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CHEMICAL ANALYSES OF JAPANESE MINERALS (II)

By

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No. 371

INTRODUCTION

This report is a supplement to the report "Chemische Analysenresultate von japanischen Mineralien" published in 1936.* That report included all analyses of Japanese minerals in earlier publications, thus being complete from 1807 to 1935. Since that time, many of Japanese minerals have been analysed and their results have been published.

The object of this report is mainly to put on record the additional new analyses made since 1936, not including a vast number of partial routine determinations and numerous analyses made in connection with technical purposes, as in the former report.

Many of the analyses that have been published are widely scattered in different scientific journals and publications and it is therefore impossible to find them without a great expenditure of time. Anyone wishing to make an exhaustive search for analyses of Japanese minerals will therefore have to consult both reports.

It may be interesting to compare the number of analyses of Japanese minerals since 1936 with those previously made as follows:

1807-1935	1936-1946
568	347
(Japan Proper)	(Japan Proper)

The number of analyses in the period 1936-1946 equals more than half of those previously made in 128 years. It induces that considerable research works on mineralogic and geochemical problems in the last 11 years have been done.

* This journal, Vol. III, Nos. 3-4, 1936.

Journ. Fac. Sci. Hokkaidô Univ., Sapporo, Ser. IV, Vol. VII, No. 2, 1948.

In preparing this report, minerals from south Saghalin, Korea and Formosa were included, but now analyses of those minerals were taken off from the present report.

Here the mineral analyses are arranged according to the classification of "Dana's A System of Mineralogy, 6th Ed., 1920", because the new edition was unobtainable.

In general the following expression for each analysis is adopted:
Name of mineral : Locality : Occurrence : Name of Analyst :
Name of Author : Literature.

When the name of Analyst was not given in the publication, the Author's name is written in place of the Analyst's and when Analyst and Author was the same, only the name of Analyst is written in this report. In case of the mode of occurrence was not given or doubtful, its description is omitted.

I wish to acknowledge the interest and encouragement shown by Prof. J. Suzuki of this department and Mr. Y. Okamoto of the geological Institute of Kyūsyū Imperial University. To Mrs. K. Sakurai and K. Masutomi I express my thanks for having introduced me to the new analyses available on this report.

August, 1946.

Z. HARADA.

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List of Abbreviation

Beitr. z. Miner. v. Japan, N. F.	Beiträge zur Mineralogie von Japan, Neue Folge.
Bull. Inst. P. C. Res.	Bulletin of the Institute for Physical and Chemical Research.
Jap. J. Geol. Geogr.	Japanese Journal of Geology and Geo- graphy.
J. Jap. Ass. M. P. G.	Journal of the Japanese Association of Mineralogist, Petrologist and Econo- mic Geologists.
J. Chem. Soc. Japan	Journal of the Chemical Society of Japan.
J. Electrochem. Ass. Japan	Journal of the Electrochemical Associa- tion of Japan.
J. Fac. Sci., Hokkaidō Imp. Univ.	Journal of the Faculty of Science, Hok- kaidō Imperial University.
J. Geogr. Tokyo	Journal of Geography, Tōkyō.
J. Geol. Soc. Japan	Journal of the Geological Society of Japan.
J. Jap. Ceram. Ass.	Journal of the Japanese Ceramic Associa- tion.
J. Mining Inst. Japan	Journal of the Mining Institute of Japan.
J. Soc. Chem. Ind. Japan	Journal of the Society of Chemical In- dustry, Japan.
Mem. Fac. Sci., Kyōto Imp. Univ.	Memoir of the Faculty of Science, Kyōto Imperial University.
Proc. Imp. Acad.	Proceedings of the Imperial Academy.
Rep. 58th Special Committee, Jap. Ass. Prom. Sci.	Report of the 58th Special Committee, Japanese Association of the Promotion of Science.
Sci. Rep. Inst. Geol. Miner., Fac. Sci., Kyōto Imp. Univ.	Scientific Report of the Institute of Geology and Mineralogy, Faculty of Science, Kyōto Imperial University.
Sci. Pap.	Scientific Papers of the Institute for Physical and Chemical Research.
Sci. Earth Crust.	Science of the Earth Crust.
Studies Geol. Miner. Inst., Tōkyō Bun- rika Daigaku	Studies from the Geological and Mine- ralogical Institute, Tōkyō Bunrika Daigaku.
Z. Bl. f. Miner. usw.	Zentralblatt für Mineralogie, Geologie und Paläontologie.

I. Element Minerals

(1) Native Bisthmus.

δ	9.84	($^{39}_{40}$)
Bi	98.0	%
Pb	1.0	
Sb	0.2	
V	0.2	
Fe	0.1	
Mn, Zn	0.2	
CaO	0.8	
SiO ₂	0.3	
MgO	tr.	
Al ₂ O ₃	tr.	
Total	100.8	

Sinyasiki, Isikawa town, Isikawa county, Hukusima Pref. : Pegmatite : Analyst, S. Hata, Sci. Pap. 15 (1936) 1292.

(2) Ruthenosmiridium.*

δ	18.97
Ir	39.018 %
Os	38.895
Ru	21.08
Rh	0.988
Total	99.981

Niseparomappu river, Uryū county, Isikari Prov., Hokkaidō : Placer : Analyst, S. Aoyama, J. Jap. Ass. M. P. G. 16 (1936) 78.

II. Sulphide Minerals

(3) Zincblende

Zn	58.14 %
S	32.33
Cu	0.30
Fe	4.85
SiO ₂	4.42
Total	100.04

* A variety of iridosmine containing ruthenium (and rhodium).
RuOsIr : Hexagonal. White.

Tomiho gold mine, Okayama village, Sinobu county, Hukusima Pref. : Analyst, Bureau of Mine, Sendai : M. Watanabe; J. Jap. Ass. M. P. G., 26 (1941) 296.

(4) *Marmatite.*

δ	3.80
Zn	31.8 %
Fe	20.7
S	24.6
Insoluble	10.8
CaCO_3	(12.1)
Total	100.0

Kaso mine, Kamitoga county, Totigi Pref. : Mn-deposit : Analyst, T. Yosimura, J. Geol. Soc., Japan, 45 (1938) 128; J. Fac. Sci., Hokkaidô Imp. Univ., Ser. IV, 4 (1939) 345.

(5) *Alabandite.*

δ	3.81
SiO_2	9.97 %
TiO_2	0.18
Al_2O_3	2.51
FeO	2.30
MnO	19.45
MgO	1.26
CaO	1.72
H_2O	0.20
CO_2	1.50
Mn	37.51
S	22.00
Total	98.60

Kaso mine, Kamitoga county, Totigi Pref. : Mn-deposit : Analyst, T. Yosimura, J. Geol. Soc., Japan, 45 (1938) 346.

(6) *Pyrrhotite.*

δ	4.68
Fe	49.36 %
S	33.02
CaCO_3	6.98
Insoluble	12.35
Total	101.71

Kaso mine, Kamitoga county, Totigi Pref. : Mn-deposit : Analyst, T. Yosimura, J. Geol. Soc., Japan, 45 (1938) 124, J. Fac. Sci., Hokkaidô Imp. Univ., Ser. IV, 4 (1939) 344.

III. Salpho-salts Minerals

(7) Tetrahedrite.

Cu	31.25 %
Sb	28.41
S	26.17
Ag	tr.
Pb	tr.
Fe	4.27
As	5.28
Sn	3.21
Insoluble	1.18
Total	99.77

Tin bearing Tetrahedrite (Collusite) : Kutosan mine, Kuttyan town, Abuta county, Iburi Prov., Hokkaidô : Gold-silver-copper vein : Analyst, K. Takimoto : K. Kinoshita, J. Jap. Ass. M. P. G., 31 (1944) 11.

(8) Luzonite.

Cu	16.39 %
Fe	2.92
As	6.22
Sb	nil
S	15.39
Insoluble	59.11
Total	100.03

Hokuetu mine, Mori town, Kanbara county, Niigata Pref. : Copper deposit : Analyst, J. Kitahara : M. Watanabe, J. Jap. Ass. M. P. G., 30 (1943) 69.

(9) Stannite.

δ	4.365
Cu	27.42 %
Fe	14.55
Sn	26.08
S	29.76
Zn	0.25
Insoluble	0.85
Total	98.91

Copper-arsenic vein, Obira mine, Hasegawa village, Ōno county, Ōita Pref. :
Tin-copper vein : Analyst, K. Takimoto, J., Geol. Soc., Japan, 60 (1943) 93.

IV. Oxyde and Hydroxyde Minerals

(10) *Ilmenorutile.*

SiO_2	0.06 %
TiO_2	44.82
Al_2O_3	4.48
FeO	13.20
MnO	0.00
MgO	0.21
CaO	0.43
SnO_2	1.61
$(\text{Nb}, \text{Ta})_2\text{O}_5$	34.61
$\text{H}_2\text{O}(+)$	0.71
$\text{H}_2\text{O}(-)$	0.00
Total	100.13

Tesirogi, Takase village, Tamura county, Hukusima Pref. : Pegmatite :
Analyst, K. Kimura and M. Ikawa, Warera no Kôbutsu (Our Minerals), 6 (1937)
2; J. Chem. Soc. Japan, 58 (1937) 647.

(11) *Pyrolusite.*

SiO_2	11.82 %
TiO_2	tr.
Al_2O_3	4.27
Fe_2O_3	8.03
MnO_2	55.99
MgO	3.60
CaO	2.62
BaO	—
$\text{H}_2\text{O}(+)$	7.40
$\text{H}_2\text{O}(-)$	5.38
Total	99.11

Kaso mine, Kamitoga county, Totigi Pref. : Mn-deposit : Analyst, T. Yosimura, J. Geol. Soc. Japan, 45 (1938) 196; J. Fac. Sci., Hokkaidô Imp. Univ., Ser. IV, 4 (1939) 352.

(12) Diaspore.

	1.	2.	3.	4.	5.	6.	7.	8.
δ	3.170							
SiO ₂	14.20%	8.78%	6.40%	4.06%	22.38%	5.43%	2.34%	9.26%
Al ₂ O ₃	69.40	77.01	78.54	79.25	63.25	74.93	81.71	66.46
Fe ₂ O ₃	1.60	0.65	—	0.80	0.20	—	—	—
FeO	—	—	—	—	—	1.03	0.61	1.00
MgO	—	0.25	0.87	0.01	0.36	0.05	0.43	0.53
CaO	—	tr.	0.82	0.65	0.77	1.37	0.54	7.89
H ₂ O(+) {	13.60	14.30	14.46	15.29	12.50	—	—	—
H ₂ O(—) {	0.85							
Ig. loss	—	—	—	—	—	14.67	14.24	14.75
Total	99.55	(100.98)	(101.09)	(100.06)	(99.46)	99.65	99.87	99.84

1. Diaspore : Kaso mine, Kamitoga county, Totigi Pref. : Mn-deposit : Analyst, T. Yosimura, J. Geol. Soc. Japan, **45**(1938) 196; J. Fac. Sci., Sci., Hokkaidō Imp. Univ., Ser. IV, **4**(1939) 352.
2. Medama-isi (a variety of diaspore) : Mutuisi, Wake county, Okayama Pref. : Analyst, S. Nagai, T. Asahara and M. Imaoka, J. Jap. Ceram. Ass., **51** (1943) 381.
3. Diaspore : Syōkozan, Hiba county, Hiroshima Pref. : ditto.
4. Diaspore : Exact locality is unknown, Nagasaki Pref. : ditto.
5. Diaspore : Gotō, Nagasaki Pref. : ditto.
- 6-8. Diaspore : Hirao-village, Simotakai county, Nagano Pref. : Analyst, S. Nagai, J. Jap. Ceram. Ass., **54**(1946) 8.

(13) Manganite.

δ	4.21
SiO ₂	0.32 %
Fe ₂ O ₃	tr.
MnO	76.75
MgO	0.94
CaO	0.18
H ₂ O(+)	9.65
H ₂ O(—)	0.09
O	9.39
Total	97.32

Yunosawa mine, Tihase village, W-Simamaki county, Siribesi Prov., Hokkaidō : Mn-deposit : Analyst, K. Kani and Y. Tanaka, J. Electrochem. Ass. Japan, **6**(1939) 367.

(14) *Psilomelane.*

SiO_2	.....	7.50	%
Al_2O_3	.....	8.20	
Fe_2O_3	.....	0.55	
MnO}	.....	60.11	
MgO}	.....	0.43	
CaO}	.....	tr.	
BaO}	.....	0.81	
$\text{H}_2\text{O}(+)$	.....	1.44	
$\text{H}_2\text{O}(-)$	.....	4.02	
O	.....	11.82	
Total	.....	94.88	

Isigane-isi* (Variety of Psilomelane, New Mineral) : Isigane mine, Sasaoka town, E-Kasugai county, Aiti Pref. : Mn-deposit : Analyst K. Kani and Y. Tanaka, J. Electrochem. Ass. Japan, 7(1939).

V. Carbonate Minerals

(15) *Calcite.*

	1.	2.	3.	4.	5.	6.	7.	8.
δ	2.75	3.00	2.98	3.00	2.95	—	2.793	2.784
FeO	1.06 %	2.38 %	1.14 %	1.66 %	3.95 %	3.00 %	1.08 %	1.66 %
MnO	2.37	21.27	15.05	19.59	21.07	22.34	4.21	—
MgO	1.36	2.17	0.61	2.37	5.40	0.71	0.74	1.40
CaO	50.00	32.11	41.27	33.12	24.85	29.75	50.38	54.49
CO_2	38.70	41.75	40.83	37.69	37.69	39.64	43.65	44.25
H_2O	0.56	0.20	—	0.23	0.26	—	0.13	—
ZnO	—	—	—	—	—	—	tr.	—
Insoluble	5.58	—	0.20	3.62	5.50	4.84	0.08	—
Total	99.63	99.88	99.10	97.98	98.72	100.28	100.27	101.80

1. Calcite : Kaso mine, Kamitoga county, Totigi Pref. : Mn-deposit : Analyst, T. Yosimura, J., Geol. Soc., Japan, 45(1938) 124; J., Fac. Sci., Hokkaidō Imp. Univ., Ser. IV, 4(1939) 359.
2. Mangancalcite : same locality : Ibid, 359.
3. Saccaroidal Mangancalcite : same locality : Ibid, 360.
4. White Mangancalcite : same locality : Ibid, 361.
5. Pleochroic Mangancalcite : same locality : Ibid, 362.
6. Mangancalcite : Taga mine, Taga village, Tuzuki county, Kyōto Pref. : Calcareous hornstone : Analyst, K. Masutomi, Minerals from Kyōto Prefecture. (1940) 100.
7. Mangancalcite : Kitaura, Tikumi village, Yatuka county, Simano Pref. : Analyst, K. Yamaguti, J., Geol. Soc., Japan, 44(1937) 1198.
8. Calcite : Akasaka, Huwa county, Gihu Pref. : Analyst, I. Suganuma and S. Ōsawa, J., Tōkyō Buturi Gakkō, 50 (1941) 528-9.

* A variety of Psilomelane. $4\text{MnO}_2 \cdot \text{RO} \cdot \text{H}_2\text{O}$ (R=Mn, Ba, Mg) Named from the locality.

(16) Dolomite.

δ	1.	2.	3.	4.	5.	6.
	2.700	2.879	2.879	2.860	3.000	2.725
Soluble in hydrochloric acid.						
CaO	55.09 %	44.68 %	41.67 %	30.52 %	39.55 %	27.98 %
MgO	0.39	3.30	7.16	24.14	13.04	13.98
CO ₂	43.16	45.51	24.10	42.90	46.15	36.75
Al ₂ O ₃	tr.	tr.	tr.	tr.	3.49	tr.
FeO	0.62	5.37	3.64	3.47	tr.	0.19
MnO	0.31	—	—	—	—	—
SiO ₂	0.11	—	—	—	—	—
Insoluble in hydrochloric acid.						
SiO ₂	—	0.02	18.58	0.48	—	20.18
Al ₂ O ₃	—	—	—	—	—	—
FeO	—	—	0.88	—	—	—
MgO	—	—	4.51	—	—	—
CaO	—	—	0.22	—	—	—
Total	100.21	98.88	100.76	101.51	102.23	99.08

1. Budô mine, Iwahune county, Niigata Pref. : Analyst, I. Suganuma and S. Ōsawa : J., Tôkyô Buturi Gakkô, 50 (1941) 528-9.
2. Higuti village, Titibu county, Saitama Pref. : ditto.
- 2 (white) 3 (blue)
4. Nakase mine, Yohu county, Hyôgo Pref. : ditto.
5. Tunemi, Matugae village, Kisu county, Hukuoka Pref. : ditto.
6. Tukumi town, Hokkai county, Ôita Pref. : ditto.

7.

MgO	19.42 %
CaO	31.97
CO ₂	47.18
FeO	1.03
Insoluble	1.25

Total 100.85

7. Kue village, Kasima county, Isikawa Pref. : Gneiss : Analyst, S. Koike, J. Jap. Ass. M. P. G., 15 (1936) 234.

(17) Ankerite.

	1.	2.
δ	2.87	—
FeO	8.05 %	9.13 %
MnO	2.37	8.60
CaO	38.50	27.92
CO ₂	(42.33)	44.25
Insoluble	—	0.26
Total	100.00	100.51

1. Ankerite : Kaso mine, Kamitoga county, Totigi Pref. : Analyst, T. Yosimura, J., Geol. Soc., Japan, 45(1938) 185; J. Fac. Sci., Hokkaidō Imp. Univ., IV, 4(1939) 358.
2. Manganankerite : Budō mine, Iwahūne county, Niigata Pref. : Lead-zinc deposit : Analyst, S. Koike, Beitr. z. Min. v. Japan, N. F. 2(1937) 53.

(18) Rhodochrosite.

	1.	2.	3.	4.	5.	6.
δ	—	3.38	3.51	3.58	3.05	3.51
SiO ₂	—%	5.38%	—%	2.68%	4.37%	—%
Al ₂ O ₃	—	1.28	—	—	1.08	—
FeO	n.d.	7.26	4.39	1.40	2.31	5.34
MnO	52.64	43.18	44.49	54.14	29.33	47.92
MgO	—	2.50	2.17	1.46	2.56	1.41
CaO	7.10	3.10	5.62	3.77	15.61	5.63
CO ₃	39.47	33.42	36.90	35.35	30.67	36.88
H ₂ O	—	1.62	0.20	0.12	0.95	0.06
Insoluble	—	2.67	4.98	—	12.86	1.95
Total	99.21	100.41	98.75	98.92	99.74	99.19

1. Rhodochrosite : Yunosawa mine, Ikarigaseki village, W-Tugaru county, Aomori Pref. : Analyst, K. Masubuti; M. Watanabe and N. Nakano, J. Jap. Ass. M. P. G. 15(1936) 280.
2. Iron-rhodochrosite : Kaso mine, Kamitoga county, Totigi Pref. : Mn-deposit : Analyst, T. Yosimura, J., Geol. Soc., Japan, 45 (1938) 128; J., Fac. Sci., Hokkaidō Imp. Univ., Ser. IV, 4(1939) 356.
3. Ca-rhodochrosite : ditto.
4. Rhodochrosite : ditto. 357.
5. Opaque Ca-rhodochrosite : ditto. 361.
6. Pink Rhodochrosite : ditto. 363.

(19) Aragonite.

	1.	2.
δ	2.603	2.937
Soluble in hydrochloric acid		
MgO	23.07%	18.06%
CaO	29.01	32.35
CO ₂	46.28	44.89
Al ₂ O ₃	tr.	tr.
FeO	1.48	0.57
MnO	—	tr.
Insoluble in hydrochloric acid.		
SiO ₂	—	2.05
Al ₂ O ₃	—	1.46
FeO	—	tr.

MgO	—	0.19
CaO	—	0.39
Total	99.84	99.96

1. Hutamata Hot-spring, Siribesi Prov., Hokkaidō : Precipitates of Hot-spring : Analyst, I. Suganuma and S. Ōsawa, J., Tōkyō Buturi Gakkō, 50(1941) 528-9.
2. Matusiro, Kuri village, Nima county, Simane Pref. : Gypsum deposit : ditto.

(20) Cerussite.

δ	6.78
PbO	82.5 %
CO ₂	16.2
H ₂ O	0.0
Insoluble	0.0
Total	98.7

Toroku mine, Iwato village, W-Usuki county, Miyazaki Pref. : Tin-lead-zinc deposit : Analyst, T. Yosimura, J. Jap. Ass. M. P. G. 17(1937) 185.

(21) Tengerite.

δ	3.12
Y-Rare Earths	49.0 %
Ce-Rare Earths	1.3
ThO ₂	0.3
BeO	0.7
PbO	0.2
TiO ₂ , UO ₃	0.0
SiO ₂	0.8
Al ₂ O ₃ , Fe ₂ O ₃	tr.
MnO, MgO	0.0
CaO	8.3
CO ₂	28.7
H ₂ O(+)	10.1
H ₂ O(−)	0.3
Total	99.7

Iizaka village, Date county, Hukusima Pref. : Pegmatite : Analyst, T. Iimori, Sci. Pap. 34(1938) 83.

(22) *Bismutite.*

δ	7.02	$(\frac{22^\circ}{4^\circ})$
Bi ₂ O ₃	89.03%	
CO ₂	5.99	
PbO	1.01	
Sb ₂ O ₃	0.24	
V ₂ O ₅	0.30	
Fe ₂ O ₃	0.51	
Al ₂ O ₃	0.32	
CaO	0.30	
MgO	0.10	
SiO ₂	1.17	
S	0.08	
H ₂ O(+)	0.72	
H ₂ O(−)	0.60	
Total	100.37	

Sinyasaki, Isikawa town, Isikawa county, Hukusima Pref. : Pegmatite
Analyst, S. Hata, Bull. Inst. P. C. Res., 15 (1937) 1292.

VI. Silicate Minerals

(23) *Kali-Feldspar.*

(Orthoclase, Adularia, Perthite and Anorthoclase)

	1.	2.	3.	4.	5.	6
δ	2.59	—	—	—	2.57	—
SiO ₂	60.25%	64.76%	65.90%	64.81%	63.63%	64.03%
Al ₂ O ₃	16.83	19.15	20.93	19.16	20.09	19.92
K ₂ O	6.47	10.79	8.61	10.64	13.38	10.05
Na ₂ O	7.35	3.72	2.09	3.85	0.61	4.57
CaO	0.31	0.21	1.40	0.63	2.65	0.45
Fe ₂ O ₃	1.57	0.10	—	0.38	1.20	—
FeO	—	—	—	—	—	—
MnO	3.27	—	—	—	—	—
MgO	1.23	—	0.63	0.05	—	0.01
H ₂ O(+)	1.83	0.41	—	—	—	—
H ₂ O(−)	0.40	0.35	—	—	—	—
CO ₂	—	—	—	—	0.35	—
Ig. loss	—	—	0.10	—	—	0.26
Total	99.51	99.49	99.89	100.39	101.97	99.91

1. Kali-Feldspar : Tamagawa mine, Noda village, Kunohe county, Iwate

- Pref. : Mn-deposit : Analyst, T. Yosimura, J., Geol. Soc., Japan, 45(1938) 192.
2. Perthite : Isikawayama, Isikawa town, Isikawa county, Hukusima Pref. : Pegmatite : Analyst, Y. Kawano, J. Jap. Ass. M. P. G. 15(1936) 56.
 3. Feldspar : ditto : Analyst, S. Nagai, J. Soc. Chem. Ind. Japan, 47(1944) 92.
 4. Orthoclase : Yubukuro, Tukuba town, Tukuba county, Ibaragi Pref. : Phenocryst in granite : Analyst, H. Sibata, Research Rep., Inst. Geol. and Miner., Tôkyô Bunrika Daigaku, No. 1 (1944) 73.
 5. Adularia : Kaso mine, Kamitoga county, Totigi Pref. : Mn-deposit : Analyst, T. Yosimura, J., Geol. Soc., Japan, 45(1938) 185; J., Fac. Sci., Hokkaidô Imp. Univ., Ser. IV, 4(1939) 376.
 6. Anorthoclase : North coast, Madara island, W-Matura county, Saga Pref. : Riebeckite trachyte : Analyst, Imp. Geol. Surv. : N. Aoyama, J. Geol. Soc., Japan, 48(1941) 280.

	7.	8.
δ	—	—
SiO ₂	63.36 %	66.65 %
Al ₂ O ₃	20.87	20.47
K ₂ O	10.54	4.23
Na ₂ O	3.83	7.17
CaO	0.08	0.68
Fe ₂ O ₃	} 0.63	0.45
FeO	} —	—
MgO	0.04	—
MnO	—	0.00
Ig. loss	0.42	—
Total	99.82	99.72

7-8. Feldspar : Sugiyama, Saga Pref. : Analyst, S. Nagai, J. Soc. Chem. Ind. Japan, 47(1944) 92.

(24) Kali-Barium-Feldspar.

(Celsian, Hyalophane and Kasoite*)

	1.	2.	3.	4.	5.	6.
δ	—	2.78	3.24	2.86	2.78	3.003
SiO ₂	31.78%	50.52%	39.64%	49.26%	59.52%	38.48%
Al ₂ O ₃	16.10	11.58	12.09	19.80	15.76	23.61
K ₂ O	2.15	6.35	6.02	8.02	8.80	5.10
Na ₂ O	1.40	1.72	1.34	0.92	0.98	1.85
BaO	9.70	9.02	7.75	12.16	7.60	25.50
FeO	0.20	4.97	4.74	0.92	—	—

* A variety of Barium-feldspar, containing 25.50% BaO, associated with celsian and hyalophane as gangue minerals in the Mn-deposits. Named from the locality. Monoclinic. Elongated prismatic crystals.

$$\alpha=1.564 \quad \beta=1.568 \quad \gamma=1.572 \quad \gamma-\alpha=0.007 \quad (-)2V=80^\circ.5$$

MnO	29.75	5.75	8.72	2.56	1.15	2.67
MgO	1.95	3.09	3.67	2.12	1.68	0.97
CaO	3.72	1.23	—	2.38	0.73	0.85
TiO ₂	0.28	0.22	—	0.83	1.10	—
Fe ₂ O ₃	—	—	—	—	0.68	0.60
P ₂ O ₅	—	—	—	—	1.87	—
Fe	—	—	10.72	0.78	—	—
S	—	—	5.86	—	—	—
H ₂ O	—	1.50	0.50	{ (+) 0.49 (-) 0.20 }	0.67	0.98
Ig. loss	4.12	—	—	—	—	—
Total	101.15	100.95	100.95	100.44 (100.98)	100.54	100.61

1. Celsian : Kaso mine, Kamitoga county, Totigi Pref. : Mn-deposit : Analyst, T. Yosimura, J., Geol. Soc., Japan, 43 (1936) 883; J. Fac. Sci., Hokkaidō Imp. Univ., Ser. IV, 4 (1939) 383.
- 2-5. Hyalophane : ditto : ditto, J. Geol. Soc. Japan, 43 (1936) 886-891; 45 (1939) 139-175 : J. Fac. Sci., Hokkaidō Imp. Univ., Ser. IV, 4 (1939) 379-384.
- 2 (Black hyalophane with black pigment)
3 (Reddish-brown with Fe-Ti-ore)
3. Kasoite : ditto: ditto.

(25) Plagioclase.

(a) Albite

SiO ₂	66.84%
Al ₂ O ₃	19.62
Fe ₂ O ₃	0.57
CaO	0.58
Na ₂ O	11.53
K ₂ O	0.10
H ₂ O (+)	0.73
H ₂ O (-)	0.04
Total	100.02

Bessi mine, Ehime Pref. : Chlorite schist : Analyst, J. Takubo, Mem. Fac. Sci., Kyōto Imp. Univ., B, 6 (1941) 120.

(b) Andesine

δ	2.660 \pm 0.002 (18°C)	—
SiO ₂	58.95%	59.03%
Al ₂ O ₃	24.79	26.05
Fe ₂ O ₃	0.77	—
MgO	0.74	—
CaO	7.06	7.51

Na ₂ O	.....	6.49	6.60
K ₂ O	.....	0.99	0.75
Total	.....	99.79	99.94

- W-Sieda village, Tiisagata county, Nagano Pref. : Phenocryst in liparite : Analyst, A. Engels : K. Chudoba, Z. Bl. f. Miner. usw., 1937 (A) 136.
- Ditto : Analyst, J. Takubo, Mem. Fac. Sci., Kyôto Imp. Univ., B, 6 (1941) 120.

(c) *Bytownite and Anorthite.*

	1.	2.	3.	4.	5.	6.
δ	2.736	—	—	—	—	—
SiO ₂	44.30%	43.20%	44.89%	43.79%	42.70%	44.18%
TiO ₂	tr.	—	—	—	—	—
Al ₂ O ₃	34.60	36.43	35.40	35.79	36.78	35.18
Fe ₂ O ₃	0.13	0.43	0.28	0.43	0.31	1.03
FeO	—	—	0.18	—	—	—
MnO	tr.	—	—	—	—	—
MgO	0.29	tr.	0.12	0.33	0.52	0.10
CaO	18.08	18.91	19.05	18.69	19.44	18.30
Na ₂ O	1.05	0.23	0.45	0.42	0.23	0.71
K ₂ O	0.10	0.03	0.07	0.03	0.00	0.03
H ₂ O(+)	0.97	0.61	0.13	0.59	0.24	0.85
H ₂ O(−)	0.35	0.08	0.09	0.06	0.06	0.08
Total	99.97	100.92	100.66	100.13	100.28	100.46

- Bytownorthite : Kazi island, Ehime Pref. : Plagioclase : Analyst, T. Yosimura, J., Geol. Soc., Japan, 47 (1940) 301.
- Anorthite : Kituneura, Sinsiru island, Titima Prov., Hokkaidô : Volcanic ejecta : Analyst, J. Takubo, Mem. Fac. Sci., Kyôto Imp. Univ., B, 16 (1941) 121.
- Anorthite : Iwatuki harbour, Uruppu island, Titima Prov., Hokkaido : Volcanic agglomerate : Analysts, J. Takubo, ditto.
- Anorthite : Otaru city, Siribesi Prov., Hokkaidô : Volcanic tuff : Analyst, J. Takubo, ditto.
- Anorthite : West coast, Tôya lake, Iburi Prov., Hokkaidô : Phenocryst in andesite : Analyst, J. Takubo, ditto.

(26) *Pyroxenes.*(a) *Enstatite*

	1.	2.
SiO ₂	57.63%	57.88%
TiO ₂	tr.	0
Al ₂ O ₃	1.20	2.06

Fe ₂ O ₃	0.32	0.39
MnO	0.02	tr.
MgO	36.07	36.14
CaO	0.89	1.48
FeO	3.20	3.06
Na ₂ O	n.d.	0
K ₂ O	n.d.	0
P ₂ O ₅	0	tr.
Cr ₂ O ₃	n.d.	n.d.
H ₂ O(+)	n.d.	0.30
H ₂ O(−)	n.d.	0.20
Total	99.33	101.51

1-2. Kamogawa town, Awa county, Tiba Pref. : Harzburgite : Analyst, K. Tada and M. Huzimoto : H. Kuno, J., Geol. Soc., Japan, 48 (1941) 278.

(b) *Hypersthene*

	1.	2.	3.
δ	3.487		
SiO ₂	51.69 %	53.32 %	52.83 %
TiO ₂	0.31	0.05	0.29
Al ₂ O ₃	2.27	0.88	2.42
Fe ₂ O ₃	2.69	0.71	1.53
FeO	19.77	19.91	18.05
MnO	1.20	1.22	0.36
MgO	20.44	23.26	23.05
CaO	2.52	0.74	1.45
Na ₂ O	—	n.d.	n.d.
K ₂ O	—	n.d.	n.d.
P ₂ O ₅	—	n.d.	n.d.
Cr ₂ O ₃	—	n.d.	n.d.
H ₂ O(+)	—	n.d.	n.d.
H ₂ O(−)	0.05	n.d.	n.d.
Total	100.09	99.98	100.07

- Minato village, Coast of the Inawashiro lake, Hukusima Pref. : Magnetite placer : Analyst, K. Yagi, J. Jap. Ass. M. P. G., 22 (1944) 160.
- Behind of the Kentyō temple, Kamakura city, Kanagawa Pref. : Andesitic tuff : Analyst, K. Tada and M. Huzimoto : H. Kuno, J., Geol. Soc., Japan, 48 (1941) 278.
- West of Tōnomine, Hakone Voleano, Kanagawa Pref. : Phenocryst of andesite : ditto.

(c) *Diopsid and Chrome-diopside*

	1.	2.
SiO ₂	49.29%	52.38%
TiO ₂	0.35	—
Al ₂ O ₃	3.61	3.42
Fe ₂ O ₃	4.56	1.06
Cr ₂ O ₃	0.01	0.98
FeO	15.50	0.21
MnO	0.36	—
MgO	4.82	17.38
CaO	19.39	23.10
NiO	—	0.13
Na ₂ O	1.60	—
K ₂ O	nil	—
H ₂ O(+)	n.d.	0.93
H ₂ O(−)	n.d.	0.31
Total	99.49	99.90

- Yamada village, S-Kawati county, Ōsaka Pref. : Granite : Analyst, T. Kozima : S. Tsuboi, H. Yamada and T. Kozima, J. Geol. Soc., Japan, 49(1942) 207.
- Chrome-diopside : Akaisi mine, Sekikawa village, Uma county, Ehime Pref. : Chrome deposit : Analyst, Chem. Lab., Meizi Mining Co. : Z. Harada, J. Jap. Ass. M. P. G., 29(1943) 19.

(d) *Hedenbergite and Bastite*

	1.	2.	3.
δ	3.50	5.50	3.03
SiO ₂	48.47%	44.68%	42.71%
TiO ₂	0.04	—	tr.
Al ₂ O ₃	3.40	0.35	1.96
Fe ₂ O ₃	4.36	4.32	5.13
FeO	15.23	17.40	16.50
MnO	3.26	4.40	7.05
MgO	3.55	2.19	5.04
CaO	18.06	23.96	15.56
Na ₂ O	0.82	0.22	n.d.
K ₂ O	1.01	0.18	n.d.
BaO	1.28	—	—
H ₂ O(+) ..	0.86	} 0.24	4.65
H ₂ O(−) ..	0.32		3.72
CO ₂	—	1.76	—
Total ...	100.66	99.70	101.82

- Manganhedenbergite (in vein form) : Kaso mine, Kamitoga county,

- Totigi Pref. : Mn-deposit : Analyst, T. Yosimura, J., Geol. Soc., Japan, **45**(1938) 120; J., Fac. Sci., Hokkaidō Imp. Univ., Ser. IV, **4**(1939) 411.
 2. Manganheudebergite (in granular massive aggregate) : ditto.
 3. Bastite : ditto.

(e) Augite

	1.	2.	3.	4.	5.	6.
δ					3.368	
SiO ₂	49.15%	51.05%	50.60%	49.77%	51.19%	52.38%
TiO ₂	0.91	0.52	0.71	0.82	0.70	0.38
Al ₂ O ₃	3.39	8.19	4.04	2.60	3.37	3.28
Fe ₂ O ₃	3.86	2.55	1.91	3.87	0.36	5.31
FeO	4.53	5.50	16.63	7.72	8.05	3.11
MnO	0.17	0.30	0.54	0.21	0.16	0.17
CaO	22.02	20.49	13.11	18.44	20.17	21.29
MgO	14.27	11.07	9.96	15.20	14.92	13.40
Na ₂ O	0.65	0.32	0.92	0.53	tr.	0.77
K ₂ O	0.05	0	0.26	0.04	—	0.28
P ₂ O ₅	—	—	0.20	—	—	—
H ₂ O(+)	0.82	0.23	0.47	0.58	0.49	—
H ₂ O(—)	0.61	0.10	0.62	0.58	0.15	—
Ig. loss	—	—	—	—	—	0.17
Total	100.43	100.32	99.97	100.36	100.20 (99.56)	100.54

- Nemuro, Nemuro Prov., Hokkaidō : Analcime dolerite : Analyst, Y. Kawano, J., Geogr. Soc., Tōkyō, **54**(1942) 252.
- Soedomari, Suttu town, Siribesi Prov., Hokkaidō : Andesitic agglomerate : Analyst, T. Nemoto, J., Geol. Soc., Japan, **46**(1939) 314.
- Pigeonitic augite : Semi near Sinzyo, Mogami county, Yamagata Pref. : Dolerite : Analyst, S. Tanaka : K. Sugi, J., Geol. Soc., Japan, **44**(1937) 258.
- Pleochroic common augite : Hiziriyama, Ōoka village, Sarasina county, Nagano Pref. : Agglomerate : Analyst, Y. Kawano, J. Jap. Ass. M. P. G. **22**(1939) 69.
- Violet augite : Kazi island, Sisaka Island, Ehime Pref. : Analyst, T. Yosimura, J., Geol. Soc., Japan, **47**(1940) 303.
- Suberizaka, Tōnarū, Bessi mine, Ehime Pref. : Augitite : Analyst, Z. Kuriyama : H. Satō, Expl. Text of Geol. Map "Niihama" (1/75000) (1938) 15.

	7.	8.
δ		
SiO ₂	49.71%	47.07%
TiO ₂	0.75	1.24
Al ₂ O ₃	8.05	10.26
Fe ₂ O ₃	2.56	1.90
FeO	6.10	6.83

MnO	n.d.	0.06
MgO	14.18	12.99
CaO	17.07	18.26
Na ₂ O	n.d.	0.83
K ₂ O	n.d.	0.09
H ₂ O(+)	n.d.	—
Total	98.42	(99.53)

7. Usan peninsula, Hagi city, Yamaguti Pref. : Olivine basalt : Analyst, Imp. Geol. Surv. : K. Sugi, Mem. Fac. Sci., Kyūsyū Imp. Univ., Ser. D, 1 (1942) 77.
 8. Takasima, Karatu, Saga Pref. : Nodule in Basalt : Analyst, Imp. Geol. Surv. : N. Aoyama, J., Geol. Soc., Japan, 49 (1942) 206.

(f) *Pigeonite*

SiO ₂	50.28%
TiO ₂	0.59
Al ₂ O ₃	2.03
Fe ₂ O ₃	2.33
FeO	21.70
MnO	0.38
MgO	14.77
CaO	8.02
Na ₂ O	n.d.
K ₂ O	n.d.
P ₂ O ₅	0.00
H ₂ O(+)	neglig.
H ₂ O(-)}	
(Co,Ni)O	n.d.
Li ₂ O	n.d.
Total	100.10

Hakone volcano, Kanagawa Pref. : Groundmass of Andesite : Analyst, I. Iwasaki : H. Kuno, J. Geol. Soc., Japan, 47 (1940) 349.

(g) *Jadeite*

	1.	2.	3.	4.
SiO ₂	58.12%	58.02%	58.07%	58.35%
TiO ₂	0.04	0.04	0.04	0.04
Al ₂ O ₃	22.89	22.96	22.92	23.90
Fe ₂ O ₃	0.80	0.77	0.79	0.66
FeO	0.23	0.18	0.21	0.08
MnO	tr.	0.01	0.01	0.00 ₃

MgO	1.68	1.70	1.69	0.78
CaO	1.70	1.58	1.64	0.98
Na ₂ O	12.41	12.38	12.40	12.55
K ₂ O	0.21	0.16	0.19	0.12
H ₂ O(+)	0.87	—	0.87	1.23
H ₂ O(—)	0.40	0.61	0.51	0.69
Total	99.36 (99.35)	99.28 (98.41)	99.34	99.38 ₃

1-4. Kotaki village, W-Kubiki county, Niigata Pref. : Analyst, Y. Kawano,
J. Jap. Ass. M. P. G. 22(1939) 222.
1. 2. (green colour) 3. (mean of 1 and 2) 4. (white colour)

(h) Rhodonite

	1.	2.	3.	4.	5.	6.
δ	3.73	3.68	3.58	3.70	3.653	3.697
SiO ₂	44.55%	45.95%	45.61%	45.64%	43.34%	42.47%
Al ₂ O ₃	2.53	0.10	0.08	0.09	{ } 1.02	0.31
Fe ₂ O ₃	0.90	—	—	—		0.91
FeO	5.06	6.85	3.30	0.90	17.94	—
MnO	38.14	40.22	44.85	50.23	33.96	50.17
MgO	1.84	3.34	1.75	0.54	1.54	0.28
CaO	3.57	2.70	3.97	2.14	1.57	3.69
BaO	2.06	—	—	—	—	—
Na ₂ O	0.67	—	—	—	—	—
K ₂ O	0.47	—	—	—	—	—
H ₂ O(+)	0.30	{ } 0.11	{ } 0.12	0.27	0.37	2.51
H ₂ O(—)	0.30			0.32	0.06	0.10
CO ₂	1.00	—	—	—	—	—
Total	101.08	99.27	99.68	100.13	99.80	99.82

- Iron-rhodonite : Kaso mine, Kamitoga county, Tochigi Pref. : Mn-deposit : Analyst, T. Yosimura, J. Geol. Soc., Japan, 45(1938); J. Fac. Sci., Hokkaidō Imp. Univ., Ser. IV, 4(1939) 412.
- Blood-red rhodonite : ditto, 415.
- Pink rhodonite : ditto. 416.
- Carmine-red rhodonite : ditto. 418.
- Red or brown-red rhodonite : Ōro, Goka village, Naka county, Kyōto Pref. : Pegmatite : Analyst, J. Takubo, Minerals from Kyōto Prefecture. (1940) 120.
- Brown rhodonite : Yamato mine, Amami Ōshima, Kagoshima Pref. : Mn-deposit : Analyst, T. Yosimura, J. Jap. Ass. M. P. G. 25(1941) 26.

δ	3.647	7.
SiO ₂	43.20%	

Al ₂ O ₃	0.38
Fe ₂ O ₃	0.31
MnO	46.75
MgO	1.32
CaO	4.42
BaO	2.12
SO ₃	0.96
H ₂ O(+)	1.14
H ₂ O(-)	0.04
Total	100.64

7. Pink rhodonite : ditto.

(27) Amphiboles.

(a) Tremolite

δ	3.17
SiO ₂	54.18%
TiO ₂	0.28
Al ₂ O ₃	tr.
Fe ₂ O ₃	0.50
FeO	10.84
MnO	7.38
MgO	13.24
CaO	11.50
H ₂ O(+)	2.84
H ₂ O(-)	0.16
Total	100.42

Mangan-tremolite : Kaso mine, Kamitoga county, Totigi Pref.; Mn-deposit; Analyst, T. Yosimura, J., Geol. Soc. Japan, 45(1938) 181; J. Fac. Sci., Hokkaidō Imp. Univ., Ser. IV, 4(1939) 426.

(b) Actinolite

SiO ₂	49.79%
TiO ₂	0.16
Al ₂ O ₃	2.42
Fe ₂ O ₃	3.46
FeO	14.40
MnO	5.79
MgO	10.62

Na ₂ O	.....	0.96
K ₂ O	.....	0.25
H ₂ O(+)	.....	1.52
H ₂ O(-)	.....	0.20
F	.....	0.17
		100.93
O=F ₂	.....	-0.07
		100.86

Mangan-tremolite : Kaso mine, Kamitoga county, Totigi Pref. : Mn-deposit : Analyst, T. Yosimura, J., Geol. Soc. Japan, 45(1938) 179; J. Fac. Sci., Hokkaidô Imp. Univ., Ser. IV, 4(1939) 425.

(c) Hornblende

	1.	2.	3.	4.	5.	6.
δ	.....	.....	3.336	3.195	3.195	3.27
SiO ₂	49.00%	45.72%	40.40%	40.41%	47.72%	43.34%
TiO ₂	1.57	1.15	2.32	2.06	2.10	0.15
Al ₂ O ₃	4.70	7.33	8.64	13.88	13.95	8.00
Fe ₂ O ₃	5.87	10.64	5.81	7.89	10.67	8.05
FeO	13.63	7.69	18.16	3.71	1.12	17.09
MnO	0.35	0.12	0.16	0.09	0.07	2.63
MgO	10.93	12.37	7.14	15.02	14.68	5.25
CaO	10.75	11.54	10.90	12.31	12.12	12.40
Na ₂ O	1.14	1.11	1.78	1.74	1.57	0.18
K ₂ O	0.67	0.41	1.12	0.80	0.82	1.59
H ₂ O(+)	1.32	1.65	2.53	2.17	2.10	0.93
H ₂ O(-)	0.61	0.89	0.56	0.67	0.70	0.06
Total	100.54	99.82	99.52	100.75	100.62	99.67

1. Pale brown Hornblende : Otarupen, Esasi village, Esasi county, Kitami Prov., Hokkaidô : Diorite : Analyst, T. Nemoto, J., Geol. Soc. Japan, 39(1932) 286.
2. Common Hornblende : Kobityanai, Suttu town, Siribesi Prov., Hokkaidô : Agglomerate : Analyst, S. Komatsu : Z. Harada, J. Jap. Ass. M. P. G., 28(1942) 302.
3. Barkevitic Hornblende : Yakosi mine, E-Iwai county, Iwate Pref. : Gold-silver-copper deposit : Analyst, Y. Kawano, J. Jap. Ass. M. P. G., 24(1940) 11.
4. Common Hornblende : Tonami park, Kasiwazaki city, Niigata Pref. : Gray black agglomerate : Analyst, Y. Kawano, J., Geogr. Tôkyô, 55(1948) 289.
5. Oxyhornblende : Benten island, Tonami, Kasiwazaki city, Niigata Pref. : ditto.
6. Green iron-hornblende : Kaso mine, Kamitoga county, Totigi Pref. : Mn-deposit : Analyst, T. Yosimura, J. Geol. Soc. Japan, 45(1938) 120; J. Fac. Sci., Hokkaidô Imp. Univ., Ser. IV, 4 (1939) 422.

	7.	8.	9.	10.	11.	12.
						3.101
SiO ₂	42.91%	42.53%	42.68%	46.06%	45.98%	50.49%
TiO ₂	0.59	0.40	1.88	0.37	0.54	0.57
Al ₂ O ₃	13.67	15.35	8.87	13.80	14.08	4.52
Fe ₂ O ₃	1.85	1.72	2.37	2.26	5.13	0.30
FeO	11.03	11.11	22.46	26.47	5.09	12.50
MnO	0.34	0.31	1.30	0.18	0.26	0.14
MgO	13.47	12.99	5.48	14.78	14.93	14.32
CaO	11.73	11.55	10.95	10.16	9.80	13.85
Na ₂ O	1.61	1.72	1.00	3.12	2.35	0.30
K ₂ O	0.84	0.61	0.67	0.39	0.63	0.05
H ₂ O(+)	2.00	1.76	1.70	1.78	{ 1.27	2.85
H ₂ O(-)	0.20	0.30	0.17	0.11	{ 0.33	
P ₂ O ₅	0.00	tr.	tr.	tr.	—	—
Total	99.78	99.84	99.53	99.48	100.06	100.87 (100.26)

7. Brown Hornblende : Nyotaisan, Tukuba mountain, Ibaragi Pref. : Gabbroic pegmatite : Analyst, H. Sibata, Studies, Geol. and Miner. Inst. Tôkyô Bunrika Daigaku, No. 1 (1933) 82.
 8. Black Hornblende : Nantaisan, ditto : Quartz dioritic pegmatite : ditto.
 9. Common Hornblende : Hata, Tuzu town, Kuga county, Yamaguti Pref. : Granodiorite : Analyst, S. Tanaka : T. Tsuboi, Jap. J. Geol. Geogr., 15 (1938) 128.
 10. Common Hornblende : Ipponmatsu, Kakuno village, Nii county, Ehime Pref. : Schistose Hornblendite : Analyst, S. Tanaka : G. Horikosi, J. Geol. Soc. Japan, 45 (1938) 657.
 11. Common Hornblende : ditto : Analyst, Z. Kuriyama : H. Satô, Expl. Text of the Geol. Map "Niihama" (1/75000) (1938) 14.
 12. Green Hornblende : Kazi island, Ehime Pref. : Spinel bearing Gabbro : Analyst, T. Yosimura, J. Geol. Soc. Japan, 47 (1940) 304.

(d) Amphibole asbestos

	1.	2.	3.	4.	5.	6.
SiO ₂	58.47%	56.26%	57.72%	57.85%	59.50%	56.57%
Al ₂ O ₃	0.18	0.73	0.30	0.16	1.36	?
Fe ₂ O ₃	—	—	—	—	—	1.95
FeO	7.26	7.37	8.71	7.98	6.70	4.71
MnO	—	—	—	—	—	1.19
MgO	29.17	31.05	30.22	29.13	28.20	18.82
CaO	—	—	—	—	—	0.23
H ₂ O(+)	3.51	4.19	3.11	3.22	3.43	—
Ig. loss	—	—	—	—	—	7.01
Total	98.59	99.60	100.06	98.34	99.19	98.57

	7.	8.	9.	10.	11.	12.
SiO ₂	57.56%	58.78%	54.06%	53.49%	55.24%	55.04%
Al ₂ O ₃	0.12	0.48	0.12	1.33	1.20	0.32
Fe ₂ O ₃	7.91	5.28	6.11	7.96	7.36	4.72
FeO	0.68	1.80	0.39	5.40	5.60	3.20
MgO	28.50	28.62	32.55	27.18	26.04	24.07
CaO	0.10	0.00	0.00	0.00	0.00	9.52
Na ₂ O	0.18	0.38	0.15	0.56	0.26	0.34
H ₂ O(+)	4.76	4.12	6.60	3.60	3.84	2.52
Total	99.81	99.44	99.98	99.51	99.54	99.73

1-5. Kōziyama, Sioda, Sioe village, Isikawa county, Hukusima Pref. : Analyst, Imp. Geol. Surv. : R. Sonobe, Report of Asbestos in Hukusima Pref. (Geol. Surv. Japan) (1942). (1) Kōziyama, Sioda, Sioe village. (2) Dōnoisi, Ogura, same village. (3) Southern hill, Sawai, Sawada village. (4) Eastern mountain district, Muzinamori, Ōmorita village. (5) Takiwa, Asakawa village.

6-9. Utida, Toyohuku village, Simomasuki county, Kumamoto Pref. : Analyst, Imp. Geol. Surv. : R. Sonobe : Report of Asbestos in Kumamoto Prefecture (Geol. Surv. Japan) (1943).

10. 11. Toyono village, same country : ditto.

12. Obara, Hirayama, Hiraogi village, Kamoto county, same Pref. : ditto.

	13.	14.	15.	16.	17.	18.
SiO ₂	53.48%	44.70%	54.10%	53.60%	49.90%	54.40%
Al ₂ O ₃	1.12	11.31	1.72	5.17	5.12	2.94
Fe ₂ O ₃	2.68	6.71	1.03	0.52	2.08	1.30
FeO	2.48	0.62	1.51	1.40	1.17	1.71
MgO	26.75	17.02	12.70	24.04	23.65	23.80
CaO	8.47	9.21	24.82	11.70	12.61	12.35
Na ₂ O	0.30	0.55	0.62	0.31	0.19	0.10
H ₂ O(+)	4.40	8.54	3.50	3.36	2.02	3.34
Total	99.68	98.66	100.05	100.10	96.74	99.94

13. 14. Kayaki village, W-Sonoki county, Nagasaki Pref. : Analyst, Imp. Geol. Surv. : S. Sonobe, Report of Asbestos in Nagasaki Prefecture. (Geol. Surv. Japan) (1942). 13. (Nunomaki, Kayaki village). 14. (Suzuka, Kayaki village).

15. Hasinoue, Tameisi village, same county : ditto.

16. 17. 18. Takahama village, same county : ditto.

	19.	20.	21.
SiO ₂	57.62%	56.90%	50.96%
Al ₂ O ₃	0.15	0.57	2.00
Fe ₂ O ₃	1.06	0.60	0.98
FeO	2.90	3.16	4.06
MgO	23.46	23.52	28.66
CaO	12.32	12.22	7.30
Na ₂ O	0.10	0.11	0.18

H ₂ O(+)	2.40	2.86	4.92
Total	100.01	99.94	99.06

19. 20. 21. Kurosaki village, W-Sonoki county, Nagasaki Pref. : ditto.

(28) *Zunyite.*

	1.	2.	3.	4.
SiO ₂	24.36%	22.96%	4.44%	37.12%
TiO ₂	1.09	—	—	—
Al ₂ O ₃	57.13	55.32	59.07	47.00
FeO	—	0.84	15.36	1.33
CaO	0.78	0.41	0.65	2.00
MgO	—	0.23	1.23	1.28
Na ₂ O	0.32	—	—	—
P ₂ O ₅	0.35	—	—	—
H ₂ O	10.99	—	—	—
Ig. loss	—	14.32	13.52	6.59
F	5.32	5.75	5.64	3.56
Cl	2.46	—	—	—
	102.79	99.61	99.74	100.26
F, Cl=O	—2.80			
	99.90			

1. Iriyama, Kuni village, Azuma county, Gunma Pref. : Kaolin vein in Sulphur deposit : Analyst, H. Sawada, J. Jap. Ass. M. P. G. 22(1939) 246.

2-4. Siga plateau, Hirao village, Simotakai county, Nagano Pref. : Analyst, S. Nagai, J. Jap. Ceram. Ass., 54(1946) 8.

(29) *Garnets.*(a) *Grossularite*

SiO ₂	35.73%
Al ₂ O ₃	22.21
Fe ₂ O ₃	0.33
MgO	4.16
CaO	31.20
Ig. Loss.	4.24
Total	98.87

Kiuragi village, E-Matura county, Saga Pref. : Chrome deposit : Analyst, Kinoshita, J. Geol. Soc. Japan, 43(1936) 154.

(b) Pyrope

SiO ₂	.....	40.50%
TiO ₂	.....	0.10
Al ₂ O ₃	.....	21.17
Fe ₂ O ₃	.....	2.14
FeO	.....	11.55
MnO	.....	0.26
MgO	.....	14.56
CaO	.....	9.23
Na ₂ O	.....	0.26
K ₂ O	.....	0.13
Ig. loss	.....	0.15
Total	.....	100.05

Higasiakaisiyama, Ehime Pref. : Garnet Pyroxenite : Analyst, Z. Kuriyama : H. Satō, Expl. Text of Geol. Map, "Niihama" (1/75000) (1938) 20.

(c) Almandine

	1.	2.	3.	4.	5.	6.
SiO ₂	35.90%	37.29%	36.26%	36.59%	37.52%	48.88%
TiO ₂	0.11	—	—	0.34	0.48	0.58
Al ₂ O ₃	20.73	21.32	21.27	22.15	21.03	17.22
Fe ₂ O ₃	2.21	} 32.44	32.83	1.26	2.68	17.48
FeO	24.89		30.13	25.17	3.45	
MnO	14.28	1.47	1.87	1.78	1.89	1.41
MgO	0.97	3.21	3.55	3.21	4.66	3.90
CaO	0.81	4.62	4.32	5.09	6.06	6.44
Na ₂ O	0.11	—	—	—	—	0.51
K ₂ O	0.03	—	—	—	—	0.14
H ₂ O(+)	0.19	—	—	0.08	—	—
H ₂ O(−)	0.32	—	—	0.13	—	—
Ig. loss	—	—	—	0.58	0.36	
Total	100.55	100.35	100.10	100.76	100.07	100.37

1. Nagakubo, Isikawa town, Isikawa county, Hukusima Pref. : Pegmatite : Analyst, Y. Kawano, J. Jap. Ass. M. P. G., 20(1938) 219.
2. Nizyō Volcano, Nara Pref. : Andesite : Analyst, H. Yosizawa, Takyū, (Globe) 14 (1930) 353.
3. Ditto : Granit : ditto.
4. Ditto : Analyst, Y. Kawano, J. Jap. Ass. M. P. G., 21(1939) 83.
5. Amatakiyama, Tuda town, Ōkawa county, Kagawa Pref. : Andesite :

- Analyst, K. Yagi : S. Kôzu and K. Yagi, J. Jap. Ass. M. P. G., 26(1941) 107.
6. Iyo mine, Doi village, Uma county, Ehime Pref. : Garnet-zoisite-amphibolite : Analyst, Z. Kuriyama : H. Satô, Expl. Text, Geol. Map "Niihama" (1/75000) (1938) 17.

(d) Spalmandine

δ	.....	3.12
SiO ₂	.....	34.95%
Al ₂ O ₃	.....	14.80
Fe ₂ O ₃	.....	16.60
MnO	.....	22.28
CaO	.....	4.52
Na ₂ O	.....	1.67
K ₂ O	.....	0.16
B ₂ O ₃	.....	0.15
Rare Earths.	.....	2.45
BeO	.....	0.39
H ₂ O(+)	.....	0.45
CO ₂	.....	0.41
Total	.....	98.83

Iizaka village, Date county, Hukusima Pref. : Thin layer in druses of granite : Analyst, T. Iimori, Sci. Pap., 34(1938) 837.

(e) Spessartine

	1.	2.	3.	4.	5.	6.
δ	4.10	4.04	3.97	3.83	4.11	4.09
SiO ₂	35.52%	34.93%	36.40%	43.75%	35.28%	35.53%
TiO ₂	0.60	—	0.15	0.44	1.03	1.07
Al ₂ O ₃	18.42	20.06	21.97	19.80	20.62	20.44
Fe ₂ O ₃	4.12	2.53	0.30	—	—	1.05
FeO	2.70	2.01	7.15	7.16	5.32	5.06
MnO	32.45	32.91	23.37	22.92	31.64	31.65
MgO	0.67	0.59	0.68	0.31	0.50	1.08
CaO	3.63	5.74	11.42	7.36	3.98	4.77
Na ₂ O	0.45	0.45	—	0.10	0.35	0.25
K ₂ O	0.01	tr.	—	—	0.26	0.15
H ₂ O(+)	1.01	} 0.05	—	0.13	0.12	0.10
H ₂ O(—)	0.16		—	—	—	—
CO ₂	—	1.30	0.21	—	0.40	—
BaO	—	—	—	—	—	0.41
Total	99.74	100.57	101.65	101.96	99.50	101.56

1-6. Kaso mine, Kamitoga county, Totigi Pref. : Mn-deposit : Analyst, T. Yosimura, J. Geol. Soc. Japan, 45(1938) 148; J., Fac. Sci., Hokkaidô Imp. Univ., Ser. IV, 4 (1939) 391.

1. (yellow) 2. (Amber-yellow) 3. (Brown-yellow) 4. (Yellow-gray)
5. (Black) 6. (Red)

	7.	8.	9.	10.
SiO ₂	35.50%	35.78%	35.64%	35.97%
TiO ₂	0.29	0.27	0.28	0.29
Al ₂ O ₃	18.86	18.93	18.90	18.90
Fe ₂ O ₃	3.60	3.16	3.38	4.49
FeO	15.87	15.87	15.87	15.19
MgO	0.44	0.43	0.44	0.42
CaO	1.52	0.89	1.21	1.14
MnO	23.86	24.06	23.96	24.08
H ₂ O(-)	0.51	0.71	0.61	0.46
Total	100.45	100.10	100.29	100.94

7. 8. Wada pass, Nagano Pref. : Glassy quartz andesite : Analyst, Y. Kawano, J. Jap. Ass. M. P. G., 25 (1941) 5.
9. Mean Value of 7 and 8.
10. Same locality : Analyst, K. Yagi : ditto.

(30) Olivine, Fayalite, Knebelite and Tephroite.

	1.	2.	3.	4.	5.	6.
δ	—	—	4.26	4.16	4.98	4.01
SiO ₂	38.34%	40.76%	29.65%	30.04%	29.24%	29.21%
TiO ₂	—	—	0.00	tr.	—	—
Al ₂ O ₃	0.14	—	1.14	1.27	1.78	0.20
Fe ₂ O ₃	1.54	1.28	3.46	1.65	1.66	—
FeO	19.70	7.03	59.62	33.20	17.98	16.92
MnO	0.75	0.01	4.50	20.12	40.02	43.23
MgO	39.74	50.11	0.49	3.36	4.02	2.64
CaO	0.22	0.12	0.29	6.58	2.51	0.35
Na ₂ O	—	—	0.12	—	0.40	—
K ₂ O	—	—	0.07	—	0.15	—
P ₂ O ₅	—	—	0.03	—	—	—
CO ₂	—	—	—	3.56	0.60	2.80
H ₂ O(+)	—	—	0.48	—	—	—
H ₂ O(-)	—	—	0.25	0.10	0.13	0.12
BaO	—	—	—	—	1.68	—
Fe	—	—	—	—	—	2.59
S	—	—	—	—	—	1.41
Total	100.43	99.51	100.10	99.88	100.07	99.47

1. Olivine : Sinsiru bay, Sinsiru island, Tisima Prov., Hokkaidô : Beach sand : Analyst, N. Yonemitsu, unpublished.

2. Olivine : Takasima, Karatu city, Saga Pref. : Basalt : Analyst, Imp. Geol. Surv. : N. Aoyama, J. Geol. Soc. Japan, **49** (1942) 206.
3. Manganfayalite : Hatiman, Naegi town, Naegi county, Gihu Pref. : Pegmatite : Analyst, K. Isono : H. Sibata, J. Geol. Soc. Japan, **46** (1939) 512.
4. Ironknebelite : Kaso mine, Kamitoga county, Totigi Pref. : Mn-deposit : Analyst, T. Yosimura, J. Geol. Soc. Japan **45** (1938) 126; J. Fac. Sci., Hokkaidō Imp. Univ., Ser. IV, **4** (1939) 404.
5. Picroknebelite : ditto.
6. Manganknebelite : ditto.

	7.	8.
δ	3.965	3.98
SiO ₂	27.97%	28.78%
TiO ₂	0.15	—
Al ₂ O ₃	tr.	0.10
FeO	10.99	4.57
MnO	52.45	62.12
MgO	2.75	2.10
CaO	0.94	2.08
CO ₂	1.04	0.50
H ₂ O	4.02	—
Total	100.29	100.25

7. Irontephroite : ditto.
8. Tephroite : ditto.

(31) Zircon.

	1.	2.	3.	4.	5.	6.
δ	3.971	4.11	4.238	4.24	—	—
SiO ₂	21.35%	23.00%	26.39%	24.60%	23.67%	29.56%
Al ₂ O ₃	0.48	3.53	0.75	1.02	1.79	2.24
Fe ₂ O ₃	0.59	4.28	2.63	2.64	1.49	1.86
MnO	0.50	0.12	—	0.41	0.00	0.00
MgO	0.03	0.05	0.12	0.16	0.00	0.00
CaO	1.23	2.25	1.65	0.55	0.00	0.00
Ce-Rare Earths.	—	0.70	0.00	—	—	—
Y-Rare Earths.	—	10.23	2.84	—	—	—
Rare Earths.	15.89	—	—	9.51	0.00	0.00
ThO ₂	3.52	0.07	1.37	0.99	—	—
ZrO ₂	43.57	{ 40.2 }	39.65	52.03	45.55	56.88
HfO ₂			3.4	53.24	1.87	2.34
UO ₂	2.08	4.93	2.84	0.00	UO ₃ 3.61	UO ₃ 4.51
TiO ₂	0.00	0.90	—	0.00	0.00	0.00
(Nb, Ta) ₂ O ₅	0.54	1.03	0.35	—	0.00	0.00
SnO ₂	—	—	—	—	—	—
P ₂ O ₅	4.23	5.30	2.32	3.44	0.60	0.75

$H_2O(+)$	6.08	2.89	2.94	3.05	1.49	1.86
$H_2O(-)$			0.47	—	—	—
CO_2	0.61	—	—	—	—	—
Total	100.70	98.93	100.76	99.61	100.53	100.00

- * 1. Yamagutilite (A variety of Zircon) : Yamaguti village, W-Tikuma county, Nagano Pref. : Pegmatite : Analyst, K. Kimura and Y. Hiro-naka, J. Chem. Soc. Japan, 57 (1936) 1195.
 2. Yamagutilite : Iizaka village, Date county, Hukusima Pref. : Pegmatite : Analyst, S. Hata, Sci. Pap. 34(1938) 621.
 3. Yamagutilite : Ooro, Goka village, Naka county, Kyôto Pref. : Pegmatite : Analyst, J. Takubo, Warera no Kôbutu (Our Minerals) 10(1941) 121.
 4. Yamagutilite : Kutinokura, Kaminogô village, Tuki county, Nara Pref. : Pegmatite : Analyst, K. Masutomi and T. Higami, Sci. Earth Crust, 1 (1944) 435-6.
 5-6. Zircon : Masaki, Kawasaki town, Tagawa county, Hukuoka Pref. : Pegmatite : Analyst, K. Kimura and S. Okauti, J. Chem. Soc. Japan, 59(1938) 1129.
 5. (Black gray colour) 6. (Leaving enclosed uraninite and pyrite in the specimen, the result was recalculated to 100%)

7.

δ	—
SiO_2	29.03%
Al_2O_3	1.13
Fe_2O_3	3.54
MnO	0.00
CaO	1.56
MgO	1.56
Rare Earths	1.89
ThO_2	1.89
ZrO_2	58.07
HfO_2	2.41
UO_3	1.42
TiO_2	0.00
$(Nb, Ta)_2O_5$	0.00
P_2O_5	0.00
$H_2O(+)$	1.56
Total	100.56 (100.61)

7. Pale gray brown coloured Zircon : ditto.

(32) Danburite.

	1.	2.
δ	2.998	
SiO ₂	48.22%	48.64%
Al ₂ O ₃	0.22	0.50
Fe ₂ O ₃	0.44	0.32
MgO	0.11	
CaO	22.29	23.10
B ₂ O ₃	28.56	26.33
Na ₂ O	—	0.21
K ₂ O	—	0.15
H ₂ O(+)	0.32	0.08
H ₂ O(—)	0.32	0.36
Total	100.16	99.69

1. Danburite crystal : Toroku mine, Iwato village, W-Usuki county, Miyazaki Pref. : Limestone-granite contact : Analyst, S. Komatsu; Z. Harada, J. Fac. Sci., Hokkaidē Imp. Univ., Ser. IV, 5 (1939) 72.
 2. Massive aggregate of Danburite : ditto.

(33) Topaz.

SiO ₂	32.80%
Al ₂ O ₃	55.38
FeO	0.37
MgO	0.09
CaO	0.08
F	18.20
H ₂ O(+)	0.24
H ₂ O(—)	0.00
	107.16
F=O ₂	-7.66
	99.50

Suizawa village, Mie county, Mie Pref. : Pegmatite : Analyst, K. Isono ; Z. Harada, Unpublished.

(34) Datolite.

SiO ₂	37.52%
Al ₂ O ₃	0.38

FeO	0.31
MgO	0.65
CaO	33.44
Na ₂ O	0.13
K ₂ O	0.12
B ₂ O ₃	21.53
H ₂ O(+)	5.70
H ₂ O(-)	0.20
Total	99.98

Iwato copper mine, Iwato village W-Usuki county, Miyazaki Pref. : Copper-pyrrhotite contact deposit : Analyst, K. Isono : Z. Harada, Unpublished.

(35) *Gadolinite.*

	1.	2.	3.	4.	5.	6.
δ	4.7		4.4		4.355	4.303
CaO	2.73%	11.91%	0.48%	1.22%	2.15%	0.56%
MgO	0.00	1.14	0.00		0.15	0.48
MnO	2.50	0.84	1.22		7.58	0.58
BeO	9.36	10.73	10.08	9.98	10.75	9.99
FeO	7.90	11.24	8.39		10.42	10.89
Fe ₂ O ₃	6.13	7.65	4.33	14.47	6.56	4.57
Al ₂ O ₃	1.29	1.68	0.96	1.02	2.85	1.02
Ce ₂ O ₃	7.78	4.69	1.56		Σ Ce ₂ O ₃ 4.58	46.50
(La, Y) ₂ O ₃ etc.	34.61(Y ₂ O ₃ 24.47 etc.)		46.94		Σ Y ₂ O ₃ 24.73	
ThO ₂	0.85	0.81	0.36	46.42	1.12	0.36
SiO ₂	24.94	23.89	23.26	23.62	26.41	24.60
H ₂ O(+)	1.20	2.05	1.60		1.65	1.09
H ₂ O(-)	0.14		1.60		0.70	
CO ₂	0.34					
Total	100.13	100.34	99.18	(96.73)	99.65	100.44

1. Gadolinite : Yamaguti village, W-Tikuma county, Nagano Pref. : Pegmatite : Analyst, K. Kimura and M. Miyamoto : J. Chem. Soc. Japan, 57(1936) 1201.
2. Calcigadolinite. (Calcium bearing Gadolinite) : Tadati village, W-Tikuma county, Nagano Pref. : Pegmatite : Analyst, T. Nakai, J. Chem. Soc. Japan, 59 (1938) 1208.
- 3-4. Gadolinite (green) : Tukano, same village : Pegmatite : Analyst, T. Nakai, J. Chem. Soc. Japan, 62(1941) 244.
5. Gadolinite : Tenzin river, Simotanokami village, Kurita county, Siga Pref. : Pegmatite : T. Hattori, T. Higami and M. Sirakami, Sci. Earth-Crust, 1(1943) 323.

6. Gadolinite : Otowadani, Syūgakuin, Sakyōku, Kyōto city, Kyōto Pref. :
 Pegmatite : Analyst, T. Higami, Ibid. 1(1944) 443.

(36) *Yttrialite.*

δ	4.31
MgO	0.56%
CaO	0.90
MnO	0.39
PbO	0.10
FeO	2.77
Al ₂ O ₃	1.91
Ce-Rare Earths	6.42
Y-Rare Earths	44.70
TiO ₂	0.05
ZrO ₂	0.53
ThO ₂	5.25
UO ₂	3.72
SiO ₂	29.91
H ₂ O (+)	0.72
H ₂ O (-)	0.45
F	0.00
CO ₂	0.50
Total	98.88

Iizaka village, Date county, Hukusima Pref. : Pegmatite : Analyst, S. Hata,
 Sci. Pap. 34(1938) 456.

(37) *Thorogummite.*

δ	3.26-3.31
SiO ₂	21.10%
P ₂ O ₅	1.77
(Nb, Ta) ₂ O ₅	0.40
ThO ₂	25.05
Y-Rare Earths.	12.19
Ce-Rare Earths.	0.57
UO ₂	7.91
ZrO ₂	4.78
Fe ₂ O ₃	8.67
Al ₂ O ₃	2.22
BeO	0.40
CaO	0.95
MnO	0.35

MgO	0.00
PbO	tr.
(As, Sb) ₂ O ₃	0.32
H ₂ O	10.80
CO ₂	3.01
Total	100.49

Iizaka village, Date county, Hukusima Pref. : Pegmatite : Analyst, S. Iimori and S. Hata, Sci. Pap. 34(1938) 449.

(38) *Thulite.*

δ	3.23
SiO ₂	44.69%
Al ₂ O ₃	26.04
Fe ₂ O ₃	0.74
FeO	3.30
MnO	0.24
MgO	0.48
CaO	20.02
H ₂ O	0.15
Ig. loss	5.21
Total	99.87

Myōzin island, Ehime Pref. : Contact Zone : Analyst, T. Yosimura, J. Jap. Ass. M. P. G., 17(1932) 197.

(39) *Epidote.*

SiO ₂	39.93%
Al ₂ O ₃	12.79
FeO	19.50
MgO	1.64
CaO	23.34
H ₂ O	1.39
Total	98.59

Yosizawa mine, Higasidani village, Kisu County, Hukuoka Pref. : Contact deposit : Analyst, K. Hurukawa : K. Kinoshita, Warera no Kobutu (Our Minerals) 5(1931) 89.

(40) Allanite.

	1.	2.	3.	4.	5.	6.
δ	3.80	3.78	3.72	3.81	3.87	3.74
BeO	0.00%	0.00%	0.13%	0.00%	0.00%	0.00%
MgO	0.39	0.45	0.27	0.40	0.73	0.18
CaO	5.66	7.35	6.01	8.97	8.02	11.61
MnO	3.50	4.87	4.42	2.83	2.52	0.60
FeO	12.40	12.21	12.34	11.91	12.56	11.23
Al ₂ O ₃	15.27	13.50	14.70	14.39	14.31	14.55
Fe ₂ O ₃	3.60	3.87	3.80	5.61	4.07	4.31
(Ce, Y) ₂ O ₃ ..	24.90	22.82	23.33	21.18	22.18	20.49
SiO ₂	30.68	20.76	30.23	31.11	30.92	31.36
TiO ₂	0.37	0.13	0.23	0.25	0.28	0.51
SnO ₂	0.30	0.13	0.21	0.35	0.09	0.54
ThO ₂	1.54	2.26	1.14	0.50	0.93	1.58
UO ₂	0.00	0.00	—	—	0.39	0.00
P ₂ O ₅	—	0.07	0.09	—	0.39	0.09
H ₂ O(+)	1.63	1.36	1.43	1.45	1.20	1.93
H ₂ O(−)	0.22	0.15	—	—	—	—
Total	100.96	100.24	98.68	99.22	98.86	99.01

	7.	8.	9.	10.	11.	12.
δ	3.90	3.71	3.84	3.70	2.4	—%
BeO	0.00%	0.00%	0.05%	0.00%	—%	—%
MgO	0.15	0.30	0.18	0.63	0.00	0.00
CaO	10.71	9.21	7.54	9.79	4.63	0.22
MnO	2.40	1.53	4.05	3.27	—	0.00
FeO	11.75	10.83	11.28	10.15	0.0	0.0
Al ₂ O ₃	13.05	16.21	15.07	15.41	10.79	10.54
Fe ₂ O ₃	6.35	4.35	5.33	4.07	35.60	36.21
(Ce, Y) ₂ O ₃ ..	21.43	20.70	22.28	20.85	2.00 Ce ₂ O ₃ 0.97 (La, Nd) ₂ O ₃ 0.30	—
SiO ₂	30.98	30.40	30.86	31.53	14.97	11.50
TiO ₂	0.35	0.30	0.69	0.22	0.95	1.08
SnO ₂	0.24	0.35	0.32	0.11	—	—
ThO ₂	0.51	1.86	1.22	1.66	3.60	7.36
UO ₂	0.00	0.00	0.00	0.10	—	—
P ₂ O ₅	—	—	0.04	0.36	—	—
H ₂ O(+)	1.53	1.97	1.54	1.63	9.99	13.71
H ₂ O(−)	0.14	0.52	—	0.31	15.57	14.55
CO ₂	—	0.56	—	—	3.50	4.94
Total	99.59	99.09	100.45	100.09	101.60	101.38

	13.	14.	15.	16.	17.
δ	3.67	3.7	3.9	3.95	3.9
SiO ₂	30.58%	29.93%	28.28%	31.86%	34.65%
TiO ₂	—	—	—	0.35	—

BeO	2.49	—	—	—	—
MgO	—	0.15	1.73	1.91	1.29
CaO	8.20	8.64	9.32	10.50	10.42
MnO	2.05	2.31	1.62	1.28	1.22
FeO	10.81	9.90	5.17	10.83	4.76
Fe ₂ O ₃	5.74	9.14	21.81	8.14	9.70
Al ₂ O ₃	12.71	14.53	15.99	14.31	16.03
La ₂ O ₃	—	—	—	—	0.63
Ce ₂ O ₃	—	5.38	—	—	5.96
Pr ₂ O ₃	—	—	—	—	0.57
Ne ₂ O ₃	—	—	—	—	3.80
Sm ₂ O ₃	—	—	—	—	1.92
Gd ₂ O ₃	—	—	—	—	1.02
Y ₂ O ₃ etc.	—	6.54	—	—	4.19
Rare Earths.	23.94	—	13.54	18.75	—
ThO ₂	0.26	1.47	0.98	1.14	2.11
ZrO ₂	0.54	—	—	—	—
UO ₂	tr.	—	—	—	—
UO ₃	tr.	—	—	—	—
U ₃ O ₈	—	0.03	—	—	—
H ₂ O	3.33	1.67	1.85	1.60	1.58
Total	100.68	99.89	99.79	100.69	99.84

1-10. Abukuma district, Hukusima Pref. : Pegmatite : Analyst, S. Hata, Sci. Pap. 36(1939) 116-117.

1. (Sirane) 2. (Ryôzan) 3. (Husamata) 4. (Kozima-Ippon-matu)
5. (Iizaka) 6. (Harimiti) 7. (Ôta) 8. (Siraiwa)
9. (Ôkuma) 10. (Nogisawa)

11. Weathered part of 8. : ditto.

12. Weathered part of 10. : ditto.

13. Beryllium bearing Allanite : Iisaka village, Date county, Hukusima Pref.; Pegmatite : Analyst, T. Iimori, Sci. Pap. 36 (1939) 53.

14. Tadati village, W-Tikuma county, Nagano Pref. : Pegmatite : Analyst, T. Nakai, J. Chem. Soc. Japan, 58 (1937) 1301.

15. Hiradani, Siga county, Siga Pref. : Pegmatite : Analyst, M. Ikawa, J. Chem. Soc. Japan, 58(1937) 1265.

16. Ditto. : Analyst, B. Higami, Unpublished, communicated by K. Masutomi.

17. Ôyama village, Oti county, Ehime Pref. : Pegmatite : Analyst, M. Ikawa, J. Chem. Soc. Japan, 58(1937) 1263.

(41). Tourmaline.

	1.	2.	3.	4.	5.	6.
SiO ₂	68.32%	35.48%	35.01%	35.89%	35.13%	35.25%
TiO ₂	0.91	—	—	—	—	—
Al ₂ O ₃	13.65	32.28	36.01	36.58	36.30	36.23

Fe ₂ O ₃	—	17.12	15.57	16.40	17.60	18.37
FeO	5.73	—	—	—	—	—
MgO	0.98	0.52	2.47	2.02	1.30	1.31
CaO	1.25	0.76	0.50	0.70	0.94	0.50
Na ₂ O	1.13	—	—	—	—	—
K ₂ O	1.03	—	—	—	—	—
B ₂ O ₃	3.76	9.60	9.03	7.36	7.95	7.56
H ₂ O	3.15	—	—	—	—	—
Ig. loss	—	3.78	0.99	0.93	1.00	0.50
Total	99.91	99.57	99.98	99.88	99.96	99.72

- 1. Sarusawa village, E-Iwai county, Iwate Pref. : Pegmatite : Analyst, Chem. lab. Tôkyô Experimental Station, Tôbô Sangyô Kenkyûzyo. : Unpublished.
- 2. Kesen county, Miyagi Pref. : Placer deposit : Analyst, S. Nagai, J. Jap. Ceram. Ass. 52 (1944) 88.
- 3-6. Isikawayama, Isikawa town, Isikawa county, Hukusima Pref. : Pegmatite : Analyst, S. Nagai, Ibid. 51 (1943) 200.

	7.	8.	9.	10.	11.	12.
SiO ₂	36.45%	36.20%	36.96%	37.66%	31.75%	35.43%
TiO ₂	—	0.52	0.41	—	—	—
Al ₂ O ₃	35.28	33.41	32.90	21.19	37.28	34.68
Fe ₂ O ₃	16.40	—	—	25.86	—	—
FeO	—	13.29	13.52	—	14.72	15.72
MnO	—	0.54	0.02	1.36	—	—
MgO	1.49	1.91	2.65	—	3.16	2.71
CaO	0.56	0.40	0.37	tr.	0.98	0.88
Na ₂ O	—	2.42	1.70	2.96	—	—
K ₂ O	—	0.85	0.62	—	—	—
B ₂ O ₃	8.49	8.78	9.02	10.23	10.27	8.79
Li ₂ O	—	tr.	tr.	—	—	—
F	—	tr.	tr.	—	—	—
H ₂ O	—	2.54	2.54	0.56	2.65	1.90
Ig. loss	0.97	—	—	—	—	—
Total	99.64	100.86	100.67	99.82	100.81	100.01

- 7. Ditto : Analyst, S. Nagai, Ibid., 52(1944) 88.
- 8. Ditto : Analyst, M. Zyôkô, Ibid., 52 (1944) 132.
- 9. Ditto (in Quartz) : ditto.
- 10. Ditto : Analyst, Chem. lab. Takeda. Chem. Ind. Co. : S. Iwao, Report of Tourmaline deposits in Japan. (Geol. Surv. Japan) (1946).
- 11-12. Ditto : Analyst, S. Nagai : ditto.

	13.	14.	15.	16.	17.	18.
SiO ₂	37.41%	34.08%	36.98%	35.10%	35.19%	60.60%
TiO ₂	0.16	0.47	0.79	0.33	0.23	—

Al ₂ O ₃	33.65	32.94	31.80	34.07	34.15	17.12
Fe ₂ O ₃	—	—	—	0.56	5.66	—
FeO	12.17	13.04	11.66	14.37	9.91	9.98
MnO	0.11	0.04	0.24	0.10	0.13	—
MgO	1.55	3.97	2.57	1.45	1.46	3.26
CaO	0.01	0.11	1.59	0.46	0.33	1.10
Na ₂ O	1.76	2.36	1.65	2.15	2.09	—
K ₂ O	1.80	0.35	0.50	tr.	—	—
B ₂ O ₃	7.87	9.91	9.91	9.38	9.25	5.12
Li ₂ O ₂	—	—	tr.	—	—	—
F	—	—	tr.	—	—	—
H ₂ O(+)	3.64	3.34	2.50	1.95	1.90	} 3.60
H ₂ O(—)	—	—	—	0.30	0.26	
Total	100.13	100.61	100.19	100.23	100.56	100.82

13-14. Ditto : Analyst, Research Inst. Tôbô Sangyô Kenkyûzyo : ditto.

15. Yosida village, Hazu county, Aiti Pref. : Analyst, M. Zyôkô, J. Jap. Ceram. Ass., 52(1944) 132.

16-17. Schorlite : Kurobira, Miyamoto village, Nakakoma county, Yamanshi Pref. : Quartz vein in Granite : Analyst, S. Komatsu : Z. Harada, J. Fac. Sci., Hokkaidô Imp. Univ., Ser. IV, 5(1939) 32.

18. Yakuôzi mine, Ôda village, Mine county, Yamaguti Pref. : Tourmaline copper vein : Analyst, S. Nagai : S. Iwao, loc. cit.

	19.	20.	21.	22.	23.	24.
SiO ₂	50.93%	37.15%	37.42%	44.66%	49.40%	34.92%
TiO ₂	0.64	0.73	0.82	0.46	0.58	0.36
Al ₂ O ₃	20.36	28.52	29.48	23.02	23.46	29.63
Fe ₂ O ₃	0.28	15.17	2.08	—	0.70	0.61
FeO	11.93	—	3.59	14.20	9.49	13.36
MnO	tr.	0.03	0.03	tr.	tr.	tr.
MgO	3.72	4.37	10.29	2.12	4.07	4.78
CaO	1.39	1.17	1.28	4.95	0.79	0.43
Na ₂ O	1.74	2.24	3.09	1.46	1.89	2.05
K ₂ O	0.85	0.77	0.12	0.12	0.40	0.18
B ₂ O ₃	5.19	8.12	8.98	7.38	6.51	7.83
Li ₂ O	—	—	—	tr.	—	—
F	—	—	—	1.95	—	—
H ₂ O	3.01	1.39	{ (+) 2.40 (-) 0.38	1.22	3.15	—
Total	100.13	99.66	99.94	100.76	100.44	94.15

19-20. Ditto : Analyst, Research Inst. Tôbô Sangyô Kenkyûzyo : S. Iwao, loc. cit.

21. Dravite : Sekizen mine, Nii county, Ehime Pref. : Serpentine : Analyst, S. Komatsu : Z. Harada, loc. cit.

22. Schorlomite : Obira mine, Ōno county, Ōita Pref. : Analyst, M. Zyōkō,
J. Jap. Ceram. Ass. 52 (1944) 132.

23-24. Ditto : Analyst, Research Inst. Tōbō Sangyō Kenkyūzyo : S. Iwao,
loc. cit.

	25.	26.	27.	28.	29.	30.
SiO ₂	41.40%	62.6%	80.2%	43.70%	49.46%	41.40%
Al ₂ O ₃	17.02	16.4	9.2	23.20	10.95	17.02
Fe ₂ O ₃	19.94	10.5	5.5	7.98	5.30	6.96
FeO	—	—	—	5.83	4.30	12.98
MgO	3.71	3.7	2.3	4.23	18.12	3.71
CaO	—	0.9	0.3	—	—	—
Na ₂ O	1.45	—	—	3.02	1.33	1.45
K ₂ O	0.29	—	—	0.02	tr.	0.29
Li ₂ O	—	—	—	0.05	0.11	0.10
B ₂ O ₃	4.74	4.7	2.2	7.65	3.58	4.78
H ₂ O	4.20	1.0	0.7	tr.	tr.	tr.
Total	92.75	99.8	100.4	95.68	93.15	88.69

25. Ditto : Analyst, Chem. Lab. Takeda Chem. Ind. Company : S. Iwao,
loc. cit.

26-27. Ditto : Analyst, Chem. Lab. Asano Cement Ind. Company : S.
Iwao, loc. cit.

28-30. Ditto : Analyst, Ōmiya Research Inst. Mitubisi Mining Company :
Iwao, loc. cit.

	31.	32.	33.	34.
SiO ₂	33.94%	32.80%	44.4 %	35.30%
TiO ₂	0.10	—	—	0.66
Al ₂ O ₃	35.39	32.83	25.65	33.40
Fe ₂ O ₃	0.36	—	16.15	—
FeO	14.05	17.87	—	10.20
MnO	tr.	—	—	0.23
MgO	0.91	2.93	0.8	4.24
CaO	0.53	1.40	2.66	0.42
Na ₂ O	1.70	—	—	2.32
K ₂ O	0.18	—	—	0.49
B ₂ O ₃	9.50	9.22	8.21	9.83
H ₂ O	3.67	2.90	—	—
Ig. loss	—	—	0.72	3.00
Total	100.33	99.95	98.59	100.09

31. Sikagawa mine, Sikagawa, Kitagata village, E-Usuki county, Miyazaki
Pref. : Pegmatite in granite : Analyst, Chem. Lab. Tōbō Sangyō Kenkyūzyo : S. Iwao, loc. cit.

32. Ditto : Analyst, S. Nagai, loc. cit.

33. Hanaoka mine, Hanaoka, Kanoya city, Kagesima Pref. :

Quartz-Tungsten vein in granite : Analyst, Chem. Lab. Takeda Chem. Ind. Company : S. Iwao, loc. cit.

34. Ditto : Analyst, Chem. Lab. Tôbô Sangyô Kenkyûzyô : S. Iwao, loc. cit.

(42) *Zeolites.*

(a) *Heulandite*

SiO_2	60.81%
Al_2O_3	
Fe_2O_3	14.70
MgO	0.33
CaO	8.76
$\text{H}_2\text{O}(+)$	12.86
$\text{H}_2\text{O}(-)$	3.50
Total	100.96

Kurino mine, Kurino village, Aira county, Kagoshima Pref. : Gold quartz vein : Analyst, K. Kinoshita : Y. Nakamura, Warera no Kôbutsu (Our Minerals), 5 (1936) 260.

(b) *Desmine*

SiO_2	57.45%
Al_2O_3	
Fe_2O_3	17.53
CaO	6.60
Na_2O	0.65
K_2O	0.33
H_2O	17.48
Total	100.04

Tôrakuji, Mizotani village, Takeno county, Kyôto Pref. : Radial columnar aggregate in dyke rock : Analyst, T. Iimori : K. Masutomi, Ibid. 5 (1936) 88.

(43) *Micas.*

(a) *Lepidolite and Protolithionite*

	1.	2.	3.
δ			3.18
SiO_2	46.86%	45.98%	33.60%
TiO_2	0.14	0.22	0.06

Fe ₂ O ₃	1.01	3.56	1.44
FeO	0.16	6.00	28.54
MnO	7.55	2.46	0.86
MgO	0.52	1.50	0.10
CaO	0.78	1.80	0.14
Na ₂ O	0.22	0.25	0.46
K ₂ O	9.48	9.91	8.90
Li ₂ O	5.20	4.57	0.32
P ₂ O ₅	—	—	0.03
F	8.31	5.66	2.36
H ₂ O(+)	0.25	0.86	1.66
H ₂ O(−)	1.28	1.14	0.08
	104.41	102.08	100.91
F = ½ O	—3.66	—2.38	—0.99
	100.75	99.70	99.92

1. 2. Sakihama, Okirai village, Kesen county, Iwate Pref. : Pegmatite : Analyst, H. Sibata, Rep. 58th Special Committee, Jap. Ass. Prom. Sci., No. 7 (1944) 4.
 1: (Lepidolite) 2. (Protolithionite)
 3. Protolithionite : Yagenyama, Hirukawa village, Ena county, Gifu Pref. : Pegmatite : Analyst, K. Isono : H. Sibata, J. Geol. Soc. Japan, 46 (1939) 74.

(b) Biotite

	1.	2.	3.	4.	5.	6.
SiO ₂	36.34%	34.13%	34.46%	35.87%	35.51%	36.13%
TiO ₂	3.29	2.62	2.52	2.77	3.07	3.15
Al ₂ O ₃	13.88	19.74	18.50	16.18	15.80	15.23
Fe ₂ O ₃	4.49	2.07	1.00	3.37	2.95	3.00
FeO	15.00	18.97	20.09	20.15	18.95	18.83
MnO	0.52	0.33	0.51	0.43	0.35	0.34
MgO	11.80	7.76	8.03	7.20	9.52	9.61
CaO	0.28	—	—	0.95	0.35	0.63
Na ₂ O	0.57	0.21	0.25	0.40	0.26	0.52
K ₂ O	8.80	9.15	9.00	8.43	9.40	9.06
P ₂ O ₅	0.07	—	—	0.35	tr.	0.21
H ₂ O(+)	3.60	4.30	4.25	3.58	3.13	2.75
H ₂ O(−)	0.70	0.18	0.74	0.18	0.10	0.20
Total	99.34	99.46	99.44	99.86	99.39	99.66

1. Senmaya town, E-Iwai county, Iwate Pref. : Hornblende biotite granodiorite : Analyst, S. Tanaka : S. Tsuboi, J. Geol. Soc. Japan, 45 (1938) 454.

2. 3. 4. Usuki, Miyamoto village, E-Sirakawa county, Hukusima Pref. : ditto.
 2. (Injection biotite gneiss) 3. (Garnet biotite granodiorite) 4. (Schistose biotite granite)
 5. 6. Akasaka, Sämekawa village E-Sirakawa county, Hukusima Pref. : ditto.
 5. (Schistose quartz diorite) 6. (Schistose biotite granite)

	7.	8.	9.	10.	11.	12.
SiO ₂	34.76%	34.39%	35.08%	34.22%	35.06%	35.21%
TiO ₂	tr.	3.28	2.99	3.64	3.29	2.65
Al ₂ O ₃	16.18	19.54	19.55	14.87	16.53	20.07
Fe ₂ O ₃	4.05	0.77	0.69	1.86	0.87	0.68
FeO	8.75	21.42	18.11	26.17	21.10	16.88
MnO	3.90	0.45	0.30	0.67	0.48	0.35
MgO	16.15	0.40	8.80	5.16	8.71	9.78
CaO	—	0.23	tr.	0.33	0.13	tr.
BaO	4.18	—	—	—	—	—
Na ₂ O	2.32	0.36	0.40	0.25	0.26	0.37
K ₂ O	8.25	9.45	9.53	9.00	9.46	8.94
P ₂ O ₅	—	tr.	tr.	tr.	tr.	tr.
H ₂ O(+)	1.41	3.30	3.72	2.90	3.10	3.80
H ₂ O(−)	—	0.10	0.14	0.08	0.17	0.53
Total	99.95	99.69	99.31	99.25	99.16	99.26

7. Green biotite : Kaso mine, Kamitoga county, Totigi Pref. : Mn-deposit : Analyst, T. Yosimura, J. Geol. Soc. Japan, 45(1938) 166; J. Fac. Sci., Hokkaidô Imp. Univ., Ser. 4(1939) 430.
 8. 9. Hirasawa near Tukuba town, Tukuba county, Ibaragi Pref. : Analyst, S. Tanaka : S. Tsuboi, J. Geol. Soc. Japan, 45(1938) 454.
 8. (Biotite granite) 9. (Injection biotite gneiss)
 10. 11 12. Karakasa, Tenryûkyô, Simoina county, Nagano Pref. : ditto.
 10. (Schistose hornblende biotite granite) 11. (Injection biotite gneiss)
 12. (Hornblende granite)

	13.	14.	15.	16.	17.	18.
SiO ₂	36.60%	35.06%	33.86%	39.13%	34.60%	33.68%
TiO ₂	3.30	3.65	2.74	0.94	3.33	2.28
Al ₂ O ₃	14.98	15.58	14.93	15.00	14.28	17.18
Fe ₂ O ₃	1.00	1.84	3.02	0.90	2.10	2.42
FeO	19.23	20.31	26.02	8.03	26.80	25.60
MnO	0.13	0.32	0.84	0.11	0.50	1.66
MgO	11.15	8.75	6.03	20.30	4.98	4.46
CaO	0.18	0.62	0.39	0.37	0.60	0.80
Na ₂ O	0.37	0.41	0.50	0.30	0.41	0.48
K ₂ O	9.06	8.87	8.31	9.54	8.53	7.37
P ₂ O ₅	0.13	tr.	0.08	tr.	0.08	0.23
Cr ₂ O ₃	—	—	—	0.33	—	—

H ₂ O(+)	3.20	3.97	3.10	1.95	3.30	3.50
H ₂ O(-)	0.20	0.53	0.43	0.18	0.15	0.15

Total	99.53	99.51	100.25	97.11	99.66	99.81
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13. Ōkawairiyama, Simoina county, Nagano Pref. : Biotite zone in granite : ditto.
14. Takatō town, Kamiina county, Nagano Pref. : Hornblende bearing biotite granodiorite : ditto.
15. Sanageyama, W-Kamo county, Aiti Pref. : Biotite granite : ditto.
16. Suberizaka, Kadono village, Nii county, Ehime Pref. : Diopsidic granite : Analyst, S. Tanaka : G. Horikosi, J. Geol. Soc. Japan, 45 (1938) 658.
17. Tutiyané, Nada village, Kuga county, Yamaguti Pref. : Granite : Analyst, S. Tanaka : S. Tsuboi, J. Geol. Soc. Japan, 43 (1936) 407.
18. Near Iwakura station, Ogōri town, Yosiki county, Yamaguti Pref. : Granite : ditto.

	19.	20.	21.	22.	23.
SiO ₂	84.62%	36.40%	34.90%	34.73%	35.36%
TiO ₂	3.79	4.68	3.53	3.20	4.07
Al ₂ O ₃	14.83	14.60	17.64	18.00	19.73
Fe ₂ O ₃	1.05	0.76	0.87	0.71	0.27
FeO	36.34	18.39	20.88	20.80	19.46
MnO	0.58	0.20	0.63	0.80	0.16
MgO	5.51	11.90	8.08	7.95	7.86
CaO	0.38	0.11	0.23	0.15	tr.
Na ₂ O	0.17	0.30	0.34	0.34	0.44
K ₂ O	8.97	8.97	9.08	9.24	8.99
P ₂ O ₅	tr.	tr.	tr.	tr.	tr.
H ₂ O(+)	3.08	2.90	3.10	3.30	3.00
H ₂ O(-)	0.10	0.08	—	0.09	—
Total	99.42	99.29	99.28	99.31	99.34

19. Hata, Tuzu town, Kuga county, Yamaguti Pref. : Schistose hornblende biotite granodiorite : ditto.
20. Ōhata, Kōzino village, the same country : Hypersthene bearing hornblende biotite dioritic xenolith in granite : ditto.
21. Mukuno, Kabano village, Ōshima county, Yamaguti Pref. : Garnet bearing schistose quartz diorite : ditto.
22. Iiyama, Komatu town, Ōshima county, Yamaguti Pref. : Garnet bearing schistose quartz diorite : ditto.
23. Kaziyahara, Hizumi village, Kuga county, Yamaguti Pref. : Sillimanite bearing cordierite injection biotite gneiss : ditto.

(c) *Phlogopite*.

δ	.....	3.21
SiO_2	.....	37.16%
TiO_2	.....	0.46
Al_2O_3	.....	15.17
FeO}	.....	2.52
MnO}	.....	18.24
MgO}	.....	17.88
CaO}	.....	0.95
Na_2O}	.....	1.18
K_2O}	.....	4.55
$\text{H}_2\text{O}(+)$	.....	2.18
$\text{H}_2\text{O}(-)$	.....	0.30
Total	.....	100.29

Manganphlogopite : Kaso mine, Kaimitoga county, Totigi Pref. : Mn-deposit : Analyst, T. Yosimura, J. Geol. Soc. Japan, 45 (1938) 100, J. Fac. Sci., Hokkaidô Imp. Univ., Ser. IV, 4(1939) 341.

(44) *Chlorites*.(a) *Chlorite*.

	1.	2..
δ	2.79	—
SiO_2	28.99%	35.11%
TiO_2	0.10	—
Al_2O_3	12.97	1.24
Fe_2O_3	8.97	0.69
FeO	17.85	—
MnO	2.28	—
MgO	12.91	33.27
CaO	0.84	8.41
$\text{H}_2\text{O}(+)$	10.95	18.90
$\text{H}_2\text{O}(-)$	3.35	4.11
Total	99.21	101.73

1. Kaso mine, Kamitoga county, Totigi Pref. : Mn-deposit : Analyst, T. Yosimura, J. Geol. Soc. Japan, 45 (1938) 191; J. Fac. Sci., Hokkaidô Imp. Univ., Ser. IV, 4 (1939) 434.
2. Kiuragi, E. Matura county, Saga Pref. : Chrome deposit : Analyst, K. Kinosita, J. Geol. Soc. Japan, 43 (1936) 158.

(b) *Kämmererite.*

SiO ₂	31.10%
Al ₂ O ₃	11.30
Fe ₂ O ₃	1.73
FeO	0.49
MgO	35.43
CaO	1.40
Cr ₂ O ₃	4.40
NiO	0.25
H ₂ O(+)	12.41
H ₂ O(−)	1.45
Total	99.96

Akaisi mine, Uma county, Ehime Pref. : Chrome deposit : Analyst, Chem. lab. Meizi Mining Company : Z. Harada, J. Jap. Ass. M. P. G. 29 (1938) 12.

(c) *Thüringite.*

SiO ₂	22.24%
Al ₂ O ₃	17.05
Fe ₂ O ₃	13.83
FeO	26.26
MnO	5.42
CaO	tr.
H ₂ O(+)	10.05
H ₂ O(−)	0.98
Total	99.48

Manganthüringite : Itinokosi, Tateyama, Toyama Pref. : Diorite : Analyst, T. Sudô, J. Jap. Ass. M. P. G. 24 (1940) 111.

(d) *Chamosite.*

SiO ₂	24.50%
Al ₂ O ₃	16.32
Fe ₂ O ₃	7.45
FeO	31.46
MnO	3.33
MgO	4.59
H ₂ O(+)	11.36
Total	99.01

Arakawa mine, Senpoku county, Akita Pref. : Chalcopyrite quartz vein :
Analyst, T. Sudô, J. Geol. Soc. Japan, 48 (1941) 425.

(e) *Stilnomelane.*

	1.	2.
SiO ₂	39.21%	40.78%
Al ₂ O ₃	10.49	8.96
TiO ₂	0.33	0.61
Fe ₂ O ₃	24.14	6.38
FeO	6.68	21.56
MnO	1.29	1.40
MgO	3.26	4.24
CaO	3.37	3.59
Na ₂ O	0.48	nil
K ₂ O	1.42	0.55
H ₂ O(+)	8.91	11.69
H ₂ O(-)		
Total	99.58	11.69

1. 2. Senba, Minato town, Titibu county, Saitama Pref. : Green schist :
Analyst, Z. Kozima, Proc. Imp. Acad. 20 (1943) 328.
1. (Stilnomelane-axinite lens in green schist)
2. (Stilnomelane lens in green schist)

(45) *Chrysotile.*

	1.	2.	3.	4.	5.	6.
SiO ₂	32.29%	40.08%	39.00%	40.52%	39.40%	37.95%
Al ₂ O ₃	1.93	1.58	0.82	0.32	1.06	0.97
Fe ₂ O ₃	5.63	2.29	6.07	1.73	4.49	5.39
FeO	1.87	3.47	0.99	1.17	1.12	
MgO	38.75	40.65	36.07	41.95	36.84	37.84
CaO	1.56	0.00	0.22	0.11	0.50	0.65
Na ₂ O	—	—	—	—	0.08	0.03
H ₂ O(+)	13.71	13.76	{ 13.07	{ 13.25	{ 16.55	{ 15.95
H ₂ O(-)			{ 1.41	{ 1.47	{	
Total	100.92	100.23	100.13	100.34	100.09	99.90

1. 2. Sakaezawa, Yamabe village, Sorati county, Isikari Prov. Hokkaidô : Serpentine : Analyst, H. Konisi : J. Suzuki, J. Jap. Ass. M. P. G. 26 (1941) 268; J. Geol. Soc. Japan, 48 (1941) 262.
3. 4. Ditto : Analyst, T. Inouye, Unpublished.
5. Hatikenseki, Simotake village, Yatusiro county, Kumamoto Pref. : Serpentine : Analyst, Imp. Geol. Surv. : R. Sonobe, Report of Asbestos in Kumamoto Prefecture. (Geol. Surv. Japan) (1943).

6. Kawadoko, Tonoo village, Simomasuki county, Kumamoto Pref. : Serpentinite : ditto.

(46) *Garnierite*.

	1.	2.
SiO ₂	48.28%	55.2%
Al ₂ O ₃	1.71	2.1
Fe ₂ O ₃		
MgO	15.38	5.5
CaO	—	tr.
NiO	23.42	20.1
S	—	2.9
H ₂ O(+)	5.42	—
H ₂ O(−)	5.61	5.8
Ig. loss	—	7.5
Total	99.82	99.1

1. Miyakawa village, Suwa county, Nagano Pref. : Weathered part of Dunite : Analyst, M. Nakahira, Bull. Inst. P. C. Res. 22(1943) 375.
2. Wakayama nickel mine, Mie town, Ōno county, Ōita Pref. : Associated with millerite and opal in serpentine : Analyst, T. Sudô and T. Anzai, Proc. Imp. Acad. 18(1942) 403.

(47) *Saponite*.

SiO ₂	51.81%
Al ₂ O ₃	0.18
Fe ₂ O ₃	1.14
MnO	1.94
MgO	24.53
CaO	1.29
Na ₂ O	0.73
K ₂ O	0.21
H ₂ O(+)	6.22
H ₂ O(−)	12.47
Total	100.52

Kaso mine, Kamitoga county, Totigi Pref. : Mn-deposit : Analyst, T. Yosimura, J. Geol. Soc. Japan, 45(1938) 196; J. Fac. Sci., Hokkaidô Imp. Univ., Ser. IV, 4(1939) 436.

(48) *Glauconite.*

	1.	2.	3.	4.
SiO ₂	57.43%	61.96%	65.42%	64.47%
Al ₂ O ₃	4.55	11.81	12.38	17.36
Fe ₂ O ₃	12.09	—	—	—
FeO	3.02	7.93	8.18	3.78
MgO	3.97	2.32	2.79	2.35
CaO	0.79	5.49	2.52	0.12
Na ₂ O	2.25	1.19	2.03	0.75
K ₂ O	4.55	3.69	3.38	4.57
H ₂ O	8.86	—	—	—
Ig. loss	—	5.99	3.79	6.45
S	1.89	—	—	—
Total	99.40	100.38	100.48	99.84

1. Ōsunakuzure, Huzikoto village, Yamamoto county, Akita Pref. : Analyst, Y. Miki, Sci. Earth Crust 1(1944) 408.
2. Mitui village, Yamamoto county, Akita Pref. : Analyst, S. Nagai, J. Soc. Chem. Ind. Japan, 47 (1944) 92.
3. Wakura, Noto county, Isikawa Pref. : ditto.

(49) *Montmorillonite.*

SiO ₂	48.20%
Al ₂ O ₃	13.98
Fe ₂ O ₃	3.84
MgO	4.27
CaO	2.60
H ₂ O (+)	8.57
H ₂ O (-)	18.10
Total	99.56

Sibui, Tunetoyo village, E-Sirakawa county, Hukusima Pref. : Analyst, T. Sudô and T. Anzai, Proc. Imp. Acad, 18(1942) 402.

(50) *Dickite.*

SiO ₂	44.87%
Al ₂ O ₃	40.88
Fe ₂ O ₃	0.67
H ₂ O	14.02
Total	(99.94)

Syôkôsan, Hiba county, Hiroshima Pref. : Analyst, S. Nagai, T. Asahara and M. Imaoka, J. Jap. Ceram. Ass., 51 (1943) 381.

(51) *Kaolinite.*

	1.	2.
SiO ₂	67.60%	82.00%
Al ₂ O ₃	17.50	6.68
Fe ₂ O ₃	1.40	1.13
Cr ₂ O ₃	1.12	0.41
MgO	4.03	3.72
NiO	0.44	0.17
Ig. loss	7.63	5.51
Total	99.72	99.62

1. 2. Chrome Koalin : Urakawa town, Iwata county, Shizuoka Pref. : Analyst, T. Sudô and T. Anzai, Proc. Imp. Acad. 18 (1942) 404.

(52) *Allophane.*

δ	1.9702
SiO ₂	32.82%
Al ₂ O ₃	42.50
FeO	0.70
H ₂ O	24.20
Total	100.22

Takanami village, Usa county, Oita Pref. : Gold-silver quartz vein : Analyst, K. Masutomi, Warera no Kôbutu (Our Minerals) 10 (1941) 176.

(53) *Abukumalite.**

δ	4.35
SiO ₂	20.84%
BeO	0.00
MgO	0.22
CaO	13.55
MnO	1.13

* Phospho-orthosilicate of yttrium and calcium, CaY₂(Si, P)₂O₈, hexagonal and isomorphous with britholite. Named from the locality, Abukuma range. Dark reddish brown colour, prismatic. $\omega=1.750$. $\epsilon=1.752$. F. Maratschki (Z. f. M. (A) 1939, 161) regards it as a yttrium silicate apatite.

Fe ₂ O ₃	2.10
Al ₂ O ₃	1.05
Ce-Rare Earths	6.45
Y-Rare Earths	45.98
ThO ₂	0.90
UO ₂	0.00
B ₂ O ₃	0.00
TiO ₂ , ZrO ₂	0.00
Ta ₂ O ₅ , Nb ₂ O ₅	0.00
P ₂ O ₅	5.84
H ₂ O(+)	0.57
H ₂ O(-)	0.16
CO ₂	0.08
F	0.45
Total	99.30

Iizaka village, Date county, Hukusima Pref. : Pegmatite : Analyst, S. Hata,
Sci. Pap. 34(1938) 1020.

(54) *Penwithite*.

	1.	2.	3.	4.
δ	—	2.44	2.02	2.24
SiO ₂	34.84%	36.50%	27.28%	83.06%
Al ₂ O ₃	1.30	1.07	0.82	1.02
Fe ₂ O ₃	1.39	1.47	2.78	0.99
MnO	34.96	36.85	24.38	4.35
MnO ₂	1.41	—	—	—
MgO	1.31	6.02	5.68	3.97
CaO	0.55	—	3.86	—
Na ₂ O	0.11	—	—	—
K ₂ O	tr.	—	—	—
H ₂ O(+)	21.79	11.87	14.90	5.37
H ₂ O(-)	—	6.72	9.89	2.96
Cu	0.01	—	—	—
O	—	—	0.25	—
CO ₂	1.63	—	—	—
Total	99.30	100.50	99.84	101.72

1. Tamagawa mine, Noda village, Kunohe county, Iwate Pref. : Mn-deposit : Analyst, K. Kawai, J. Geol. Soc. Japan, 40(1933) 349.
2. 3. 4. Kaso mine, Kamitoga county, Totigi Pref. : Mn-deposit : Analyst, T. Yosimura, J. Geol. Soc. Japan, 45(1938) 187; J. Fac. Sci., Hokkaidō Imp. Univ., Ser. IV, 4(1939) 436.
 2. (brown) 3. (black) 4. (opaline)

(55) Aquacreptite.

	1.	2.	3.	4.	5.
SiO ₂	41.026%	43.576%	42.29%	31.90%	45.69%
Al ₂ O ₃	0.906	3.710	2.31	0.33	10.13
Fe ₂ O ₃	10.009	8.875	9.44	12.58	tr.
MgO	18.099	16.167	14.43	16.72	25.76
CaO	1.916	2.278	2.09	14.62	2.33
H ₂ O	27.134	26.280	26.70	24.57	16.41
Total	99.690	100.876	100.26	100.72	100.32

1. 2. Kiuragi, E-Matura county, Saga Pref. : Chrome deposit : Analyst, K. Kinoshita, J. Geol. Soc. Japan, 43(1946) 153.
 1. (yellow) 2. (brown)
 3. Ditto. : Analyst, K. Hurukawa : K. Kinoshita, Warera no Kôbutu (Our Mineral) 5 (1936) 106.
 4. Hinomima, Amakusa county, Kumamoto Pref. : Analyst, K. Indô : ditto.
 5. Hakozima, Taneyama village, Yatusiro county, Kumamoto Pref. : Vein in Serpentine : ditto.

(56) Protonontronite.

δ	1.975
SiO ₂	51.94%
Al ₂ O ₃	12.71
Fe ₂ O ₃	0.25
MgO	17.00
CaO	6.54
H ₂ O(+)	4.94
H ₂ O(−)	5.72
Total	99.10

Aida village, Uto county, Kumamoto Pref. : Pyroxene andesite : Analyst, K. Indô : K. Kinoshita, Warera no Kôbutu (Our Minerals) 5(1936) 261.

VII. Niobate Minerals

(57) Fergusonite.*

	1.	2.	3.	4.	5.
δ	5.77	—	—	—	5.537
Nb ₂ O ₅	29.88%	—%	—%	45.90%	—%
Ta ₂ O ₅	16.26	—	—	0.50	—

* See SUPPLEMENT.

(Nb, Ta) ₂ O ₅	—	47.99	49.25	—	46.7
Y-Rare Earths ...	35.05	—	—	37.57	} 40.2
Ce-Rare Earths ...	7.15	—	—	Ce ₂ O ₃ 1.20	
Y ₂ O ₃	—	37.20	34.14	—	—
ThO ₂	1.27	3.71	2.72	4.31	2.6
SnO ₂	0.11	—	—	0.18	0.3
ZnO	—	0.0	0.0	—	—
UO ₂	5.43	—	—	4.86	1.1
U ₃ O ₈	—	0.74	2.14	—	—
ZrO ₂	0.07	—	—	—	—
WO ₃	—	—	—	0.05	—
PbO	0.10	0.0	0.0	—	—
SiO ₃	0.66	1.68	2.54	0.70	1.0
TiO ₂	0.72	0.40	0.40	0.35	0.3
Al ₂ O ₃	0.21	—	—	1.20	0.8
Fe ₂ O ₃	0.60	3.61	6.20	0.21	4.0
MnO	0.10	2.67	0.18	tr.	0.0
MgO	0.00	0.16	0.31	0.05	0.5
CaO	2.54	0.46	0.0	0.75	1.3
Na ₂ O	—	0.90	1.58	—	—
K ₂ O	—	0.20	0.10	—	—
H ₂ O	—	0.28	0.44	2.17	n.d.
Ig. loss	1.32	—	—	—	—
Total	101.47	100.00	100.00	99.86	98.8

1. Iizaka village, Date county, Hukusima Pref. : Pegmatite : Analyst, S. S. Iimori and S. Hata, Sci. Pap. 34(1938) 505.
2. Hirukawa village, Ena county, Gihu Pref. : Pegmatite : Analyst, K. Kimura and H. Hamaguti, J. Chem. Soc. Japan, 59(1938) 1125.
3. Harada village, Mituki county, Hiroshima Pref. : Pegmatite : ditto.
4. Ooro, Goka village, Naka county, Kyôto Pref. : Pegmatite : Analyst, J. Takubo, J. Chem. Soc. Japan, 59 (1938) 1121; Mem. Fac. Sci., Kyôto Imp. Univ., B. 14(1939) 341.
5. Hiradani, Kido village, Siga county, Siga Pref. : Pegmatite : Analyst, T. Higami, Sci. Earth Crust, 1(1938) 318.

(58) Columbite.

δ	5.781
Ta ₂ O ₅	78.13%
Nb ₂ O ₅	—
SnO ₂	0.16
WO ₃	tr.
Rare Earths	0.11
SiO ₂	0.41
TiO ₂	tr.

Al ₂ O ₃	0.04
FeO	14.31
MnO	5.32
MgO	tr.
CaO	tr.
H ₂ O	1.15
Total	99.67

Hiradani, Kido village, Siga county, Siga Pref. : Pegmatite : Analyst, S. Osawa and T. Higami, Sci. Earth Crust, 1 (1937) 70.

(59) *Yttrotantalite.*

δ	5.774
Ta ₂ O ₅	40.40%
Nb ₂ O ₅	14.25
UO ₂	4.11
Ce ₂ O ₃	1.34
Ce-Rare Earths	0.90
Y-Rare Earths	18.61
SnO ₂	0.44
ThO ₂	2.45
SiO ₂	1.24
TiO ₂	0.36
Al ₂ O ₃	2.18
FeO	5.81
MnO	3.89
MgO	0.13
CaO	0.08
H ₂ O(—)	0.19
Total	96.38

Simotanokami village, Kurita county, Siga Pref. : Pegmatite : Analyst, J. Takubo and K. Ooya, Rep. Inst. Geol. Miner., Fac. Sci., Kyōto Imp. Univ., No. 3 (1944) 36-37.

(60) *Samarskite.*

δ	5.624
(Nb, Ta) ₂ O ₅	50.49%
SnO ₂	0.73
SiO ₂	1.95
TiO ₂	0.07

Al ₂ O ₃	.....	0.66
Rare Earths	.....	14.41
UO ₂	.....	15.84
FeO	.....	11.52
MnO	.....	0.97
MgO	.....	1.43
CaO	.....	1.85
H ₂ O	.....	0.88
Total	.....	100.80

Mikunidake, Nisisyô village, Takasima county, Siga Pref. : Pegmatite : Analyst, T. Higami, Sci. Earth Crust, 1(1939) 440.

(61) *Euxenite.*

	1.	2.
δ	4-5	4.843
SiO ₂	2.83%	0.45%
TiO ₂	41.78	38.44
Al ₂ O ₃	0.51	0.80
Fe ₂ O ₃	1.15	8.77
FeO	1.82	—
MnO	2.06	0.74
MgO	0.00	0.32
CaO	3.91	2.25
BaO	1.23	—
Rare Earths	14.47	20.05
SnO ₂	2.45	0.51
ThO ₂	0.20	—
ZrO ₂	1.76	—
(Nb, Ta) ₂ O ₅	14.22	17.36
U ₃ O ₈	10.11	7.69
H ₂ O(+)	2.52	—
H ₂ O(-)	0.20	—
Ig. loss	—	3.48
Total	101.22	100.86

- Yamanoo, Makabe town, Makabe county, Ibaragi Pref. : Pegmatite : Analyst, K. Kimura and M. Ikawa, Warera no Kôbutu (Our Minerals) 10(1941) 78.
- Hiradani, Kido village, Siga county, Siga Pref. : Pegmatite : Analyst, T. Higami, Sci. Earth Crust, 1(1943) 316.

VIII. Phosphate Minerals

(62) Xenotime.

	1.	2.
δ	4.46	4.42
P_2O_5	25.38%	26.1 %
Ce-Rare Earths.	2.14	0.4
Y-Rare Earths .	51.82	52.8
SiO_2	4.32	8.2
Al_2O_3	4.80	{ }0.8
Fe_2O_3	—	
FeO	1.10	—
MnO	1.72	tr.
MgO	0.02	—
CaO	0.61	0.8
ZrO_2	1.90	3.0
ThO_2	2.47	2.2
UO_2	3.17	5.2
H_2O	0.20	—
Total	99.65	99.5

1. Iizaka village, Date county, Hukusima Pref. : Pegmatite : Analyst, S. Hata, Sci. Pap. 34(1938) 620.
2. Uran rich Xenotime : Sadakiyo, Yuu town, Kuga county, Yamaguti Pref. : Pegmatite : Analyst, S. Hata, Sci. Pap. 29(1936) 38.

(63) Monazite.

	1.	2.
δ	5.11	—
P_2O_5	29.10%	26.41%
Ce_2O_3	27.77	22.03
Rare Earths ...	—	38.57
Ce-Rare Earths.	28.15	—
Y-Rare Earths .	3.01	—
ThO_2	6.49	5.53
UO_3	—	0.44
BeO	—	1.44
ZrO_2	—	0.00
SiO_2	2.64	5.07
TiO_2	—	0.00
Al_2O_3	0.75	0.00
Fe_2O_3	1.33	1.52
MgO	0.08	0.00
CaO	0.47	—

Insoluble	1.38
H ₂ O	0.64
Total	100.43

1. Kutinokura, Kaminogō village, Siki county, Nara Pref. : Pegmatite : Analyst, K. Masutomi and T. Higami, Sci. Earth Crust, (1944) 437.
2. Kotōge, Kawasaki town, Tagawa county, Fukuoka Pref. : Pegmatite : Analyst, K. Kimura and T. Iimori, J. Geol. Soc. Japan, 43 (1936) 450.

(64) Apatite.

	1.	2.
CaO	53.85%	52.40%
P ₂ O ₅	41.78	40.98
Cl	1.42	3.74
F	0.44	1.15
Fe ₂ O ₃	0.61	
FeO		0.21
MnO	0.41	1.52
MgO	0.54	0.54
Na ₂ O	0.00	0.00
K ₂ O	0.00	0.00
H ₂ O	0.10	0.06
Total	99.15	100.60

1. 2. Kurokura, Miho village, Simo-Asigara county, Kanagawa Pref. : Analyst, A. Kannari : Z. Harada, J. Jap. Ass. M. P. G. 18 (1937) 243.
1. (peripheral part) 2. (central part)

(65) Autunite.

SiO ₂	4.5%
Al ₂ O ₃	5.9
Fe ₂ O ₃	1.0
MnO	0.0
MgO	0.0
CaO	5.9
Rare Earths	0.0
ThO ₂	51.4
P ₂ O ₅	12.9
H ₂ O (+)	12.6
H ₂ O (-)	6.4
Total	100.6

Isii, Yanai town, Kuga county, Yamaguti Pref. : Pegmatite : Analyst, K. Kimura and T. Iimori, J. Geol. Soc. Japan, 43(1936) 452; J. Chem. Soc. Japan, 58(1937) 1145.

IX. Uranate Minerals

(66) *Uraninite or Pitchblende.*

	1.	2.	3.	4.	5.	6.
U_3O_8	84.0 %	79.6 %	—%	89.34%	(87.19)%	69.34%
UO_3	—	—	22.23	—	—	—
UO_2	—	—	55.40	—	—	—
ThO_2	1.5	1.0	3.86	2.07	5.68	1.89
$(\text{Ce}, \text{Y})_2\text{O}_3$..	10.0	12.4	—	—	—	—
Rare Earths ..	—	—	—	6.44	5.84	3.12
Y-R. E.	—	—	14.60	—	—	—
Ce-R. E.	—	—	0.41	—	—	—
$(\text{Nb}, \text{Ta})_2\text{O}_5$..	—	—	0.74	—	—	—
Bi_2O_3	0.0	2.5	0.00	—	—	—
(+ Insoluble)						
PbO	0.7	0.4	1.01	1.79	0.13	1.12
SiO_2	—	—	0.11	—	—	—
Al_2O_3	} 3.2	—	0.17	—	—	0.25
Fe_2O_3		3.4	0.44	0.00	0.13	—
CO_2	—	—	0.28	—	—	—
$\text{CuO}, \text{As}_2\text{O}_3$..	tr.	0.0	—	—	—	—
H_2O	—	—	0.50	—	—	—
Insoluble ...	—	—	—	—	1.03	4.10
Total	99.4	99.3	99.75	99.64	100.00	99.82

1. Cleveite : Ohari village, Igu county, Miyagi Pref. : Pegmatite : Analyst, S. Hata and T. Iimori, Bull. Inst. P. C. Res., 17(1938) 358.
2. Cleveite : Santyôme, Ôkuma village, Date county, Hukusima Pref. : Pegmatite : ditto.
3. Cleveite : Iizaka village, Date county, Hukusima Pref. : Pegmatite : Analyst, T. Iimori, Sci. Pap. 39 (1942) 209.
4. 5. 6. Kawasaki town, Tagawa county, Hukuoka Pref. : Pegmatite : Analyst, K. Kimura and T. Iimori, J. Geol. Soc. Japan, 43(1936) 451.
4. 5. (Masaki) 6. (Kotôge).

X. Sulphate and Tellurate Minerals

(67) Anglesite.

PbO	71.60%
SO ₃	28.08
Total	99.68

Yakumo mine, Yakumo town, Yamakosi county, Iburi Prov., Hokkaidō : Lead-zinc vein : Analyst, R. Suzuki, J. Jap. Ass. M. P. G. 25(1941) 136.

(68) Gypsum.

CaO	32.09%
SO ₃	46.00
Ig. loss	20.21
Total	98.21

Selenite : Hukuoka village, Karita county, Miyagi Pref. : Analyst, R. Suzuki, J. Jap. Ass. M. P. G. 90(1943) 17.

(69) Leadhillite.

δ	6.62
PbO	66.42%
CuO	2.55
SO ₃	6.03
CO ₂	9.81
H ₂ O(+)	1.90
H ₂ O(-)	0.28
As ₂ O ₅	0.40
Insoluble	
Fe ₂ O ₃	9.04
As ₂ O ₅	1.85
P ₂ O ₅	{
Another	0.88
Total	99.16

Toroku mine, Iwato village, W-Usuki county, Miyazaki Pref. : Tin-lead-zinc deposit : Analyst, T. Yosimura, J. Jap. Ass. M. P. G. 17(1937) 130.

(70) Caledonite.

	1.	2.	3.
δ	6.13	6.13	6.13
PbO	66.58%	66.80%	66.69%
CuO	9.39	8.75	9.07
SO ₃	12.48	12.38	12.43
CO ₂	2.55	4.03	3.29
H ₂ O	3.49	3.19	3.34
As ₂ O ₅	—	tr.	tr.
Insoluble	0.40	—	0.20
Total	94.89	95.15	95.02

1. 2. 3. Toroku mine, Iwato village, W-Usuki county, Miyazaki Pref. : Tin-lead-zinc deposit : Analyst, T. Yosimura, J. Jap. Ass. M. P. G. 17(1937) 124.
 3. (Mean value of 1. and 2.)

(71) Alunite.

SiO ₂	0.50%
Al ₂ O ₃	37.54
Fe ₂ O ₃	0.49
Na ₂ O	3.84
K ₂ O	4.32
SO ₃	39.62
H ₂ O (+)	13.38
H ₂ O (-)	0.37
Total	100.11 (100.06)

Ukusu village, Kamo county, Sizuoka Pref. : Analyst, Y. Kawano, J. Jap. Ass. M. P. G. 17(1936) 33.

(72) Teinéite.*

δ	3.80
----------------	------

* Hydrous tellurate and sulphate of copper. Cu(Te, S)O₄·2H₂O, as blue orthorhombic crystals from oxidation zone of Teine mine. Named from the locality.

a : b : c = 0.7051 : 1 : 0.7860

Cleavage // (010) good, // (001), (100) weak.

H = 2.5 d = 3.80

$\alpha = 1.767 \quad \beta = 1.782 \quad \gamma = 1.791 \quad \gamma - \alpha = 0.026 \quad (-)2V = 36.0^\circ$

CuO	28.0 %
TeO ₃	48.0
SO ₃	6.6
H ₂ O	12.2
Insoluble { Quartz	1.7
{ Barite	1.4
Total	100.9

Teine mine, Teine village, Isikari Prov., Hokkaidō : Gold-copper vein
Analyst, T. Yosimura, J. Jap. Ass. M. P. G. 16(1936) 231.

XI. Hydrocarbon Minerals

(73) Thucholite.

C	30%
Another volatile components	30
SiO ₂	20
Ash Component (Σ Rare Earths, ThO ₂ , U ₃ O ₈ etc.)	20
Total	100

Kotōge, Kawasaki town, Tagawa county, Hukuoka Pref. : Pegmatite
Analyst, K. Kimura and T. Iimori, J. Chem. Soc. Japan, 58(1937) 1138.

SUPPLEMENT

(74) Iridosmine.

	1.	2.	3.
δ	20.35–20.42	20.15–20.22	—%
Ir	45.31%	38.23%	—%
Os	36.01	37.65	—
Ru	14.70	21.03	—
Pd	tr.	0.87	51.10
Pt	0.51	1.81	48.90
Rh	1.09	0.51	—
Total ...	99.62	100.10	100.00

- Iridosmine : No. 8 valley, the 2 Tesio experimental plantation of Hokkaidō Imp. University, Tesio Prov., Hokkaidō : Placer : Analyst, R. Takahasi, J. Mining Inst. Japan, 57(1941) 588.
- Ditto : No. 4 gold placer valley, Uryū experimental plantation of Hokkaidō Imp. University, Isikari Prov., Hokkaidō : ditto : ditto.

3. A variety of iridosmine with magnetic property : the same locality of
No. 1 : ditto : ditto.

(75) *Ferro-Cobaltite*

Fe	22.25%
Co	15.31
As	39.52
S	22.56
Insoluble	0.57
 Total	100.21

Tiyogahara mine, Otuho village, E-Iwai county, Iwate Pref. : Nickel-cobalt-copper vein : Analyst, J. Kitahara : M. Watanabe, J. JaJp. Ass. M. P. G., (1943) 281.

(76) *Ferri-Molybdite*

Fe ₂ O ₃	21.78%	17.70%
M _o O ₃	41.76	55.57
H ₂ O(+)	15.21	20.22
Ig. loss	—	5.66
Insoluble	20.76	0.42
 Total	99.51	100.57

1. Ino, Umi town, Kasuya county, Hukuoka Pref. : Molybdenite quartz vein : Analyst, T. Dôno : K. Nakamura, Warera no Kôbutu (Our Minerals) 6(1937) 181.
2. Kawai, Ayô village, Ôhara county, Simane Pref. : Molybdenite quartz vein : Analyst, T. Sudô, J. Jap. Ass. M. P. G. 30(1943) 269.

(77) *Petalite*

SiO ₂	77.62%
Al ₂ O ₃	16.39
Fe ₂ O ₃	0.19
FeO	0.14
MnO	0.00
MgO	0.16
CaO	0.52
Na ₂ O	0.52
K ₂ O	0.12
Li ₂ O	4.49

H ₂ O	0.66
Total	100.63

Nagatoro, Hukuoka city, Hukuoka Pref. : Pegmatite : Analyst, H. Sibata,
General Rep. 58th Special Committee, Jap. Ass. Prom. Sci., No. 12(1945) 14.

(78) *Torbernite*

CuO	5.4%
UO ₃	38.4
P ₂ O ₅	8.8
SiO ₃	1.5
CaO	tr.
As ₂ O ₅	0.0
Bi ₂ O ₅	0.0
H ₂ O	n.d.

Santyōme, Ōkuma village, Tamura county, Hukusima Pref. : Pegmatite :
Analyst, S. Hata, T. Iimori, Bull. Inst. P. C. Res. 17(1938) 356.

(57) *Fergusonite* (continued)

	6.	7.
δ	5.4	5.54
Nb ₂ O ₅	6.	7.
Ta ₂ O ₅	43.3 %	50.6 %
Ce- Rare Earths	39.4	Rare Earths 38.6
Y- Rare Earths	—	—
ThO ₂	1.1	0.8
UO ₂	5.1	4.0
TiO ₂	0.4	0.4
Al ₂ O ₃	0.2	0.2
Fe ₂ O ₃	1.5	—
FeO	—	0.8
MnO	0.1	0.1
MgO	0.4	0.2
CaO	1.4	2.8
Ig. loss	2.0	—
Total	94.9	99.5

6. Kaihōsaku, Ōda village, Adati county, Hukusima Pref. : Pegmatite :
Analyst, S. Hata, T. Iimori, O. Nagasima, Bull. Inst. P. C. Res.
20(1941) 451.
7. Ōkaneda, Sekimoto village, Taga county, Ibaragi Pref. : Pegmatite :
Analyst, S. Hata : ditto.

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