORIT	16	16	4	3	5.60	5.44	12.22	90.00	90.00	90.00
16001	EIS(1)	24	24	4	1	4.52	4.52	7.37	90.00	90.00	120.00
16002	EIS(1C)	192	192	8	1	6.35	6.35	6.35	90.00	90.00	90.00
16003	CUPRIT	48	48	2	1	4.27	4.27	4.27	90.00	90.00	90.00
16004	BROMELLIT	12	12	2	1	2.69	2.69	4.37	90.00	90.00	120.00
16005	PERIKLAS	192	192	4	1	4.21	4.21	4.21	90.00	90.00	90.00
16006	TENORIT	8	8	4	1	4.66	3.42	5.12	90.00	99.48	90.00
16007	PARATENORIT	32	32	16	1	5.84	5.84	9.90	90.00	90.00	90.00
16008	CREDNERIT	8	8	2	2	5.58	2.88	5.88	90.00	104.00	90.00
16009	DELAFOSSIT	36	36	1	2	3.03	3.03	17.13	90.00	90.00	120.00
16010	MONTROYDIT	8	8	4	1	6.61	5.52	3.52	90.00	90.00	90.00
16011	LITHARGIT	16	16	2	1	3.96	3.96	5.00	90.00	90.00	90.00
16012	MASSICOTIT	8	8	4	1	5.48	5.88	4.74	90.00	90.00	90.00
16013	BROWNMILLER	16	16	4	5	5.58	14.50	5.34	90.00	90.00	90.00
16014	SYNTHETISCH	8	8	4	5	5.64	14.68	5.39	90.00	90.00	90.00
16015	MAYENIT	48	48	3	33	12.02	12.02	12.02	90.00	90.00	90.00
16016	SPINELL	192	192	8	4	8.10	8.10	8.10	90.00	90.00	90.00
16017	HAUSMANNIT	32	32	4	4	5.76	5.76	9.44	90.00	90.00	90.00
16018	MAROKIT	8	8	4	4	9.71	10.03	3.16	90.00	90.00	90.00
16019	TRIPPKEIT	16	16	4	4	8.59	8.59	5.56	90.00	90.00	90.00
16020	TAAFFEIT	12	12	4	8	5.72	5.72	18.38	90.00	90.00	120.00
16021	SWEDENBORGI	12	12	2	7	5.43	5.43	8.82	90.00	90.00	120.00
16022	CLAUDETIT	4	4	4	3	5.26	12.90	4.55	90.00	93.81	90.00
16023	SYNTHETISCH	4	4	4	3	7.99	4.57	9.11	90.00	101.68	90.00
16024	VALENTINIT	8	8	4	3	4.93	12.48	5.43	90.00	90.00	90.00
16025	ARSENOLITH	192	192	16	3	11.08	11.08	11.08	90.00	90.00	90.00
16026	BISMIT	4	4	4	3	5.84	8.16	7.49	90.00	112.93	90.00
16027	SYNTHETISCH	8	8	8	3	10.95	10.95	5.63	90.00	90.00	90.00
16028	SILLENIT	96	96	12	3	10.10	10.10	10.10	90.00	90.00	90.00
16029	SYNTHETISCH	192	192	4	3	5.66	5.66	5.66	90.00	90.00	90.00

16030	RUSSELLIT	16	16	4	3	5.43	5.43	11.30	90.00	90.00	90.00
16031	KOECHLINIT	16	16	4	6	5.50	16.24	5.49	90.00	90.00	90.00
16032	PARTRIDGEIT	48	48	16	3	9.43	9.43	9.43	90.00	90.00	90.00
16033	KORUND	36	36	6	3	4.77	4.77	13.04	90.00	90.00	120.00
16034	GEIKIELITH	6	36	6	3	5.10	5.10	14.12	90.00	90.00	120.00
16035	BETA-KORUND	24	24	1	36	5.57	5.57	22.60	90.00	90.00	120.00
16036	SENAIT	6	36	3	38	10.42	10.42	20.86	90.00	90.00	120.00
16037	PEROWSKITE	8	8	4	3	5.37	7.64	5.44	90.00	90.00	90.00
16038	STIBICONIT	192	192	8	7	10.26	10.26	10.26	90.00	90.00	90.00
16039	PSEUDOBROOK	16	16	4	5	9.81	9.95	3.74	90.00	90.00	90.00
16040	QUARZ	6	18	3	2	4.91	4.91	5.41	90.00	90.00	120.00
16041	HOCH-QUARZ	12	12	3	2	5.00	5.00	5.46	90.00	90.00	120.00
16042	TRIDYMIT	8	8	48	2	18.54	5.01	25.79	90.00	117.67	90.00
16043	TRIDYMIT	8	8	8	2	8.74	5.04	8.24	90.00	90.00	90.00
16044	HOCH-TRIDYM	24	24	4	2	5.04	5.04	8.24	90.00	90.00	120.00
16045	CRISTOBALIT	8	8	4	2	4.97	4.97	6.93	90.00	90.00	90.00
16046	HOCH-CRISTO	192	192	8	2	7.13	7.13	7.13	90.00	90.00	90.00
16047	MELANOPHLOG	24	24	48	2	13.40	13.40	13.40	90.00	90.00	90.00
16048	FASERIGES	16	16	4	2	4.72	5.16	8.36	90.00	90.00	90.00
16049	KEATIT	8	8	12	2	7.46	7.46	8.61	90.00	90.00	90.00
16050	COESIT	8	8	16	2	7.23	12.52	7.23	90.00	120.00	90.00
16051	RUTIL	16	16	2	2	4.59	4.59	2.96	90.00	90.00	90.00
16052	PYROLUSIT	16	16	2	2	4.39	4.39	2.87	90.00	90.00	90.00
16053	SYNTHETISCH	16	16	8	2	9.88	9.88	2.85	90.00	90.00	90.00
16054	PSILOMELAN	4	4	2	22	9.45	13.90	5.72	90.00	90.00	90.00
16055	RAMSDELLIT	8	8	4	2	4.53	9.27	2.87	90.00	90.00	90.00
16056	BYSTROEMIT	16	16	2	6	4.68	4.68	9.21	90.00	90.00	90.00
16057	SELENOLITH	4	8	8	2	8.37	8.37	5.06	90.00	90.00	90.00
16058	ANATAS	32	32	4	2	3.74	3.74	9.39	90.00	90.00	90.00
16059	TELLURIT	8	8	8	2	12.02	5.44	5.59	90.00	90.00	90.00
16060	PARATELLURI	8	8	4	2	4.81	4.81	7.61	90.00	90.00	90.00
16061	BROOKIT	8	8	8	2	9.18	5.45	5.15	90.00	90.00	90.00
16062	FERBERIT	4	4	2	4	4.71	5.70	4.94	90.00	90.00	90.00
16063	IXIOLITH	8	8	2	4	4.75	5.74	5.16	90.00	90.00	90.00
16064	EUXENIT	8	8	4	6	14.57	5.52	5.17	90.00	90.00	90.00
16065	SYNTHETISCH	8	8	2	6	9.82	3.82	7.04	90.00	118.83	90.00
16066	FERGUSONIT	16	16	4	4	5.16	5.16	10.89	90.00	90.00	90.00
16067	SYNTHETISCH	8	8	4	4	5.34	10.94	5.07	90.00	93.30	90.00
16068	CERVANTIT	4	8	4	4	4.79	5.43	11.73	90.00	90.00	90.00
16069	THOREAULITH	8	8	4	7	17.11	4.85	5.56	90.00	90.00	90.00
16070	BADDELEYIT	4	4	4	2	5.22	5.27	5.38	90.00	99.47	90.00
16071	CERIANIT	192	192	4	2	5.41	5.41	5.41	90.00	90.00	90.00
16072	SYNTHETISCH	8	8	2	5	11.52	4.37	3.56	90.00	90.00	90.00
16073	MOLYBDIT	8	8	4	3	3.95	13.81	3.69	90.00	90.00	90.00
16074	SYNTHETISCH	4	4	4	3	7.29	7.49	3.83	90.00	90.00	90.00
16075	SASSOLIN	2	2	4	3	7.04	7.05	6.58	92.58	101.17	119.83
16076	GIBBSIT	4	4	8	3	8.64	5.09	9.72	90.00	94.57	90.00
16077	BAYERIT	4	4	4	3	5.01	8.68	4.76	90.00	90.00	90.00
16078	BRUCIT	12	12	1	2	3.13	3.13	4.74	90.00	90.00	120.00
16079	DIASPOR	8	8	4	2	4.41	9.40	2.84	90.00	90.00	90.00
16080	MANGANIT	8	8	8	2	8.88	5.25	5.71	90.00	90.00	90.00
16081	BOEHMIT	16	16	4	2	3.69	12.20	2.86	90.00	90.00	90.00
16082	GUYANAIT	8	8	2	2	4.86	4.30	2.95	90.00	90.00	90.00
16083	HETEROGENIT	36	36	3	2	2.85	2.85	13.13	90.00	90.00	90.00
16084	LITHIOPHORI	8	8	2	4	5.06	2.91	9.55	90.00	100.50	90.00
16085	HYDROCALUMI	2	4	8	10	9.60	11.40	16.87	90.00	111.00	90.00
16086	SOEHNGEIT	48	96	8	3	7.47	7.47	7.47	90.00	90.00	90.00
16087	WICKMANIT	24	48	4	6	7.87	7.87	7.87	90.00	90.00	90.00
16088	STOTTIT	8	8	4	6	7.55	7.55	7.47	90.00	90.00	90.00
16089	DUTTONIT	8	8	4	3	8.80	3.95	5.96	90.00	90.67	90.00
16090	HAEGGIT	8	8	2	5	12.17	2.99	4.83	90.00	98.25	90.00
16091	DOLORESIT	8	8	2	8	19.64	2.99	4.83	90.00	103.92	90.00
16092	SIMPLOTIT	8	8	4	14	8.37	17.02	8.39	90.00	90.00	90.00
16093	PASCOIT	8	8	2	44	16.89	10.20	10.91	90.00	93.33	90.00
16094	HUMMERIT	2	2	1	44	10.81	11.01	8.85	106.07	107.82	65.67
16095	SHERWOODIT	32	32	16	37	37.80	37.80	13.80	90.00	90.00	90.00
16096	ROSSIT	2	2	2	10	8.53	7.01	8.56	78.47	103.38	65.03
16097	HEWETTIT	4	4	1	25	12.56	3.61	11.47	90.00	97.00	90.00
16098	METAHEWETTI	8	8	2	19	12.25	3.61	9.27	90.00	118.00	90.00
16099	GRANTIT	8	8	2	20	12.41	3.60	17.54	90.00	95.25	90.00
16100	HENDERSONIT	8	8	4	32	12.40	3.59	18.92	90.00	90.00	90.00
16101	SYNTHETISCH	32	32	4	4	6.30	5.64	9.92	90.00	90.00	90.00
16102	BECQUERELIT	8	8	4	6	13.92	12.45	15.09	90.00	90.00	90.00
16103	COMPREIGNAC	8	8	2	30	7.16	12.14	14.88	90.00	90.00	90.00
16104	SCHOEPIT	8	8	4	40	14.33	16.79	14.73	90.00	90.00	90.00

16105	VANDENBRAND	2	2	2	6	7.86	5.44	6.10	91.87	102.00	89.62
16106	CURIT	8	8	2	31	12.50	13.01	8.40	90.00	90.00	90.00
16107	REINERIT	8	8	4	6	6.09	14.40	7.80	90.00	90.00	90.00
16108	TRIGONIT	2	4	2	9	7.26	6.81	11.09	90.00	91.82	90.00
16109	ASBECASIT	12	12	2	20	8.33	8.33	15.29	90.00	90.00	120.00
16110	STENHUGGARI	32	32	16	7	16.12	16.12	10.70	90.00	90.00	90.00
16111	CHALKOMENIT	4	4	4	5	6.66	9.12	7.37	90.00	90.00	90.00
16112	SYNTHETISCH	4	4	4	5	6.49	8.80	7.62	90.00	98.60	90.00
16113	POUGHIT	8	8	4	13	9.66	14.20	7.86	90.00	90.00	90.00
16114	DENNINGIT	16	16	8	5	8.78	8.78	12.99	90.00	90.00	90.00
16115	SPIROFFIT	8	8	4	8	13.00	5.38	12.12	90.00	98.00	90.00
16116	CLIFFORDIT	24	24	8	8	11.37	11.37	11.37	90.00	90.00	90.00
16117	ZEMANNIT	12	12	2	9	9.41	9.41	7.64	90.00	90.00	120.00
16118	LAUTARIT	4	4	4	6	7.19	11.40	7.33	90.00	106.37	90.00
16119	DIETZEIT	4	4	4	10	10.18	7.31	14.06	90.00	106.53	90.00
16120	SCHWARTZEMB	16	16	2	5	5.61	5.61	12.55	90.00	90.00	90.00
16121	SALESIT	8	8	4	4	6.71	4.79	10.79	90.00	90.00	90.00
16122	BELLINGERIT	2	2	1	20	7.23	7.84	7.94	105.10	96.95	92.92
17001	NITRONATRIT	36	36	12	3	10.14	10.14	8.42	90.00	90.00	120.00
17002	NITROKALIT	8	8	4	3	5.43	9.19	6.46	90.00	90.00	90.00
17003	NITRAMMIT	8	8	2	3	5.76	5.46	4.97	90.00	90.00	90.00
17004	NITROBARIT	12	12	4	6	8.13	8.13	8.13	90.00	90.00	90.00
17005	SYNTHETISCH	4	4	2	6	5.58	6.05	6.90	90.00	94.50	90.00
17006	GERHARDIT	4	4	4	6	5.56	6.07	13.71	90.00	90.00	90.00
17007	LIKASIT	8	8	2	17	5.79	6.72	21.65	90.00	90.00	90.00
17008	DARAPSKIT	4	4	2	8	10.56	6.91	5.19	90.00	102.78	90.00
17009	NAHCILITH	4	4	4	3	7.53	9.72	3.54	90.00	93.32	90.00
17010	KALICINIT	4	4	4	3	15.04	5.70	3.69	90.00	103.42	90.00
17011	TESCHEMACHE	8	8	8	3	7.30	10.81	8.78	90.00	90.00	90.00
17012	WEGSCHEIDER	2	2	2	12	10.04	15.56	3.47	91.92	95.82	108.67
17013	CALCIT	36	36	6	3	9.97	9.97	8.52	90.00	90.00	120.00
17014	DOLOMIT	6	36	6	3	9.68	9.68	7.99	90.00	90.00	120.00
17015	HUNTIT	18	18	1	12	9.51	9.51	7.85	90.00	90.00	120.00
17016	ARAGONIT	8	8	4	3	4.95	7.96	5.73	90.00	90.00	90.00
17017	BARYTOVALCI	2	4	2	12	8.17	5.23	6.59	90.00	106.13	90.00
17018	FAIRCHILDIT	24	24	2	12	5.29	5.29	13.32	90.00	90.00	120.00
17019	BUTSCHLIIT	6	18	3	6	5.38	5.38	18.12	90.00	90.00	120.00
17020	SHORTIT	8	8	2	9	7.11	10.99	4.99	90.00	90.00	90.00
17021	SAHAMALITH(	4	4	2	12	5.92	16.21	4.46	90.00	106.75	90.00
17022	BURBANKIT	12	12	2	15	10.53	10.53	6.47	90.00	90.00	120.00
17023	AZURIT	4	4	2	8	4.97	5.84	10.29	90.00	92.40	90.00
17024	MALACHIT	4	4	4	5	9.48	12.03	3.21	90.00	98.00	90.00
17025	HYDROZINKIT	8	8	2	12	13.48	6.32	5.37	90.00	95.50	90.00
17026	AURICHALCIT	8	8	4	12	27.20	6.41	5.29	90.00	90.00	90.00
17027	LOSEYIT	8	8	4	16	14.95	5.56	16.25	90.00	95.40	90.00
17028	DAWSONIT	8	8	4	5	6.73	10.36	5.58	90.00	90.00	90.00
17029	TUNISIT	16	16	2	22	11.22	11.22	6.58	90.00	90.00	90.00
17030	STENONIT	4	4	4	3	5.45	8.67	13.14	90.00	98.33	90.00
17031	NORTHUPIT	96	96	16	6	14.02	14.02	14.02	90.00	90.00	90.00
17032	BASTNAESIT	12	12	6	3	7.16	7.16	9.79	90.00	90.00	120.00
17033	PARISIT	9	9	18	9	7.18	7.18	84.10	90.00	90.00	120.00
17034	ROENTGENIT	9	9	9	15	7.13	7.13	69.40	90.00	90.00	120.00
17035	BISMUTIT	32	32	2	5	3.87	3.87	13.69	90.00	90.00	90.00
17036	KETTNERIT	16	16	2	4	3.79	3.79	13.59	90.00	90.00	90.00
17037	BEYERIT	32	32	2	8	3.79	3.79	21.81	90.00	90.00	90.00
17038	BARRINGYONI	2	2	4	5	9.15	6.20	6.09	90.00	94.00	90.00
17039	NESQUEHONIT	4	4	4	6	7.68	5.39	12.00	90.00	90.75	90.00
17040	THERMONATRI	8	8	4	4	10.74	6.45	5.25	90.00	90.00	90.00
17041	SODA	8	8	4	13	12.76	9.01	13.47	90.00	122.80	90.00
17042	PIRSSONIT	16	16	8	8	11.32	20.06	6.00	90.00	90.00	90.00
17043	TRONA	8	8	4	8	20.41	3.49	10.31	90.00	106.33	90.00
17044	GAYLUSSIT	8	8	4	11	14.35	7.78	11.21	90.00	127.85	90.00
17045	CALKINSIT	4	4	4	13	9.57	12.65	8.94	90.00	90.00	90.00
17046	MCKELVEYIT	6	6	2	32	9.17	9.17	19.15	90.00	90.00	90.00
17047	WELOGANIT	3	6	2	31	8.96	8.96	18.06	90.00	90.00	90.00
17048	HYDROMAGNES	8	8	4	18	18.58	9.06	8.42	90.00	90.00	90.00
17049	ARTINIT	4	8	2	8	16.69	3.15	6.21	90.00	90.00	90.00
17050	CALLAGHANIT	8	8	4	11	10.06	11.80	8.24	90.00	107.30	90.00
17051	MANASSEIT	24	24	1	20	6.13	15.37	15.37	90.00	90.00	120.00
17052	HYDROTALKIT	36	36	3	23	6.14	6.14	46.24	90.00	90.00	120.00
17053	RUTHERFORDI	8	8	2	5	4.84	9.20	4.29	90.00	90.00	90.00
17054	BAYLEYIT	4	4	4	29	26.65	15.31	6.53	90.00	90.00	90.00
17055	SWARTZIT	4	4	2	23	11.12	14.72	6.74	90.00	99.43	90.00
17056	META-ZELLER	4	4	4	11	9.72	18.23	4.97	90.00	90.00	90.00
17057	ZELLERIT	4	4	4	13	11.22	19.25	4.93	90.00	90.00	90.00

17058	LIEBIGIT	8	8	8	21	16.71	17.55	13.79	90.00	90.00	90.00
17059	ANDERSONIT	6	18	18	18	18.04	18.04	23.90	90.00	90.00	120.00
17060	WYARTIT	8	8	2	40	11.25	7.08	20.98	90.00	90.00	90.00
17061	SCHROECKING	2	2	2	25	9.60	9.62	14.46	91.70	91.80	120.08
17062	JEREMEJEWIT	12	12	12	3	8.56	8.56	8.18	90.00	90.00	120.00
17063	SYNTHETISCH	8	8	2	6	5.39	8.39	4.49	90.00	90.00	90.00
17064	NORDENSKIOE	6	18	1	6	4.86	4.86	15.95	90.00	90.00	120.00