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CHEMICAL ANALYSES OF JAPANESE MINERALS (IV)

By

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INTRODUCTION

This report is a supplement of the report "Chemische Analysenresultate von Japanischen Mineralien" published in 1936.* That report, the second** and the third report*** included all analyses of Japanese minerals in earlier publication, thus being completed from 1807 to 1935, from 1936 to 1946, from 1946 to 1952 respectively.

The object of this report is mainly to put on record the additional new analyses made since 1953 and not including a vast number of partial routine determinations and numerous analyses made in connection with technical purposes, as in the former reports.

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

563 analyses of Japanese minerals were reported in the period 1953-1957. It induces that considerable research works on mineralogic and geochemical problems in the last five years have been done in Japan.

Here the mineral analyses, except silicates, are arranged according to the classifications of DANA's System of Mineralogy, 7th Edition, the classifications of silicates are classified by the classification of H. STRUNZ's *Mineralogische Tabellen*, 3 Auflage (1957).

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

When Analyst and Author was the same, or when Analyst was not

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

** This Journal Vol. VII, Nos. 1-2, 1948.

*** This Journal Vol. VIII, No. 4, 1954.

stated, only the Analyst either the Author is written in this report. In the case of the mode of occurrence was not given or uncertain, its description is omitted.

The amalgamations of village and town were held in Japan during 1953 and 1958. Therefore the new revised name of the locality was written in this report.

Misprinted or miscalculated total sum of analyses were corrected in brackets.

September, 1958

Z. HARADA

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List of Abbreviation

Am. Miner.	American Mineralogist.
Bull. Earthq. Res. Inst.	Bulletin of the Earthquake Research Institute, University of Tôkyô.
Bull. Res. Inst. Miner. Metall.	Bulletin of the Research Institute of Mineral Dressing and Metallurgy, Tôhoku Uni- versity.
Bull. Nagoya Inst. Tech.	Bulletin of the Nagoya Institute of Tech- nology.
Jap. J. Geol. Geogr.	Japanese Journal of Geology and Mineralogy.
J. Ceram. Ass. Japan.	Journal of the Ceramic Association of Japan.
J. Chem. Soc. Japan.	Journal of the Chemical Society of Japan.
J. Earth Sci., Nagoya Univ.	Journal of the Earth Science, Nagoya Uni- versity.
J. Fac. Sci., Hokkaidô Univ.	Journal of the Faculty of Science, Hokkaidô University.
J. Geogr. Tôkyô.	Journal of Geography, Tôkyô.
J. Geol. Soc. Japan.	Journal of the Geological Society of Japan.
J. Ind. Chem. Japan.	Industrial Chemistry Section, Journal of the Chemical Society of Japan.
J. Miner. Soc. Japan.	Journal of the Mineralogical Society of Japan.
J. Min. Inst. Kyûsyû.	Journal of the Mining Institute of Kyûsyû.
J. Jap. Ass. M.P.G.	Journal of the Association of Mineralogists, Petrologists and Economic Geologists.
J. Sci., Hiroshima Univ.	Journal of Science, Hiroshima University.
Mem. Coll. Sci., Univ. Kyôto.	Memoirs of the College of Science, University of Kyôto.
Mem. Fac. Sci. Kyûshû Univ.	Memoirs of the Faculty of Science, Kyûshû University.
Mem. Sch. Sci. & Eng., Waseda Univ.	Memoirs of the School of Science and En- gineering, Waseda University.
Miner. J.	Minerological Journal.
Proc. Japan Acad.	Proceedings of Japan Academy.
Rep. Fac. Eng., Iwaté Univ.	Report of the Faculty of Engineering, Iwaté University.
Rep. Res. Lab. Asahi Glass Co.	Report of the Research Institute of the Asahi Glass Company.
Sci. Pap. Coll. Gen. Ed., Univ. Tôkyô.	Science Paper of the College of General Edu- cation, University of Tôkyô.
Sci. Rep. Kanazawa Univ.	Science Report of the Kanazawa University.
Sci. Rep. Saitama Univ.	Science Report of the Saitama University.
Sci. Rep. Tôhoku Univ.	Science Report of the Tôhoku University.
Stanford Univ. Publ., Univ. Ser., Geol. Sci.	Stanford University Publication, University Series, Geological Science.
Yamaguchi J. Sci.	Yamaguchi Journal of Science.

I. Sulfide Minerals

(1) *Diegenite*

	1.	2.
Cu	56.27%	56.45%
Fe	1.75	1.69
S	11.44	11.28
SiO ₂	14.14	14.12

- 1, 2. Ôjamine mine, Yakuwa, Ôizumi, Asahi village, Higasitagawa county, Yamagata Pref.: Analyst, T. TAKEUCHI and M. NAMBU, J. MINER. Soc. Japan, I. (1954) 876. Later (1957) this mineral was named by the same authors as "neodiegenite" (Sci. Rep. Tôhoku Univ. III. Ser. 5 (1957) 308).

(2) *Alabandite*

δ	4.03-4.06
Mn	57.64%
Fe ³⁺	tr
Fe ²⁺	3.73
Zn	0.36
S	34.48
Total	96.21

Kusugi mine, Kawagoé, Syutô town, Kuga county, Yamaguti Pref.: In manganese deposit in Palaeozoics.: Analyst, W. H. HERDSMAN: E. D. LEE, Stanford Univ. Publ., Univ. Ser. Geol. Sci., 5, (1955) 45.

(3) *Bismuthinite*

Pb	1.52%
Cu	1.93
Bi	74.44
Sb	1.01
S.	16.23
Total	95.18
	(95.13)

Miyatamata mine, Kyôwa village, Senpoku county, Akita Pref.: Steelgray acicular crystal in quartz vein with hematite: Analyst, S. MATSUDA (1952): H. OHMACHI and S. MATSUDA, J. Miner. Soc. Japan, I, (1953) 72.

(4) *Horobetsuite** (New Mineral)

	1.	2.	3.
δ	—	5.449	—

* Crystal habit prismatic with striations parallel to the prism zone. Size 1.0-7.0 mm in length and 0.2-2.0 mm in diameter. Sp. gr. 5.449. Hardness ca 2. Lead gray color. Streak black. Chemical formula (Bi, Sb)₂S₃ Bi₂S₃: Sb₂S₃=7:3~3:7. The name is for the mine.

Bi	56.93%	44.80%	51.84%
Sd	21.49	32.30	17.20
S	21.57	23.00	24.15
Fe	tr.	tr.	5.20
Insol.	tr.	0.05	0.98
Total	99.99	100.15	99.37

- 1, 2, 3. Horobetsu mine, Horobetsu town, Horobetsu county, Iburi Prov. Hokkaidô:
Occurs with free sulphur and iron sulfide minerals in sulphur deposit.: Analyst,
(1) (2) ...S. ITO, (3) ...R. SEI: K. HAYASE, *Miner. J.* **1**, (1955) 191.

(5) *Pyrite*

	1.	2.	3.	4.	5.	6.	7.
Fe	45.39%	45.36%	45.29%	46.12%	46.32%	46.15%	46.29%
S	53.34	52.33	51.25	52.50	51.85	52.53	52.51
Insol.	1.39	1.52	2.38	1.92	1.71	1.22	1.21
Total	99.12	99.21	99.12	100.54	99.88	100.62	100.61
			(98.92)			(99.90)	(100.01)
	8.	9.	10.	11.	12.	13.	14.
δ	—	—	—	—	—	—	4.980
Fe	45.23%	45.20%	46.21%	46.20%	46.22%	46.18%	46.29%
Zn	—	—	—	—	—	—	0.21
Cu	—	—	—	—	—	—	0.05
Pb	—	—	—	—	—	—	tr.
S	52.44	51.73	52.51	51.77	52.79	52.68	52.73
SiO ₂	—	—	—	—	—	—	0.46
Insol.	2.86	2.23	1.57	1.60	1.57	1.03	—
Total	100.53	99.16	100.29	99.57	100.58	99.89	(99.74)

- 1-13. Tutiya-Isizaki mine, Zenikamezawa village, Kameda county, Osima Prov. Hokkaidô: In pyrite vein: Analyst, Y. HARIYA: Z. HARADA & Y. HARIYA, *Miner. J.* **1**, (1954), 105.
14. Kamikita mine, Tenmabayasi village, Kamikita county, Aomori Pref.: Fine crystal with pentagonal dodecahedron (210); Analyst, H. FUSHIMI, *Mem. Sch. Sci. & Eng. Waseda Univ.*, No. 21 (1957) 91.

(6) *Cobaltite*

Co	23.10%
Ni	4.68
Fe	1.30
As	35.52
S	15.19
SiO ₂	6.30
Al ₂ O ₃	11.11
Total	97.20

Yonesato mine, Esasi town, Esasi county, Iwaté Pref.: In contact metasomatic deposit: Analyst, M. SUZUKI: T. TAKEUCHI and M. NAMBU. Bull. Res. Inst. Miner. Dress. Metall., **11**, (1955) 33.

(7) *Gersdorffite*

Ni	14.00%
Co	8.08
Fe	5.80
As	36.47
S	14.04

Okura mine, Yamato village, Minamiuonuma county, Niigata Pref.: In cupriferous pyrrhotite deposit in serpentine: Analyst, K. ISONO: H. GÔHARA, J. Miner. Soc. Japan, **2**, (1956) 405.

(8) *Loellingite*

Fe	29.77%
Co	0.89
Ni	tr.
As	58.59
S	10.41
SiO ₂	tr.

Total 99.66

sulfurian loellingite: Mukuromi mine, Kamaisi city, Iwaté Pref.: In contact metasomatic gold deposit: Analyst, T. TAKEUCHI, M. SHIMADA, M. NAMBU & K. OKADA, Bull. Res. Inst. Miner. Metall. **13** (1957) 129.

(9) *Marcasite*

Fe	41.81%
Cu	0.03
Zn	0.05
Pb	0.04
As	0.05
S	53.71
Ge	0.08
SiO ₂	0.09

Total 99.86
(95.86)

Dôhi vein, Obira mine, Ogata town, Ôno county, Ôita Pref.: In copper vein: Analyst, H. MINATO: M. MIYAHISA, J. Min. Inst. Kyusyu, **22**, (1954) 153.

II. Sulphosalt Minerals

(10) *Enargite*

	1.	2.
S	32.30%	32.52%

As	18.66	18.84
Sb	0.48	0.36
Cu	48.25	47.60
Fe	0.00	0.03
Total	99.69	99.62
		(99.35)

- 1, 2. Yoti, Saku town, Minamisaku county, Nagano Pref.: Analyst, K. ISONO: I. SUNAGAWA, J. Geogr. Tôkyô, **62**, (1953) 31.

(11) *Luzonite*

δ	4.48-0.03 (20°C)
Cu	44.3%
Fe	0.7
Zn	tr.
Bi	1.5
As	11.0
Sb	10.4
S	30.8
SiO ₂	0.7
Cr ₂ O ₃	0.9
Total	100.3

Antimony rich luzonite: Teiné mine, Teiné town, Sapporo county, Isikari Prov. Hokkaidô: In gold silver copper vein: Analyst, H. MINATO (1950): H. MINATO, Y. TAKANO and H. MURAOKA, Sci. Pap. Coll. Gen. Ed., Univ. Tôkyô, 4, (1954) 159.

III. Oxyde and Hydroxyde Minerals

(12) *Quartz*

SiO ₂	97.35%
Al ₂ O ₃	1.64
Fe ₂ O ₃	0.44
MgO	0.19
CaO	0.31
Ig. loss	0.43
Total	100.36

Sanko, Huzioka village, Nisikamo county, Aiti Pref.; Analyst, K. HUKUO & H. SUZUKI, Bull. Nagoya Inst. Tech. No. 7 (1955) 3.

(13) *Opal (Geyserite)*

	1.	2.	3.	4.
SiO ₂	89.14%	90.07%	93.63%	87.54%
Al ₂ O ₃	1.70	0.94	0.02	2.61

Fe ₂ O ₃	tr.	1.08	0.10	2.45
MgO	non	tr.	—	0.11
CaO	2.59	0.66	tr.	0.85
P ₂ O ₅	0.27	—	—	—
SO ₃	0.76	tr.	—	tr.
H ₂ O (+)	0.30	0.56	1.98	0.65
H ₂ O (—)	5.48	6.45	3.40	6.31
Total	100.25	99.76	99.18	100.52

1. Opal: Isiyasuba deposit, Suwa iron mine, Tino town, Suwa county, Nagano Pref.: White fibrous. In jarosite bed: Analyst, H. MINATO (1948), J. Miner. Soc. Japan, **1**, (1953) 69.
- 2, 3, 4. Geyserite: Makizono town, Aira county, Kagosima Pref.: Siliceous sinter, soluble silica (2) 51.12% (4) 42.39%: Analyst, K. SHIMADA & T. KOMAKI; J. Ceram. Ass. Japan, **62**, (1954) 607.

(14) *Manganosite*

δ	n.d.
MnO	89.75%
MgO	4.06
FeO	2.82
O	0.12
SiO ₂	1.67
Al ₂ O ₃	tr.
CaO	tr.
Na ₂ O	n.d.
K ₂ O	n.d.
CO ₂	n.d.
H ₂ O (+)	n.d.
H ₂ O (—)	n.d.
Total	98.42

Ôashi mine, Kanuma city, Totigi Pref.: In manganese deposit: Analyst, T. YOSHIMURA, Manganese deposits in Japan, (1952) 86.

(15) *Corundum*

δ	3.963 ($^{16}\text{O}^{16}\text{C}$)
Al ₂ O ₃	96.40%
SiO ₂	1.19
TiO ₂	0.31
Fe ₂ O ₃	1.82
MnO	none
MgO	0.09
CaO	none
H ₂ O (+)	0.17
H ₂ O (—)	0.13
Total	100.11

Okita, Daitô town, Higashiiwai county, Iwaté Pref.: Porphyritic crystal in sillimanite hornfels: Analyst, S. HASEGAWA, J. Jap. Ass. M.P.G., **39**, (1955) 20.

(16) *Hematite (Specularite)*

	1.	2.
Fe ₂ O ₃	92.54%	} 100.32%
FeO	2.13	
NiO	—	0.000
MnO	—	0.92
MgO	0.38	—
CaO	0.05	—
SiO ₂	2.66	—
TiO ₂	0.42	0.0
V ₂ O ₅	—	0.02
Cr ₂ O ₃	—	0.000
H ₂ O ₃ (+)	0.67	—
H ₂ O ₃ (-)	0.00	—
Insol	0.61	—
Total	100.46	100.260
	(99.46)	

1. Specularite: Maédaké, Mt. Asama volcano, Nagano Pref.: In cracks of two-pyroxene andesite: Analyst, E. MINAMI & J. OSSAKA, Bull. Earthq. Res. Inst., **35**, (1957) 623.
2. Hematite: Ebisu mine, Takuwa, Mitoya town, Iisi county, Simané Pref.: In aplite dyke: Analyst, K. KATSURA: K. KINOSHITA & K. MUTA, J. Geol. Soc. Japan, **60**, (1954) 375.

(17) *Hydrohematite*

	1.	2.
SiO ₂	3.89%	1.67%
Al ₂ O ₃	2.17	2.27
Fe ₂ O ₃	89.73	92.39
H ₂ O(+)	2.75	2.00
H ₂ O(-)	1.20	1.20
Total	99.74	99.49
		(99.53)

- 1, 2. Oowani mine, Higasi-Tugaru county, Aomori Pref.: Primary hydrohematite (crystallized out from hydrothermal solution) in macaceous hematite deposit. (1) central part, (2) shell part: Analyst, M. NAMBU, Bull. Res. Inst. Miner. Metall., **11**, (1955) No. 1, 59.

(18) *Ilmenite*

	1.	2.
δ	—	3.705 ($^{45^{\circ}\text{C}}$)
TiO ₂	48.69%	46.23%

Fe ₂ O ₃	2.60	11.33
FeO	46.85	26.95
MnO	0.76	13.80
SiO ₂	0.81	0.32
Al ₂ O ₃	1.23	—
MgO	—	—
CaO	—	none
H ₂ O(+)	—	0.18
H ₂ O(−)	—	0.46
Total	100.94	99.67 (99.27)

1. Isikawa town, Isikawa county, Hukusima Pref.: In pegmatite: Analyst, T. ASHIZAWA: K. SAKURAI and T. ASHIZAWA, J. Miner. Soc. Japan, **1**, (1953) 147.
2. Manganoilmenite: Teragi, Iwaizumi town, Simohei county, Iwaté Pref.: In pegmatite: Analyst, S. HASEGAWA: K. ÔMORI and S. HASEGAWA, J. Jap. Ass. M.P.G., **39**, (1955) 96.

(19) *Pyrolusite*

	1.	2.	3.
δ	3.347 (4.89)*	3.987 (4.22)*	4.809 (5.07)*
Mn ₂ O	72.28%	70.98%	76.45%
O	15.69	14.10	17.12
MgO	tr.	1.59	tr.
CaO	1.39	0.59	0.07
BaO	0.32	2.00	tr.
SiO ₂	10.29	0.73	1.27
TiO ₂	0.03	0.02	0.03
Al ₂ O ₃	0.27	tr.	0.39
Fe ₂ O ₃	0.35	0.97	0.42
Na ₂ O	tr.	0.32	n.d.
K ₂ O	tr.	0.78	n.d.
P ₂ O ₅	n.d.	n.d.	n.d.
H ₂ O(+)	0.53	5.37	4.77
H ₂ O(−)	0.98	1.79	1.34
Total	102.12 (102.13)	99.24	101.86

1. Pirika mine, Imagané town, Siribesi Prov. Hokkaidô: In manganese ore deposit. Colour, bluish black: Analyst, Y. UKAI, S. NISHIMURA & T. MAEDA, Mem. Coll. Sci., Univ. Kyôto, Ser. B, **23**, (1956) 205.
- 2, 3. Hukaura mine, Hukaura town, Nisitugaru county, Aomori Pref.: In manganese ore deposit. Colour, (2) coal black, fibrous; (3) bluish black, massive, brittle and easy to grind to fine powder: Analyst, loc. cit.

* Corrected sp. gr., excluding the heterogeneously contaminated substances.

(20) *Cryptomelane*

	1.	2.	3.	4.	5.
δ	4.393 (4.39) *	4.314 (4.54) *	4.009 (4.28) *	3.783 (4.19) *	3.987 (4.10) *
MnO	77.01%	75.26%	76.51%	73.92%	74.10%
O	15.84	15.74	14.50	14.99	13.78
SiO ₂	0.43	0.60	0.38	0.14	1.62
TiO ₂	0.05	0.03	0.09	tr.	0.04
Al ₂ O ₃	0.46	0.25	0.61	0.06	1.71
Fe ₂ O ₃	0.97	0.86	1.01	1.15	1.23
MgO	0.32	tr.	0.36	0.30	0.40
CaO	tr.	0.12	0.27	0.64	0.22
BaO	0.97	1.54	0.92	tr.	0.10
Na ₂ O	2.30	0.35	0.07	0.75	0.25
K ₂ O	0.79	0.50	0.99	1.34	0.58
P ₂ O ₅	n.d.	0.13	0.21	n.d.	n.d.
H ₂ O (+) ..	0.89	3.45	3.35	4.39	4.66
H ₂ O (−) ..	0.89	1.51	2.07	3.38	0.89
Total	100.92	100.34	101.34	101.06	99.59
					(99.58)

- 1, 2. Cryptomelane: Kawai mine, Hinozawa, Yamagata village, Kunohé county, Iwaté Pref.: Precipitated product, having a botryoidal or kidney shape: Analyst, Y. UKAI, S. NISHIMURA & T. MAYEDA, Mem. Coll. Sci., Univ. Kyôto, Ser. B. **23**, (1956) 205.
- 2, 3. Mixture of Cryptomelane and ramsdellite: The same locality: (2) Hardness high, broken into angular blocks, (3) Colour, dull black: ditto.
4. Cryptomelane: Maruno mine, Nomura town, Higasiura county, Ehimé Pref.: Colour. dull black: ditto.
5. Mixture of Cryptomelane and ramsdellite: Tuzinaka mine, Nomura town, the same county: Precipitated product, having a botryoidal form: ditto.

(21) *Wad*

	1.	2.	3.
MnO ₂	40.29%	85.55%	42.29%
MnO	6.21	0.34	24.29
SiO ₂	32.40	0.25	8.10
Al ₂ O ₃	0.62	0.48	0.92
Fe ₂ O ₃	0.49	0.99	0.81
MgO	2.29	1.63	1.19
CaO	1.95	0.88	3.31
BaO	0.33	0.89	0.13
CaO	0.07	0.03	0.03
ZnO	tr.	tr.	tr.
PbO	0.03	0.01	0.01
Na ₂ O	0.30	0.30	0.24
K ₂ O	0.49	0.77	0.44

P ₂ O ₅	0.54	0.54	0.41
H ₂ O (+)	7.80	4.25	13.20
H ₂ O (—)	7.27	1.21	6.39
Total	101.08	98.12	101.76

1. Akan mine, Moasyoro, Asyoro town, Asyoro county, Tokati Prov. Hokkaidô: Bog manganese ore: Analyst, Y. HARIYA, J. Miner. Soc. Japan. 3, (1957) 303.
2. Niimi hot spring, Iwanai town, Iwanai county, Siribesi Prov. Hokkaidô: loc. cit.
3. Komagataké mine, Mori town, Kayabé county, Osima Prov. Hokkaidô: loc. cit.

(22) *Todorokite*

δ	3.66
MnO ₂	78.85%
MnO	13.15
MgO	2.50
CaO	1.15
BaO	0.21
SiO ₂	0.40
Al ₂ O ₃	0.10
Fe ₂ O ₃	0.13
H ₂ O	0.68
Total	97.17

A mineral resembling Todorokite: Ikesiro mine, Matugaki town, Kamo county, Sizuoka Pref.: Analyst, I. FUJII (1956): K. SAKURAI & S. TAKASU, J. Miner. Soc. Japan, 3, (1957) 242.

(23) *Anatase*

δ	3.917 (25°C)
TiO ₂	96.18%
SiO ₂	0.90
Al ₂ O ₃	0.55
Fe ₂ O ₃	1.60
MnO	tr.
MgO	0.47
CaO	non.
Ig. loss	0.37
Total	100.07

Nariai mine, Izuhara town, Simoagata county (Tusima island), Nagasaki Pref.: Small reddish brown crystals were found in a silicified white rock of lead and zinc ore deposit.: Analyst, H. MINATO (1956): H. MINATO & Y. OKAMOTO, Sci. Pap. Coll. Gen. Ed., Univ. Tôkyô, 7, (1957) 148.

(24) *Lepidocrosite*

	1.	2.	3.	4.
SiO ₂	1.02%	39.00%	2.20%	3.36%

Al ₂ O ₃	1.64	1.39	0.92	1.18
Fe ₂ O ₃	83.52	50.86	83.43	82.20
FeO	—	—	0.28	—
CaO	—	—	1.20	—
FeS ₂	—	—	0.28	—
H ₂ O (+)	11.62	6.58	11.79	10.58
H ₂ O (—)	1.72	2.23	0.16	0.70
Total	99.52	100.06	100.26	98.02

1. Abesiro mine, Kawauchi town, Simokita county, Aomori Pref.: In limonite deposit: Analyst, M. NAMBU: T. TAKEUCHI and M. NAMBU, J. Miner. Soc. Japan, 2, (1955) 167.
2. Ooage mine, Kawauchi town, Simokita county, Aomori Pref.: Lepidocrosite after pyrite: Analyst, M. NAMBU: ditto, and M. NAMBU, Bull. Res. Inst. Miner. Metall., II, No. 1, (1955) 49.
3. Kamaisi mine, Kamaisi city, Iwaté Pref.: Lepidochrosite after pyrite: Analyst, M. NAMBU: op. cit. 44.
4. Wasitaki, Kamaisi city, Iwaté Pref.: Lepidochrosite after pyrite: Analyst, M. NAMBU: op. cit. 40.

(25) *Boehmite*

Al ₂ O ₃	80.60%
SiO ₂	2.95
TiO ₂	0.04
Fe ₂ O ₃	0.72
MgO	0.02
CaO	0.14
Ig. loss	15.67
Total	100.14

Ehara, Hidaka town, Kinosaki county, Hyōgo Pref.: In kaolin mineral: Analyst, T. ŌTA & C. YAMAMOTO, J. Miner. Soc. Japan, 3, (1957) 323.

(26) *Manganite*

	1.	2.
δ	—	2.774 (3.94)
MnO	72.63%	59.39%
O	9.08	12.43
SiO ₂	3.50	1.30
TiO ₂	tr.	0.05
Al ₂ O ₃	tr.	1.84
Fe ₂ O ₃	0.22	0.51
MgO	tr.	3.46
CaO	0.04	1.96
BaO	1.33	0.11
Na ₂ O	—	tr.

K ₂ O	—	0.79
P ₂ O ₅	—	n.d.
H ₂ O (+)	12.92	4.39
H ₂ O (—)	0.32	14.31
Total	100.04	100.64 (100.54)

1. Ōyé mine, Oyé, Simoda village, Minamikanbara county, Niigata Pref.: In tuff: Analyst, K. NAGASHIMA (1954): S. TAKASU, J. Miner. Soc. Japan, **3**, (1957) 332.
2. Manganous manganite (δ -phase of MnO₂): Tatiki mine, Wati town, Hunai county, Kyôto Pref.: Luster, resinous. Covering the surface of rhodonite: Analyst, Y. UKAI, S. NISHIMURA & T. MAYEDA, Mem. Coll. Sci. Univ. Kyôto, Ser. B, **23**, (1956) 205.

(27) *Gibbsite*

δ	2.33 (20°C)
SiO ₂	12.74%
Al ₂ O ₃	54.47
Fe ₂ O ₃	1.19
Ig. loss	31.69
Total	100.09

Okunodai, Dedo, Nisime village, Yuri county, Akita Pref.: A white small spherical nodule in clay: Analyst, S. HONDA, J. Miner. Soc. Japan, **2**, (1956) 389.

(28) *Goethite*

	1.	3.	3.
Fe ₂ O ₃	87.85%	79.70%	82.75%
SiO ₂	2.05	1.45	3.50
Al ₂ O ₃	0.96	4.16	0.73
FeO	0.79	—	—
MnO	0.20	—	—
MgO	1.04	—	—
CaO	0.76	—	—
H ₂ O (+)	2.12	9.29	11.48
H ₂ O (—)	1.78	4.34	0.81
Total	97.55	98.94	99.27

1. Mixture of goethite, hydrohematite and lepidocrosite: Asari mine, Otaru city, Hokkaidô: In iron deposit in liparite: Analyst, M. KADO (1955): H. ÔMACHI, J. Jap. Ass. M.P.G., **41**, (1957) 49.
2. Ooagé mine, Kawauti town, Simokita county, Aomori Pref.: Goethite after pyrite: Analyst, M. NAMBU, Bull. Res. Inst. Miner. Metall., **11**, No. 1 (1955) 49.
3. Goethite with small amount of lepidocrosite: Kinbusan, Kôhu city, Yamanashi Pref.: Goethite after pyrite: Analyst, M. NAMBU, op. cit. 51.

(29) *Limonite*

	1.	2.	3.	4.
Fe ₂ O ₃	57.94%	83.52%	74.31%	80.77%
FeO	—	—	—	0.54
MnO	—	—	—	non.
MgO	—	—	—	0.07
CaO	—	—	0.41	0.41
SiO ₂	tr.	0.70	2.32	0.74
TiO ₂	—	—	0.00	—
Al ₂ O ₃	tr.	1.64	5.01	non.
MnO ₂	—	—	0.07	—
As ₂ O ₅	—	—	—	4.28
CuO	—	—	—	0.92
H ₂ O (+)	20.96	11.62	13.49	11.45
H ₂ O (—)	21.21	2.12	4.87	2.56
Total	100.11	99.60	105.48	101.33
				(101.34)

- 1, 2. Matuiwa mine, Isikura, Kesennuma city, Miyagi Pref.: (1) pisolitic (2) stalagmitic: Analyst, M. NAMBU, J. Miner. Soc. Japan, **2**, (1955) 278.
3. Seto city, Aiti Pref.: Limonite plate in mud, sand & gravel bed of the upper Tertiary: Analyst, K. HUKUO. Ibid. **2**, (1955) 293.
4. Kitabira mine, Ōda town, Miné county, Yamaguti Pref.: With strong luster: Analyst, H. MINATO (1948): Research Comm. of Minerals for New Pract. Application: K, P & As associated with limonite (1953) 153.

(30) *Hydrous ferric oxide (Takasikozō-Limonitic nodule)*

SiO ₂	53.89%
TiO ₂	1.43
Al ₂ O ₃	0.60
Fe ₂ O ₃	29.64
FeO	0.36
MgO	0.78
CaO	1.74
Na ₂ O	0.33
K ₂ O	tr.
H ₂ O (+)	6.35
H ₂ O (—)	4.86
Total	99.98

Bessho, Hino town, Gamō county, Shiga Pref.: Analyst, S. KANEMATSU and M. NAMBU, J. Jap. Ass. M.P.G., **41**, (1957) 152.

(31) *Spinel (Gahnite, Galaxite)*

	1.	2.	3.	4.	5.	6.	7.
Cr ₂ O ₃	63.29%	45.71%	47.11%	44.79%	25.47%	19.92%	66.79%

Al ₂ O ₃	5.60	5.35	9.20	37.30	44.95	16.53	1.49
FeO	21.03	27.75	25.08	0.00	17.53	45.10	14.87
MgO	7.14	11.55	12.26	17.38	10.39	15.98	8.26
CaO	0.00	3.79	6.05	0.00	1.12	1.53	0.00
Total	97.06	94.15	99.70	99.47	99.46	99.06	93.41
							(91.41)

	8.	9.	10.	11.	12.	13.
δ	4.545 (11°C)	—	4.15 (average)	4.55	4.49	4.36
Cr ₂ O ₃	—%	—%	—%	16.29%	36.50%	44.62%
Al ₂ O ₃	56.10	58.13	55.98	31.04	12.26	21.16
Fe ₂ O ₃	—	—	6.44	—	—	—
FeO	6.07	10.16	2.28	40.73	35.24	28.76
MnO	0.61	25.50	33.06	—	—	—
MgO	0.56	5.92	—	7.51	6.98	3.51
CaO	0.05	—	—	0.00	0.00	0.00
ZnO	36.00	—	0.58	—	—	—
SiO ₂	0.25	0.33	0.36	—	—	—
TiO ₂	—	0.23	—	—	—	—
H ₂ O	0.18	—	—	—	—	—
Ig. loss	—	0.52	—	—	—	—
Total	99.82	100.79	98.70	95.57	90.98	98.05

- Horokanai, Isikari Prov. Hokkaidô: In ultrabasic rocks of Kamuikotan metamorphic zone: Analyst, T. BAMBÂ, J. Geol. Soc. Japan, **59**, (1953) 123.
3. Iwanaidaké, Iburi Prov. Hokkaidô: ditto.
- Poroziridaké, Hidaka Prov. Hokkaidô: In ultrabasic rocks of Hidaka metamorphic zone: ditto.
6. Horoman, Hidaka Prov. Hokkaidô: Analyst, K. BAMBÂ: ditto.
- Nitto mine, Hidaka Prov. Hokkaidô: ditto.
- Gahnite (Zn-spinel): Nogisawa, Isikawa town, Isikawa county, Hukushima Pref.: In pegmatite: Analyst, S. HASEGAWA: K. OMORI and S. HASEGAWA, J. Miner. Soc. Japan, **1**, (1953) 116.
- Galaxite (Mn-spinel): Ôasi mine, Kanuma city, Totigi Pref.: In manganese deposit: Analyst, T. YOSHIMURA, Manganese deposits in Japan (1952) 88.
- Galaxite (Mn-spinel): Ioé mine, Zida, Ritto town, Kurita county, Siga Pref.: In manganese deposit: Analyst, W. H. HERDSMAN: E. D. LEE, Stanford Univ. Publ., Univ. Ser., Geol. Sci., **5**, (1955) 37.
- Hatimakiyama, Doi town, Uma county, Ehimé Pref.: In peridotite: Analyst, T. BAMBÂ, J. Geol. Soc. Japan, **59**, (1953) 442.
13. Higasiakaisigama, Uma county, Ehimé Pref.: (12) magnetic, (13) non-magnetic, in peridotite: ditto.

(32) *Magnetite*

	1.	2.	3.	4.	5.	6.
Fe ₂ O ₃	65.06%	66.03%	57.11%	68.02%	77.01%	69.58%
FeO	31.11	30.48	30.89	29.66	18.88	30.90

SiO ₂	1.21	0.86	—	—	—	—
TiO ₂	none	none	10.10	0.00	1.90	0.00
Al ₂ O ₃	0.65	0.64	—	—	—	—
MnO	0.55	0.57	—	0.33	1.05	0.03
MgO	0.46	0.54	—	—	—	—
CaO	0.86	0.86	—	—	—	—
V ₂ O ₅	—	—	—	0.00	0.01	0.01
NiO ..	—	—	—	0.009	0.000	0.001
Cr ₂ O ₃	—	—	—	none	0.000	none
S	tr.	tr.	—	—	—	—
P	tr.	tr.	—	none	0.05	none
H ₂ O (—)	0.63*	0.02*	—	—	—	—
Total	99.93	99.98	98.10			

- 1, 2. Kamaisi mine, Kamaisi city, Iwaté Pref.: In iron contact deposit: Analyst, S. NAGANO: T. TAKEUCHI, M. NAMBU and N. WADA, J. Jap. Ass. M.P.G., **37**, (1953) 77.
3. Unjo mine, Miyamori village, Kamihei county, Iwaté Pref.: In garnet hornfels: Analyst, K. KATO, J. Jap. Ass. M.P.G., **38**, (1954) 50.
4. Titibu mine, Otaki village, Titibu county, Saitama Pref.: In contact deposit: Analyst, K. KATSURA: K. KINOSHITA and K. MUTA, J. Geol. Soc. Japan. **60**, (1954) 375.
5. Ebisu mine, Mitoya town, Iisi county, Simané Pref.: ditto.
6. Sannotaké, Tagawa county, Hukuoka Pref.: In contact deposit: ditto.

	7.	8.	9.
δ	—	—	5.100
Fe ₂ O ₃	65.63%	69.55%	66.69%
FeO	21.23	28.11	29.71
TiO ₂	0.00	0.00	—
V ₂ O ₅	0.01	0.15	—
NiO	0.008	0.00	—
Cr ₂ O ₃	4.95	0.00	—
SiO ₂	—	—	2.97
Al ₂ O ₃	—	—	0.72
MgO	—	—	tr.
CaO	—	—	0.06
H ₂ O (+)	—	—	0.12
H ₂ O (—)	—	—	0.21
Total			100.48

7. Kiuragi, Kiuragi town, Higasimatura county, Saga Pref.: In serpentine: ditto.
8. Egami, Kayaki, Sanwa town, Nisisonoki county, Nagasaki Pref.: Contact between serpentine and crystalline schist: ditto.
9. Same locality: In chlorite schist: Analyst, G. SHIBUYA, J. Miner. Soc. Japan, **1**, (1954) 408.

* Not calculated in the Total.

(33) *Hydromaghemite*

SiO ₂	0.15%
Al ₂ O ₃	0.50
Fe ₂ O ₃	73.81
FeO	21.20
MnO	0.02
MgO	0.05
CaO	0.10
H ₂ O (+)	4.01
H ₂ O (—)	0.62
Total	100.46

Takanokura mine, Iidatē village, Sōma county, Hukusima Pref.: In weathered zone of contact iron deposit: Analyst, M. NAMBU, J. Miner. Soc. Japan, 3, (1957) 62.

(34) *Jacobsite*

Fe ₂ O ₃	56.19%
Al ₂ O ₃	11.62
MnO	29.34
TiO ₂	3.37
SiO ₂	tr.
MgO	0.10
CaO	0.13
BaO	0.00
Total	100.75

Sasahara, Kiuragi town, Higasimatura county, Saga Pref.: In tephroite ores associated with rhodonite, spessartine, rhodochrosite and a small amount of penwithite: Analyst, F. HIROWATARI & M. MIYAHISA, J. Miner. Soc. Japan, 5, (1955) 99.

(35) *Chromite*

	1.	2.	3.	4.	5.	6.
Cr ₂ O ₃	47.19%	51.15%	51.54%	52.05%	46.56%	51.35%
Al ₂ O ₃	19.33	14.13	13.67	12.63	15.94	10.59
Fe ₂ O ₃	5.36	5.49	6.01	5.91	8.80	10.92
FeO	14.72	16.94	16.09	16.50	15.07	15.16
MgO	13.03	10.77	11.98	11.27	12.01	11.08
MnO	0.17	0.21	0.32	0.29	0.19	0.12
CaO	tr.	tr.	tr.	0.18	0.41	0.10
SiO ₂	0.42	0.86	0.36	0.91	0.83	0.13
Total	100.22	99.56	99.97	99.74	99.81	99.45

1, 2, 3, 4, 5, 6. Hiroosa mine, Oosa, Simada city, Sizuoka Pref.: In serpentine: Analyst, J. KITAHARA, J. Jap. Ass. M.P.G., 38, (1954) 181.

	7.	8.	9.	10.
δ	—	—	4.39	3.99
Cr ₂ O ₃	36.43%	40.14%	40.56%	47.96%
Al ₂ O ₃	22.49	19.77	16.71	14.79
Fe ₂ O ₃	11.98	9.03	—	—
FeO	7.21	14.79	32.00	28.96
MgO	18.66	13.12	5.25	5.18
MnO	0.40	0.91	—	—
CaO	tr.	0.21	0.00	0.00
SiO ₂	2.03	1.47	—	—
Total	99.20	99.44	94.52	96.89

7, 8. Hinokami mine, Hakunan town, Hino county, Tottori Pref.: In leuchtenbergite rock: Analyst, J. KITAHARA, J. Jap. Ass. M.P.G., **39**, (1955) 174.

9, 10. Akaisi mine, Doi town, Uma county, Ehime Pref.: (9) Chromite in the county rock, (10) Chromite in the vein.: Analyst, T. BAMBA, J. Geol. Soc. Japan, **59**, (1953) 443.

(36) *Hausmannite*

δ	5.805 ($^{20^\circ\text{C}}_{4^\circ\text{C}}$)
MnO	90.87%
O	6.32
SiO ₂	0.56
TiO ₂	0.02
Al ₂ O ₃	0.05
Fe ₂ O ₃	0.74
MgO	0.47
CaO	0.18
ZnO	none
BaO	none
CO ₂	0.31
H ₂ O (+)	0.14
H ₂ O (—)	0.13
Total	99.79

Nodatamagawa mine, Noda village, Kunohé county, Iwaté Pref.: In manganese deposit: Analyst, S. HASEGAWA: K. ÔMORI & S. HASEGAWA, J. Jap. Ass. M.P.G., **41**, (1957) 172.

(37) *Fergusonite*

	1.	2.	3.	4.
δ	5.68 ($^{15^\circ\text{C}}_{4^\circ\text{C}}$)	5.46 ($^{15^\circ\text{C}}_{4^\circ\text{C}}$)	4.85 ($^{10^\circ\text{C}}_{4^\circ\text{C}}$)	5.12 ($^{15^\circ\text{C}}_{4^\circ\text{C}}$)
SiO ₂	0.70%	0.52%	1.64%	1.64%
TiO ₂	0.98	1.23	0.99	0.45
Al ₂ O ₃	0.12	0.33	0.55	1.30
Fe ₂ O ₃	0.50	0.88	} 1.04	} 0.44
FeO	—	—		

MnO	0.05	0.10	0.10	tr.
MgO	none	0.08	0.11	0.18
CaO	0.08	0.05	0.57	0.77
[Ce] ₂ O ₃	1.00	1.20	0.43	0.71
[Y] ₂ O ₃	43.16	43.43	38.29	41.12
ThO ₂	0.88	0.48	1.29	1.10
UO ₂	2.40	1.66	—	—
UO ₃	0.84	1.54	—	—
U ₃ O ₈	—	—	5.90	3.45
Nb ₂ O ₅	30.90	30.62	41.39	34.46
Ta ₂ O ₅	17.32	14.60	3.83	11.21
SnO ₂	0.09	—	0.69	0.22
ZrO ₂	—	0.22	—	—
PbO	—	0.05	—	—
CO ₂	tr.	—	—	P ₂ O ₅ tr.
H ₂ O (+)	1.01	2.22	1.78	2.14
H ₂ O (—)	0.22	0.26	1.29	0.38
Total	100.25	99.47	99.89	99.57

1. Ōhari, Marumori town, Igu county, Miyagi Pref.: In pegmatite: Analyst, K. ŌMORI & S. HASEGAWA, J. Jap. Ass. M.P.G., **41**, (1957) 214.
2. Hayamadake, Tokiwa town, Tamura county, Hukusima Pref.: In pegmatite: Analyst, S. HASEGAWA: K. ŌMORI and S. HASEGAWA, Ibid. **41**, (1957) 4.
3. Tatyōiwa, Kitayamato village, Ikoma county, Nara Pref.: In pegmatite: Analyst, J. TAKUBO, T. UEDA, S. NISHIMURA and K. MASUTOMI, J. Geol. Soc. Japan, **59**, (1953) 49.
4. Komenono, Hyōzyō town, Onsen county, Ehime Pref.: In pegmatite: Analyst, op. cit., 54.

(38) *Columbite*

Nb ₂ O ₅	65.57%
Ta ₂ O ₅	11.30
FeO	16.59
MnO	3.86
MgO	0.23
CaO	0.11
SnO ₂	0.33
TiO ₂	1.99
Total	99.98

Isikawa town, Isikawa county, Hukusima Pref.: In pegmatite: Analyst, Y. UKAI: J. TAKUBO, Y. UKAI & M. KOREKAWA, J. Miner. Soc. Japan, **1**, (1953) 295.

(39) *Yttrotantalite*

δ	5.7%
SiO ₂	1.24%

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

Simotanokami, Ōtu city, Siga Pref.: In pegmatite: Analyst, K. KIMURA, M. IKAWA & K. NAGASHIMA, J. Chem. Soc. Japan, **77**, (1956), 566.

(40) *Euxenite-Polycrase*

	1.	2.	3.	4.
δ	5.10(¹⁸ C/ ₄ C)	5.25(¹⁸ C/ ₄ C)	4.729(²⁶ C/ ₄ C)	—
SiO ₂	1.03%	0.86%	4.13%	3.43%
TiO ₂	24.72	18.12	29.08	26.30
Al ₂ O ₃	0.16	0.45	0.21	0.38
Fe ₂ O ₃	2.89	2.23	0.00	0.00
FeO	n.d.	0.16	2.97	3.39
MnO	0.43	0.24	0.88	1.08
MgO	0.15	0.10	0.35	0.42
CaO	2.34	1.05	2.29	3.30
Ce ₂ O ₃	—	—	0.19	} 1.97
[Ce] ₂ O ₃	0.42	0.33	—	
[Y] ₂ O ₃	23.37	29.09	18.96	15.22
[La] ₂ O ₃	—	—	1.55	—
ThO ₂	2.86	2.32	2.51	1.71
UO ₂	7.37	4.71	13.79	14.12
UO ₃	4.50	3.50	—	—
SnO ₂	0.15	0.09	0.33	0.29
Ta ₂ O ₅	5.49	7.05	2.20	} 25.40
Nb ₂ O ₅	21.37	27.75	17.89	
PbO	—	—	n.d.	n.d.
H ₂ O (+)	1.80	1.56	2.00	2.68
H ₂ O (—)	0.31	0.12	0.60	0.42
Total	99.36	99.73	99.93	100.11

1, 2. Nekonaki, Isikawa town, Isikawa county, Hukusima Pref.: In pegmatite:

Analyst, S. HASEGAWA: K. ÔMORI and S. HASEGAWA, J. Miner. Soc. Japan, **2**, (1955) 271.

- 3, 4. Taira village, Higasitonami county, Toyama Pref.: In pegmatite: Analyst, J. TAKUBO, T. UEDA and S. NISHIMURA, J. Miner. Soc. Japan, **1**, (1954) 283.

(41) *Samarskite*

	1.	2.	3.	4.	5.	6.	
δ	5.649	5.98	4.84	—	—	—	
SiO ₂	0.39%	0.33%	1.53%	1.56%	1.90%	—%	
TiO ₂	1.06	1.12	2.56	4.34	4.68	1.29	
Al ₂ O ₃	0.54	1.82	0.87	3.08	2.63	0.94	
Fe ₂ O ₃	2.82	—	5.46	8.74	7.77	1.77	
Ce ₂ O ₃	—	0.04	—	—	—	}16.96	
[Ce] ₂ O ₃	0.67	18.45	18.90	19.53	15.22		
[Y] ₂ O ₃	12.61	10.51	—	—	—		
UO ₂	18.83	—	8.91	—	—	—	
U ₃ O ₈	—	12.58	—	7.42	11.34	11.45	
ThO ₂	2.44	0.85	—	—	—	1.96	
ZrO ₂	—	1.31	1.08	4.78	4.51	2.46	
SnO ₂	0.21	1.83	1.43	0.93	0.70	1.96	
Ta ₂ O ₅	13.41	}57.52	(Nb, Ta) ₂ O ₅	43.63	55.87	37.28	}46.34
Nb ₂ O ₅	36.53						
FeO	7.92	7.71	—	—	—	3.65	
MnO	0.42	—	1.79	2.34	2.11	4.50	
MgO	0.12	0.52	0.24	0.21	0.38	0.03	
CaO	0.63	1.25	2.30	1.38	1.42	0.55	
BeO	—	9.45	tr.	0.47	0.28	0.02	
SrO	—	0.02	—	—	—	—	
WO ₃	—	—	6.65	4.69	4.90	5.24	
H ₂ O (+)	0.39	0.26	5.46	3.30	4.25	0.77	
H ₂ O (—)	0.11	0.15	0.92	0.94	0.87	0.23	
Total	99.69	100.04	101.22	99.58	100.24	109.11	
	(99.20)	(100.11)	(101.53)				

1. Kasuya mine, Isikawa town, Isikawa county, Hukusima Pref.: In pegmatite: Analyst, S. HASEGAWA: K. ÔMORI & S. HASEGAWA, J. Jap. Ass. M.P.G., **40**, (1956) 3.
2. Minamiyamagata, the same locality: In pegmatite: Analyst, K. KIMURA, M. IKAWA & K. NAGASHIMA, J. Chem. Soc. Japan, **77**, (1956) 569.
- 3, 4, 5. Sidara, Komaba, Nakatugawa city, Gihu Pref.: In pegmatite: loc. cit.
6. Simotanokami, Ôtu city, Siga Pref.: In pegmatite: loc. cit.

IV. Carbonate Minerals

(42) *Calcite*

	1.	2.	3.	4.	5.	6.
CaO	48.63%	51.92%	53.20%	53.45%	52.32%	53.34%

MgO	4.61	0.99	1.01	0.07	0.10	0.02
MnO	—	0.11	—	0.059	0.023	0.052
FeO	2.81	0.81	2.02	—	—	—
Fe ₂ O ₃	0.86	0.34	0.05	0.045	0.045	0.089
Al ₂ O ₃	—	0.15	—	1.055	2.805	2.161
H ₂ O(+)	—	—	—	0.90	0.95	0.97
Ig. loss	44.81	45.00	44.67	42.56	41.24	41.98
Insol.	0.19	0.20	—	1.50	2.05	1.30
Total	101.91	99.52	100.95	99.639	99.533	99.912

1, 2, 3. Kônomai mine, Monbetu city, Kitami Prov. Hokkaidô: In gold quartz vein: Analyst, S. MATSUDA: Z. HARADA & S. MATSUDA, J. Miner. Soc. Japan, 1, (1954), Attached table.

4, 5, 6. The same locality: (4) grayish brown crystal (10 $\bar{1}$ 1), (5) grayish brown crystal aggregate, (6) grayish brown crystal (10 $\bar{1}$ 1): Analyst, N. HAYAKAWA, Tôhoku Mine, 3, (1957) 6.

	7.	8.	9.	10.	11.	12.
CaO	53.01%	45.28%	53.82%	41.01%	38.08%	35.89%
MgO	0.02	—	0.03	0.24	0.32	0.40
MnO	tr.	0.080	0.118	0.076	0.069	0.061
Al ₂ O ₃	1.322	1.727	1.261	11.957	9.411	6.957
Fe ₂ O ₃	0.178	0.023	0.089	0.093	0.089	0.093
H ₂ O(+)	0.80	0.25	0.30	0.60	0.50	0.65
Ig. loss	41.68	35.76	42.30	32.40	29.30	28.60
Insol.	2.60	16.75	2.05	13.50	22.02	26.95
Total	99.610	99.970	99.968	99.876	99.789	99.601

7, 8, 9, 10, 11, 12. The same locality: (7) white crystal aggregate, (8) grayish white crystal (10 $\bar{1}$ 1), (9) grayish white crystal (10 $\bar{1}$ 1), (10) grayish white crystal (10 $\bar{1}$ 1), (11) grayish white fine aggregate, (12) grayish white crystal (10 $\bar{1}$ 1): ditto.

	13.	14.	15.	16.	17.	18.
CaO	54.30%	53.90%	53.30%	53.80%	53.42%	53.99%
MgO	0.07	0.27	0.41	0.56	0.29	0.03
MnO	0.01	0.05	tr.	0.01	—	0.02
Al ₂ O ₃	0.05	0.03	0.04	0.06	0.15	0.05
Fe ₂ O ₃	0.67	0.37	1.01	0.18	0.85	0.27
H ₂ O(+)	0.75	0.85	0.70	0.40	0.90	1.46
Ig. loss	42.80	42.50	42.60	42.80	42.42	42.40
Insol.	1.20	1.60	1.75	0.94	1.98	1.78
Total	99.85	99.57	99.81	98.75	99.81	100.00

13, 14, 15, 16, 17, 18. Kamikita mine, Kamikita county, Aomori Pref.: In white calcite vein in pyrite vein: ditto.

	19.	20.	21.	22.	23.	24.
CaO	53.20%	53.30%	52.90%	53.40%	53.30%	49.80%

MgO	tr.	0.41	0.33	0.68	0.15	0.11
MnO	0.02	0.15	0.35	0.08	0.78	0.83
Al ₂ O ₃	0.21	0.02	0.04	0.10	0.04	0.07
Fe ₂ O ₃	2.47	1.00	2.86	2.10	2.28	2.03
H ₂ O (+)	0.62	0.86	0.76	0.65	0.46	1.20
Ig. loss	41.25	41.90	41.60	42.40	42.05	42.10
Insol.	2.14	2.10	1.10	0.42	0.76	5.40
Total	99.91	99.74	99.94	99.83	99.82	99.54

19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31. Wasiimori mine, Yuda village, Waka county, Iwaté Pref.: In calcite vein in copper-lead-zinc vein, (22) (23) white calcite crystal: ditto.

	25.	26.	27.	28.	29.	30.
CaO	54.05%	54.15%	53.35%	54.15%	54.20%	53.10%
MgO	tr.	tr.	0.16	0.27	0.02	0.31
MnO	0.11	0.01	0.12	0.02	0.15	0.20
Al ₂ O ₃	0.02	0.11	0.10	0.20	0.30	0.16
Fe ₂ O ₃	1.68	1.78	2.40	1.10	0.80	1.30
H ₂ O (+)	0.35	0.72	0.80	0.65	0.85	0.80
Ig. loss	42.55	42.67	41.95	41.80	42.52	42.28
Insol.	1.20	0.54	0.84	0.68	0.62	1.02
Total	99.96	99.98	99.72	99.87	99.34	99.17

	31.	32.	33.	34.	35.	36.
CaO	52.90%	53.65%	47.50%	53.40%	56.51%	55.50%
MgO	0.07	0.32	0.27	0.02	0.01	0.40
MnO	0.90	—	0.02	0.02	FeO 0.02	FeO 0.04
Al ₂ O ₃	0.08	0.17	0.17	0.07	—	—
Fe ₂ O ₃	1.00	1.08	2.23	1.68	—	—
H ₂ O (+)	0.93	1.70	0.25	1.80	—	—
Ig. loss	41.90	42.40	36.70	42.10	43.20	44.06
Insol.	0.95	0.30	12.50	0.90	—	—
Total	98.73	99.62	99.64	99.99	99.92	100.00

32. Unekura mine, Yuda village, Waka county, Iwaté Pref.: White crystal in geode: ditto.

33. Oomata mine, Yuda village, Waka county, Iwaté Pref.: Calcite vein: ditto.

34. Yonaibata mine, Atasiokanô village, Yama county, Hukusima Pref.: In clay of gypsum deposit: ditto.

35, 36. Asio mine, Kamituga county, Totigi Pref.: In copper vein: Analyst, S. MATSUDA: Z. HARADA & S. MATSUDA, J. Miner. Soc. Japan, 1, (1954), Attached table.

	37.	38.	39.	40.	41.	42.
CaO	54.50%	52.90%	52.70%	54.00%	51.40%	52.50%
MgO	0.21	0.01	0.39	1.90	3.22	0.05
MnO	0.05	—	0.03	0.18	0.34	0.04

FeO	—	—	—	—	} 1.20	—
Fe ₂ O ₃	1.05	1.87	} 0.06	} 0.62		2.17
Al ₂ O ₃	0.15	0.08				—
SiO ₂	—	—	4.80	—	—	—
H ₂ O (+)	0.70	1.40	—	—	—	0.65
Ig. loss.	42.86	41.53	40.76	41.46	43.20	41.40
Insol.	0.50	2.25	—	—	—	2.60
Total	100.02	100.04	98.87	98.16	99.36	99.84

37. Seikosi mine, Toi town, Tagata county, Sizuoka Pref.: In gold-silver vein: ditto.
 38. Ōhito mine, Tagata county, Sizuoka Pref.: In gold vein: Analyst, ditto.
 39. Kune mine, Sakuma village, Iwata county, Sizuoka Pref.: In diabase: Analyst, K. MUTA, J. Jap. Ass. M.P.G., **41**, (1957) 22.
 40, 41. Minenosawa mine, Tatuyama village, Iwata county, Sizuoka Pref.: In green schist, (40) wall side (41) central part of vein: ditto.
 42. Ogoya mine, Komatu city, Kanagawa Pref.: Analyst, N. HAYAKAWA, loc. cit.

	43.	44.	45.	46.	47.	48.
CaO	55.35%	52.50%	55.60%	51.66%	55.53%	54.10%
MgO	0.28	1.70	0.42	0.87	0.41	0.49
MnO	tr.	0.09	0.10	0.30	0.01	0.34
FeO	} 0.12	} 1.40	—	} 5.60	} 0.16	} 0.91
Fe ₂ O ₃			} 0.15			
Al ₂ O ₃	—	—	—	—	—	—
SiO ₂	0.32	—	—	—	—	—
Ig. loss.	43.40	43.50	43.53	40.83	43.44	43.04
Total	99.47	99.17	99.86	99.26	99.55	99.26

43. Yamada, Naegi, Nakatugawa city, Gifu Pref.: In pegmatite: Analyst, K. KATSURA: K. MUTA, J. Jap. Ass. M.P.G., **41**, (1957) 18-19.
 44. Imori mine, Naka County, Wakayama Pref.: In cupriferous iron sulfide deposit: Analyst, K. MUTA, op cit. 22.
 45. Yubuneya deposit, Ebisu mine, Mitoya town, Iisi county, Simané Pref.: Analyst, K. MUTA: K. KINOSHITA & K. MUTA, J. Geol. Soc. Japan, **60**, (1954) 373.
 46, 47, 48. Kawayama mine, Kuga county, Yamaguti Pref.: In pyrrhotite deposit, (46) (47) acicular, (48) foliated: ditto.

	49.	50.	51.	52.	53.	54.
CaO	55.52%	52.15%	54.80%	54.60%	55.26%	50.47%
MgO	0.18	1.81	0.84	0.90	0.10	1.17
MnO	0.10	0.31	0.06	0.23	0.10	1.68
FeO	—	} 1.40	} 0.22	} 0.50	} 0.28	} 0.31
Fe ₂ O ₃	0.16					
Al ₂ O ₃	—	1.40	—	0.20	—	—
SiO ₂	—	0.56	—	0.22	0.12	—
Ig. loss	43.50	42.30	43.50	42.90	43.45	42.57
Total	99.46	99.93	99.42	99.55	99.31	96.20

49. Yūryō mine, Iyo county, Ehimé Pref.: In quartz calcite lens in green schist: op. cit. 86.

50. Kôrauti mine, Kurumé city, Hukuoka Pref.: In cupriferous iron sulfide deposit: op. cit. 22.
 51. Siraki mine, Hukuoka Pref.: In cupriferous iron sulfide deposit: op. cit. 22.
 52. Minamikawara mine, Arita town, Nisimatura county, Saga Pref.: op. cit. 18-19.
 53. Kurakamiyama, the same locality: In druse of liparite: ditto.
 54. Kusuku, Imari city, Saga Pref.: In druse of dolerite: Analyst, K. KATSURA: op. cit. 18-19.

	55.	56.	57.	58.	59.	60.
CaO	52.70%	53.00%	45.00%	44.50%	51.60%	53.42%
MgO	0.16	0.68	0.63	0.55	0.45	0.65
MnO	1.33	2.10	9.96	12.62	3.71	0.20
FeO	} 1.18	} 0.80	} 0.95	} 1.70	} 1.28	1.51
Fe ₂ O ₃						0.92
Al ₂ O ₃	—	—	0.07	—	—	0.11
SiO ₂	—	—	0.22	—	—	—
H ₂ O	—	—	—	—	—	0.04
Ig. loss	43.72	42.67	42.39	40.55	42.26	42.82
Insol.	—	—	—	—	—	0.01
Total	99.09	99.25	99.22	99.92	99.30	99.68

- 55, 56, 57, 58, 59. Taisyû mine, Sasu, Izuhara town, Simoagata county, Nagasaki Pref.: (55) in druss of quartz porphyry, (56) in pyrrhotite zone, (57) in dyke rock, (58) in zincblende zone, (59) in reproductive zone of galena: ditto.
 60. Taio mine, Nakatué village, Hida county, Ôita Pref.: In gold vein: Analyst, S. MATSUDA: Z. HARADA & S. MATSUDA, J. Miner. Soc. Japan, 1, (1954), Attached table.

	61.	62.	63.	64.	65.	66.
CaO	53.35%	55.40%	55.05%	54.82%	55.40%	55.40%
MgO	0.32	0.54	1.60	0.73	0.20	0.44
MnO	1.10	0.39	0.45	0.05	0.50	0.23
FeO	} 0.12	} 0.17	} 0.30	} 0.69	} 0.10	} 0.64
Fe ₂ O ₃						
Al ₂ O ₃	—	0.21	0.20	—	—	—
SiO ₂	4.40	1.30	—	0.04	—	—
Ig. loss	41.30	42.52	42.50	42.75	43.78	43.38
Total	99.59	100.53	100.10	99.08	99.98	100.09

61. The same locality: Analyst, K. MURA, loc. cit.
 62, 63. Asahi mine, Nakatué village, Hida county, Ôita Pref.: ditto.
 64. Bazyô mine, the same village: ditto.
 65, 66. Kiura mine, Umé village, Minamiamabé county, Ôita Pref.: op. cit. 21.

	67.	68.	69.	70.	71.	72.
CaO	55.15%	47.80%	53.35%	54.50%	54.10%	53.40%
MgO	0.35	3.40	0.40	0.85	0.25	0.63
MnO	0.34	0.30	0.32	0.34	0.30	0.20

FeO	} 0.08	} 1.80	} 0.06	} 0.62	} 0.96	} 1.72
Fe ₂ O ₃						
Al ₂ O ₃	—	0.64	—	—	0.04	0.32
SiO ₂	—	1.95	4.66	—	—	0.26
Ig. loss	43.20	43.20	40.22	43.10	42.78	42.50
Insol.	—	—	—	—	1.52	—
Total	99.12	99.09	99.01	99.41	99.95	99.03

67. Obira mine, Ogata town, Ōno county, Ōita Pref.: In limestone: ditto.
 68, 69. Sangasyo mine, Gokasé town, Nisisuki county, Miyazaki Pref.: In cupriferous iron sulfide deposit: ditto.
 70. Makiminé mine, Kitagata village, Higasiusuki county, Miyazaki Pref.: In cracks of cupriferous iron sulfide deposit: op. cit. 22.
 71. Osuzu mine, Tôgô village, Higasiusuki country, Miyazaki Pref.: In cassiterite quartz vein: op. cit. 21.
 72. Taiyô mine, Gamô town, Aira county, Kagosima Pref.: op. cit. 18-19.

	73.	74.	75.	76.	77.	78.
CaO	54.32%	54.00%	54.21%	55.22%	55.40%	55.30%
MgO	1.61	0.74	0.52	0.31	0.05	0.05
MnO	0.45	1.78	0.42	0.51	0.40	0.32
FeO	} 0.48	0.90	0.53	0.35	0.02	0.08
Fe ₂ O ₃						
SiO ₂	—	—	0.05	—	—	1.10
Ig. loss	42.61	42.50	43.28	43.45	43.03	43.14
Insol.	—	—	—	—	0.89	—
Total	99.37	99.92	99.01	99.84	99.79	99.97

- 73, 74. Yamagano mine, Yokokawa town, Aira county, Kagosima Pref.: In gold silver quartz vein: ditto.
 75. Yamada mine, Gamô town, the same county: ditto.
 76. Arakawa mine, Kusikino city, Kagosima Pref.: ditto.
 77, 78. Kusikino mine, the same city: ditto.

	79.
CaO	54.70%
MgO	0.18
MnO	0.52
FeO	} 0.34
Fe ₂ O ₃	
SiO ₂	0.50
Ig. loss	43.30
Total	99.54

79. Kanoya mine, Kanoya city, Kagosima Pref.: ditto.

(43) *Mn-Calcite*

	1.	2.	3.	4.	5.
δ	—	—	—	2.798($\frac{18^{\circ}\text{C}}{4^{\circ}\text{C}}$)	—
CaO	54.76%	43.25%	51.89%	47.11%	50.30%

MgO	0.28	2.41	0.50	0.17	2.21
MnO	0.65	1.11	2.47	8.10	6.09
FeO	0.21	0.25	0.13	1.18	—
SiO ₂	—	—	—	0.15	—
Al ₂ O ₃	—	1.00	} 0.02	none	—
Fe ₂ O ₃	0.03	0.12		none	0.56
CO ₂	—	—	—	42.90	—
Ig. loss	43.81	50.12	45.02	—	41.53
Insol.	—	0.25	—	—	—
Total	99.74	98.51	100.03	99.61	100.69

1. Teiné mine, Teiné town, Isikari Prov. Hokkaidô: In gold copper quartz vein: Analyst, S. MATSUDA: Z. HARADA & S. MATSUDA, J. Miner. Soc. Japan, **1**, (1954) table.
2. Eitai mine, Osyoro, Suttu town, Siribesi Prov. Hokkaidô: In gold calcite vein: Analyst, ditto.
3. Innain mine, Okatu town, Okatu county, Akita Pref.: In lead-zinc vein: Analyst, ditto.
4. Hosokura mine, Uguisuzawa town, Kurihara county, Miyagi Pref.: In lead-zinc vein: Analyst, K. YAMAOKA: K. ÔMORI & K. YAMAOKA, J. Jap. Ass. M.P.G., **38**, (1954) 85.
5. Yûryô mine, Tobe town, Iyo county, Ehimé Pref.: In antimony vein: Analyst, K. MUTA, Ibid, **41**, (1957) 86.

(44) *Magnesite (Breunerite, Pistomesite)*

	1.	2.	3.	4.
MgO	39.52%	43.58%	38.61%	20.44%
MnO	0.10	0.61	n.d.	0.88
CaO	—	—	0.96	1.49
FeO	} 13.61	6.70	} 12.60	32.06
Fe ₂ O ₃		—		1.19
Al ₂ O ₃	0.34	—	0.80	—
SiO ₂	—	—	—	0.62
CO ₂	—	—	—	41.50
Ig. loss	43.57	46.91	44.09	—
H ₂ O	—	—	—	1.25
Insol.	2.36	1.08	3.88	—
Total	99.50	98.88	100.94	99.41

1. Breunerite: Onzyaku, Kasuya county, Hukuoka Pref.: Porphyroblast in talc deposit: Analyst, K. MUTA, J. Jap. Ass. M.P.G., **41**, (1957) 22.
- 2, 3. Breunerite: Motokosi, Kametake village, Nisisonoki county, Nagasaki Pref.: ditto.
4. Pistomesite: Kurauti Honpi, Obira mine, Hasegawa, Ogata town, Ôno county, Ôita Pref.: op. cit. 21.

(45) *Siderite*

	1.	2.
Al ₂ O ₃	0.20%	0.51%
Fe ₂ O ₃	2.09	} 59.47
FeO	52.43	
MnO	0.27	0.76
MgO	4.20	1.43
CaO	0.37	1.41
CO ₂	—	35.63
Ig. loss	40.00	—
Insol.	0.12	—
Total	99.68	99.21

1. Asio mine, Kamitoga county, Totigi Pref.: In copper vein: Analyst, S. MATSUDA: Z. HARADA & S. MATSUDA, J. Miner. Soc. Japan, 1, (1954), Attached table.
2. Kusuku, Imari city, Saga Pref.: In dolerite: Analyst, K. KATSURA: K. MUTA, J. Jap. Ass. M.P.G., 41, (1957) 18-19.

(46) *Rhodochrosite*

	1.	2.	3.	4.	5.	6.
δ	3.59	3.67	3.34	—	—	—
MnO	56.60%	55.00%	53.50%	54.22%	55.82%	56.92%
FeO	0.46	2.40	4.75	2.91	3.83	0.51
MgO	1.35	1.96	2.30	0.21	0.11	0.54
CaO	2.87	2.12	2.30	1.92	2.03	3.12
Al ₂ O ₃	—	—	—	—	0.01	—
Fe ₂ O ₃	—	—	—	0.21	0.10	3.21
Ig. loss	38.00	39.00	37.80	39.22	37.52	38.87
Insol.	—	—	—	0.05	10.02	—
Total	99.28	100.48	100.65	98.74	99.44	103.17

- 1, 2, 3. Inakuraishi mine, Hurubira town, Siribesi Prov. Hokkaidô: Rhodochrosite vein in propylite: (1) scarlet, transparent crystal, (2) violet-red, transparent crystal, (3) white, powdery, opaque: Analyst, T. YOSHIMURA, Manganese deposits in Japan, (1952) 99.
- 4, 5. The same locality: Analyst, S. MATSUDA: Z. HARADA & S. MATSUDA, J. Miner. Soc. Japan, 1, (1954), Attached table.
6. Ooe mine, Ooe village, Siribesi Prov. Hokkaidô: Rhodochrosite vein in andesite: Analyst, ditto.

	7.	8.	9.	10.	11.	12.
δ	3.56	3.52	3.51	3.28	—	—
MnO	57.00%	52.87%	54.23%	51.31%	56.02%	54.43%
FeO	1.60	1.68	2.50	2.76	2.01	2.88
MgO	0.80	1.34	1.18	2.28	1.76	2.44
CaO	2.38	4.03	3.44	6.61	1.00	2.28

SiO ₂	—	—	0.04	0.11	—	—
Al ₂ O ₃	—	—	—	—	—	} 0.49
Fe ₂ O ₃	—	—	—	—	0.02	
Ig. loss	38.70	39.55	39.12	38.05	38.36	38.88
Insol	—	—	—	—	0.01	0.13
H ₂ O (—)	0.02	0.00	0.05	0.10	—	—
Total	99.50	99.61	100.56	101.22	99.18	101.53
	(100.50)					

7, 8, 9, 10. Yakumo mine, Yakumo town, Iburi Prov. Hokkaidô: Rhodochrosite vein in propylite, (7) red, transparent crystal associated with alabandite, (8) red, transparent crystal associated with galena, (9) red, transparent crystal associated with zinblende, (10) white powdery, opaque.: Analyst, T. YOSHIMURA, Manganese deposits in Japan, (1952) 98.

11, 12, 13, 14, 15, 16. The same locality: Analyst, S. MATSUDA: Z. HARADA & S. MATSUDA, J. Miner. Soc. Japan, **1**, (1954) Attached table.

	13.	14.	15.	16.	17.
δ	—	—	—	—	3.61±0.01
MnO	56.00%	54.11%	54.82%	53.21%	59.22%
FeO	3.14	4.07	4.18	4.11	0.38
MgO	0.01	1.68	1.84	1.58	1.09
CaO	3.14	0.98	1.20	4.11	0.38
ZnO	—	—	—	—	nil
Al ₂ O ₃	—	—	—	} 0.15	—
Fe ₂ O ₃	3.12	0.74	0.92		0.26
CO ₂	—	—	—	—	37.85
Ig. loss	34.58	38.36	37.11	38.73	—
Insol.	—	0.01	0.02	—	—
Total	99.99	99.95	100.09	101.89	99.18

17. Ajiro mine, Ajiro village, Motosu county, Gifu Pref.: Analyst, W. H. HERDSMAN: E. D. LEE, Stanford Univ. Publ. Univ. Ser., Geol. Sci., **5**, (1955) 48.

(47) *Aragonite*

	1.	2.	3.	4.	5.	6.
CaO	55.03%	55.40%	53.30%	52.92%	53.90%	55.05%
MnO	0.02	0.10	tr.	tr.	0.82	—
MgO	0.05	0.44	2.11	1.02	5.86	1.50
FeO	0.07	} 0.04	0.18	0.12	} 1.40	} 0.22
Fe ₂ O ₃	0.51		0.10	1.85		
Al ₂ O ₃	—	0.04	0.42	0.53	—	—
SiO ₂	—	—	0.98	0.90	—	—
Ig. loss	44.19	43.38	43.01	42.74	42.60	42.78
H ₂ O (—)	0.13	—	—	—	—	—
Insol	0.12	—	—	—	—	—
Total	100.12	99.40	100.10	100.08	99.58	99.55

1. Hebinoyu, Gedo hotspring, Waka town, Waka county, Iwaté Pref.: Calcareous sinter: Analyst, K. TAMURA: I. TAKAHASHI, Rep. Fac. Eng. Iwaté Univ. No. 10 (1957) 30.
2. Quarry, Gotyôda, Sioda town, Huzitu county, Saga Pref.: In druse of two pyroxene andesite, associated with zeolite, pyrite etc.: Analyst, K. KATSURA: K. MUTA, J. Jap. Ass. M.P.G., 41, (1957) 18-19.
3. 4. Totinoki hotspring, Aso county, Kumamoto Pref.: (3) pale gray brown colour. (4) pale red brown colour with small amount of hematite: Analyst, K. MUTA, op. cit. 84.
5. Dôhi vein, Mitsubishi Obira mine, Ogata town, Ôno county, Ôita Pref.: In botryoidol form: Analyst, K. MUTA, op. cit. 21.
6. Asahi mine, Nakatue village, Hida county, Ôita Pref.: Analyst, K. MUTA, op. cit. 18-19.

	7.
CaO	55.50%
MnO	tr.
MgO	0.22
SiO ₂	0.20
Al ₂ O ₃	—
Fe ₂ O ₃	} 0.14
FeO	
Ig. loss	43.83
Total	99.89

7. Taisyû mine, Izuhara town, Simoagata county, Nagasaki Pref.: Secondary product in lead and zinc deposit.: Analyst, K. MUTA, op. cit. 21.

(48) *Dolomite*

	1.	2.	3.	4.	5.	6.
SiO ₂	0.46%	1.02%	—%	—%	—%	—%
Al ₂ O ₃	0.27	0.78	—	0.15	0.38	—
Fe ₂ O ₃	0.14	8.04	0.01	} 4.40	} 3.13	—
FeO	12.42	—	1.57			0.31
MnO	1.22	0.89	0.01	n.d.	n.d.	—
MgO	10.58	15.43	19.51	20.13	21.89	15.00
CaO	31.53	30.00	33.57	28.89	29.29	39.82
H ₂ O(—)	0.06	—	—	—	—	—
CO ₂	43.60	—	—	—	—	—
Ig. loss	—	43.82	44.72	45.63	43.91	44.89
Insol.	—	—	0.29	0.83	1.69	—
Total	100.28	99.98	99.68	100.03	100.29	100.02

	7.	8.
SiO ₂	0.28%	1.93%
Al ₂ O ₃	—	2.60
Fe ₂ O ₃	} 1.96	0.58
FeO		4.04

MnO	0.17	2.39
MgO	17.91	17.74
CaO	34.30	28.25
Ig. loss	45.18	43.68
Total	99.80	101.21

1. Igashima mine, Gosen city, Niigata Pref.: In fluorite vein: Analyst, H. NAGASHIMA (1954): S. TAKASU, J. Miner. Soc. Japan, **2**, (1955) 137.
2. Yûryô mine, Tobe town, Iyo county, Ehimé Pref.: In metamorphic zone of antimony vein: Analyst, K. MUTA, J. Jap. Ass. M.P.G., **41**, (1957) 86.
3. Tunemi, Mozi city, Hukuoka Pref.: Analyst, S. MATSUDA: Z. HARADA & S. MATSUDA, J. Miner. Soc. Japan, **1**, (1954), Attached table.
- 4, 5. Motokosi, Kametaké village, Nisisonoki county, Nagasaki Pref.: (4) Dolomite vein in talc deposit, (5) In talc deposit: Analyst, K. SHINOHARA (1951): K. MUTA, J. Jap. Ass. M.P.G., **41**, (1957) 22.
6. Ono, Nozu town, Ōno county, Ōita Pref.: Analyst, S. MATSUDA: Z. HARADA & S. MATSUDA, J. Miner. Soc. Japan, **1**, (1954) Attached table.
7. Asahi mine, Nakatue village, Hita county, Ōita Pref.: Analyst, K. MUTA, J. Jap. Ass. M.P.G., **41**, (1957) 21.
8. Ōtuhira mine, Tôgô village, Higasiusuki county, Miyazaki Pref.: Gangue mineral of silber-antimony vein: Analyst, ditto.

(49) *Ankerite*

	1.	2.
Fe ₂ O ₃	} 9.58%	} 1.74%
FeO		
MnO	0.32	42.56
MgO	16.13	4.50
CaO	28.95	15.88
Ig. loss	45.02	34.66
Total	100.00	99.34

1. Dôhi vein, Mitsubishi Obira mine, Hasegawa, Ogata town, Ōno county, Ōita Pref.: Tabular form: Analyst, K. MUTA, J. Jap. Ass. M.P.G., **41**, (1957) 21.
2. Hôei mine, Tuzuraori, Ogata town, the same Pref.: In replacement deposit of lead & zinc minerals.: Analyst, ditto.

V. Borate Minerals

(50) *Paigeite*

δ	4.53
SiO ₂	1.16%
TiO ₂	0.11
Fe ₂ O ₃	29.84
FeO	48.72

MnO	0.62
MgO	1.51
CaO	1.60
B ₂ O ₃	13.24
Na ₂ O	0.29
CO ₂	1.14
S	0.09
H ₂ O (+)	0.70
H ₂ O (—)	0.52
Total	99.54

Kamaisi mine, Kamaisi city, Iwaté Pref.: Fibrous aggregates in the iron ores of skarn type: Analyst, J. ITO: T. WATANABE and J. ITO, Miner. J. 1, (1954) 86.

VI. Sulfate Minerals

(51) *Barite*

	1.	2.	3.
δ	4.30($\begin{smallmatrix} 20^{\circ}\text{C} \\ 4^{\circ}\text{C} \end{smallmatrix}$)	—	4.91
BaO	62.49%	} 59.20%	} 54.20%
SrO	tr.		
PbO	—	3.68	2.53
SO ₃	34.09	33.06	30.42
SiO ₂	2.01	1.89	6.61
Al ₂ O ₃	0.05	0.56	1.02
Fe ₂ O ₃	0.32	—	—
MgO	none	—	—
CaO	0.38	0.61	1.49
H ₂ O	0.54	—	—
Total	99.88	99.00	96.27

1. Naidôzi, Kominato town, Higasi-togaru county, Aomori Pref.: In epithermal vein: Analyst, S. HASEGAWA, J. Jap. Ass. M.P.G., 38, (1953) 90.
- 2, 3. Pb-bearing barite: Kanagawa mine, Tazawako town, Senpoku county, Akita Pref.: In a stream in the neighbourhood of the Kawarage mine, (2) Mixture of three layers, (3) Pheripheral layer.: Analyst, R. YAMAGUCHI: M. SHIKAWA & R. YAMAGUCHI, Ibid, 40, 147, (1956).

(52) *Jarosite*

	1.	2.	3.	4.	5.	6.
Fe ₂ O ₃	46.46%	47.60%	48.34%	47.35%	48.16%	53.85%
Na ₂ O	1.01	0.55	0.89	0.78	0.38	0.15
K ₂ O	7.09	6.04	8.52	8.80	6.47	5.12
SO ₃	30.37	27.92	31.42	31.46	24.15	23.08
H ₂ O (+)	10.13	14.33	[10.83]	[11.61]	15.73	10.84

H ₂ O (—)	0.43	dry sample	—	—	d.s.	d.s.
SiO ₂	4.10	1.75	—	—	1.34	3.35
TiO ₂	—	0.49	—	—	0.25	0.10
Al ₂ O ₃	0.76	0.55	—	—	3.27	3.71
MnO	—	—	—	—	—	—
MgO	—	0.45	—	—	0.51	0.90
CaO	—	0.81	—	—	0.33	0.61
Total	100.35	100.49	100.00	100.00	100.59	101.71

	7.	8.	9.	10.	11.	12.
Fe ₂ O ₃	56.95%	46.59%	55.11%	57.98%	57.55%	50.63%
Na ₂ O	0.30	1.40	0.32	0.22	0.20	0.48
K ₂ O	5.26	7.84	5.67	4.71	4.57	7.56
SO ₃	20.05	30.52	20.15	19.07	20.93	29.12
H ₂ O (+)	11.67	9.25	14.55	13.15	10.44	10.43
H ₂ O (—)	d.s.	d.s.	d.s.	d.s.	d.s.	1.39
SiO ₂	2.79	0.11	1.32	2.09	2.49	—
TiO ₂	0.09	0.52	0.15	0.07	0.05	—
Al ₂ O ₃	1.09	3.03	1.37	1.38	1.98	—
MgO	0.78	0.05	0.16	0.88	0.49	FeO 0.11
CaO	1.18	0.28	1.17	1.16	1.10	—
P ₂ O ₅	—	—	0.59	—	0.51	0.01
Insol.	—	—	—	—	—	0.42
Total	100.16	99.59	100.56	100.71	100.31	100.15

1. Nakanosawa, Takayu hot spring, Azuma village, Sinobu county, Hukusima Pref.: Analyst, T. MOCHIZUKI (1948): Research Committee of Minerals for New Practical Applications: Kali, phosphor & arsenic associated with limonite deposits (1953). Table 7.
2. Gunma mine, Kuni village, Azuma county, Gunma Pref.: Analyst, T. SUZUKI & M. NAKAGAWA, J. Ind. Chem. 55, (1952). 71.: loc. cit.
- 3, 4. The same locality: Analyst, (3) S. SEKINE, (4) K. KATO: M. SAITO, Proc. 7th Pacif. Sci. Congress 2, (1953) 227.
- 5, 6. Suwa mine, Tino town, Suwa county, Nagano Pref.: Analyst, loc. cit.
- 7, 8, 9, 10, 11. Myōzinyama deposit, Mitsui Aso mine, Aso town, Aso county, Kumamoto Pref.: Analyst, T. SUZUKI, S. INO & M. NAKAGAWA: N. KATAYAMA, T. SUZUKI, S. INO & M. NAKAGAWA, J. Ind. Chem. 55, (1952) 196.: loc. cit.
12. The same locality: Analyst, S. SEKINE, H. SHISHIDO & T. HIRUKAWA: loc. cit.
- 13, 14, 15, 16, 17, 18, 19. The same mine, (13), (14), (15). Myōzinyama deposit, (16), (17), (18), (19). Haizuka deposit: Analyst, M. ŌTA (1950): loc. cit.

	13.	14.	15.	16.	17.	18.
Fe ₂ O ₃	49.20%	49.40%	49.20%	51.60%	53.00%	53.40%
Na ₂ O	0.41	0.93	0.80	1.40	0.71	0.89
K ₂ O	7.46	6.79	7.42	5.62	6.68	5.72
SO ₃	30.73	29.62	27.82	25.15	26.02	24.42
H ₂ O (+)	12.80	13.12	12.65	13.65	12.93	13.85
H ₂ O (—)	d.s.	d.s.	d.s.	d.s.	d.s.	d.s.
SiO ₂	0.42	1.58	1.61	1.80	1.52	1.68

TiO ₂	—	—	—	—	—	—
MgO	—	—	—	0.87	0.15	1.31
CaO	0.53	0.46	0.62	0.35	0.51	0.29
Total	101.55	101.90	100.12	100.44	101.52	101.56
			19.	20.		
Fe ₂ O ₃			52.00%	34.51%		
Na ₂ O			0.65	1.33		
K ₂ O			6.64	5.47		
SO ₃			27.30	20.22		
H ₂ O (+)			12.85	14.52		
H ₂ O (—)			d.s.	0.81		
SiO ₂			0.96	3.51		
TiO ₂			—	0.13		
MgO			1.09	0.54		
CaO			0.32	0.04		
Total			101.81	101.14		

20. Makizono mine, Tearai hot spring, Makizono town, Aira county, Kagosima Pref.: In solfatara: Analyst, H. MINATO (1953): K. KISOSHITA, K. MUTA, H. MINATO, & Y. TAKANO, J. Miner. Soc. Japan, **2**, (1955) 128.

(53) *Fibroferrite*

	1.	2.
Fe ₂ O ₃	27.10%	29.6%
MnO	0.11	0.1
SO ₃	28.95	29.9
H ₂ O	[41.24]	40.7
Insol.	2.60	—
Total	[100.00]	100.3

- 1, 2. Yamané, Kurayosi city, Tottori Pref.: In quartz vein in granite: Analyst, T. ASHIZAWA, (1) ...1950, (2) ...1951: K. SAKURAI and T. ASHIZAWA, J. Miner. Soc. Japan, **1**, (1954) 438.

VII. Phosphate and Arsenate Minerals

(54) *Xenotime*

δ	4.45 (¹⁶ C/ ₄ C)
P ₂ O ₅	30.12%
[Y] ₂ O ₃	55.14
[Ce] ₂ O ₃	1.58
ZrO ₂	0.80
UO ₃	2.18
ThO ₂	1.28

(Nb, Ta) ₂ O ₅	1.21
SiO ₂	2.89
TiO ₂	tr.
Al ₂ O ₃	0.62
Fe ₂ O ₃	1.60
MnO	tr.
MgO	none
CaO	none
H ₂ O (+)	1.53
H ₂ O (—)	0.48
Total	99.43

Nizyûnita, Ôhari, Marumori town, Igu county, Miyagi Pref.: In pegmatite:
Analyst, S. HASEGAWA: K. ÔMORI, J. Jap. Ass. M.P.G., 41, (1957) 215.

(55) *Vivianite*

	1.	2.	3.	4.
δ	2.66 (17°C)	—	—	—
FeO	30.04%	29.30%	—%	—%
P ₂ O ₅	24.43	26.48	22.59	22.74
SiO ₂	non	0.42	0.58	0.82
TiO ₂	tr.	—	—	—
Al ₂ O ₃	2.49	0.59	0.23	non
Fe ₂ O ₃	6.84	14.00	44.05	42.60
MnO	0.24	tr.	0.25	non
MgO	0.28	0.10	tr.	tr.
CaO	0.05	0.12	0.70	—
Na ₂ O	tr.	—	—	0.35
K ₂ O	tr.	—	1.51	tr.
H ₂ O (+)	13.05	16.11	10.78	15.94
H ₂ O (—)	12.65	12.35	15.40	17.49
SO ₃	non	—	4.44	0.04
Insol.	10.36	0.06	0.25	0.40
Total	100.44	99.89	100.82	100.38
	(100.43)		(100.78)	

- 1, 2. Vivianite: Himeshima, Ôita Pref.: (1) nodular, (2) tree trunk shaped vivianite nodules, 1-8 cm in diameter, composing of radial aggregates of foliated crystals, have been found in gravels and in mudstone bed at beach: Analyst, H. MINATO (1952, 1955): H. MINATO, K. KINOSHITA and Y. OKAMOTO, Miner. J. 1, (1956) 344.
3. Ferrivivianite: Isiyasuba deposit, Suwa iron mine, Tino town, Suwa county, Nagano Pref.: In limonite deposit: Analyst, H. MINATO: Res. Comm. of Minerals for New Pract. Applications: Kali, phosphor and arsenic associated with limonite, (1953) 102.
4. Bosporite (Oxidized vivianite): op. cit., 103.

(56) *Strengite*

δ	2.82
P_2O_5	34.36%
Fe_2O_3	41.43
SiO_2	0.16
Al_2O_3	0.19
$H_2O(+)$	20.43
$H_2O(-)$	4.17
Insol.	0.03
Total	100.77

Isiyasuba deposit, Suwa iron mine, Tino town, Suwa county, Nagano Pref.: In limonite deposit: Analyst, H. MINATO: Res. Comm. of Minerals for New Pract. Applications: Kali, phosphor and arsenic associated with limonite deposits, (1953) 106.

(57) *Scorodite*

	1.	2.	3.	4.	5.	6.
δ	—	—	—	3.22	—	3.23
As_2O_5	49.00%	45.66%	31.05%	48.97%	41.56%	48.53%
Fe_2O_3	35.69	31.97	52.83	33.43	29.00	33.54
FeO	0.38	non	0.57	0.37	—	0.99
MnO	tr.	—	—	—	—	—
MgO	0.06	non	non	non	—	—
CaO	0.09	tr.	tr.	tr.	1.89	0.34
SnO	—	—	—	—	—	0.30
SiO_2 {Insol.	0.04	6.41	—	—	15.70	—
{Sol.	0.03	0.56	—	—	—	—
Al_2O_3	non	tr.	tr.	—	—	—
$H_2O(+)$	14.81	14.58	16.21	15.82	11.55	16.36
$H_2O(-)$	0.74	0.71	0.36	2.18	0.60	0.18
Total	100.84	99.89	100.57	100.77	100.02	100.23
			(101.02)		(100.30)	(100.24)

- 1, 2, 3. Kimobetu mine, Kimobetu village, Abuta country, Iburi Prov. Hokkaidô: In limonite deposit. (1) light green colour, massive, (2) white colour, powdery (3) yellow colour, powdery.: Analyst, H. MINATO: Research Committee of Minerals for New Pract. Applications: Kali, phosphor & arsenic associated with limonite deposits, 142, (1953).
4. Tunotu mine, Gôtu city, Simané Pref.: ditto.
5. Sasagatani mine, Tuwano town, Kanoasi county, Simané Pref.: In contact deposit: ditto.
6. Okumitaté mine, Iwato village, Nisiusuki village, Miyazaki Pref.: ditto.

	7.	8.
δ	—	3.167
As_2O_5	36.41%	48.51%

Fe ₂ O ₃	28.16	33.65
FeO	tr.	0.46
MnO	non.	tr.
MgO	0.65	0.96
CaO	0.46	non.
SiO ₂ { Insol.	18.87	0.22
Sol.	1.73	tr.
Al ₂ O ₃	non.	— —
H ₂ O (+)	12.72	15.04
H ₂ O (—)	1.16	1.04
Total	100.16	99.61
		(99.88)

7. Toroku mine, Iwato village, Nisiusuki county, Miyazaki Pref.: In contact arsenopyrite-cassiterite deposit: ditto.
8. Akaisi mine, Akaisi, Tiran town, Kawabé county, Kagosima Pref.: ditto.

(58) *Clinoclasite*

δ	4.33 (9°C)
As ₂ O ₅	29.66%
CuO	62.42
Al ₂ O ₃	0.63
Fe ₂ O ₃	0.32
CaO	0.05
H ₂ O (+)	7.55
H ₂ O (—)	0.36
Total	100.99

Kitabira mine, Ōda town, Miné county, Yamaguti Pref.: In druse of limonite and partly in clay: Analyst, H. MINATO: Research Committee of Minerals for New Pract. Applications: Kali, phosphor and arsenic associated with limonite deposits, (1953) 154.

(59) *Conichalcite*

	1.	2.
δ	4.5	2.5–3
As ₂ O ₅	44.30%	29.66%
CuO	30.22	62.42
ZnO	0.11	—
CaO	17.07	0.05
MgO	3.67	—
Fe ₂ O ₃	0.07	0.32
Al ₂ O ₃	0.20	0.63
SiO ₂	tr.	—
SO ₃	0.04	—
Insol.	0.08	—

H ₂ O (+)	4.46	7.55
H ₂ O (—)	0.18	0.36
Total	100.40	100.99

1. Kitabira mine, Ōda town, Miné county, Yamaguti Pref.: As thin film that covers the wall of druse in limonite: Analyst, H. MINATO (1952): H. MINATO and Y. TAKANO, Miner. J. **1**, (1953) 50.
2. The same locality: As massive aggregates of small flakes of conichalcite with limonite or iron rich clay, cementing limonite fragments: Analyst, H. MINATO (1948): H. MINATO, Miner. J. **1**, (1954) 93.

(60) *Amblygonite*

δ	3.00(20°C)
SiO ₂	0.91%
Al ₂ O ₃	34.06
Fe ₂ O ₃	0.54
MnO	0.38
MgO	0.11
CoO	0.28
Na ₂ O	3.54
Li ₂ O	7.51
P ₂ O ₅	45.91
H ₂ O (+)	5.51
H ₂ O (—)	0.39
F	1.44
—O=F	—0.59
Total	99.99

Nagatoriyama, Hukuoka city, Hukuoka Pref.: In Li-bearing pegmatite: Analyst, J. ITO: J. ITO, H. MINATO and Y. OKAMOTO, J. Miner. Soc. Japan, **2**, (1955) 265.

(61) *Olivenite*

CuO	55.80%
As ₂ O ₅	39.80
SiO ₂	0.22
Al ₂ O ₃	0.04
Fe ₂ O ₃	0.59
MnO	non.
MgO	0.17
CaO	non.
ZnO	0.07
H ₂ O (+)	3.08
H ₂ O (—)	0.14
Insol.	non.
Total	99.91

Kitabita mine, Ōda town, Miné county, Yamaguti Pref.: In oxidized zone of contact deposit: Analyst, H. MINATO, J. Miner. Soc. Japan, **1**, (1953) 137.

(62) *Adamite*

δ	4.28 (25°C)	
ZnO	56.39%	
As ₂ O ₅	39.43	
CuO	0.26	
Fe ₂ O ₃	0.85	
H ₂ O (+)	3.52	
H ₂ O (−)	non.	
Total	100.45	

Mitaté mine, Iwato village, Nisiusuki county, Miyazaki Pref.: In oxidized zone of contact dep.: Analyst, H. MINATO, J. Miner. Soc. Japan, **1**, (1953) 129.

(63) *Cuproadamite*

δ	4.3 (10°C)	—
ZnO	31.8%	47.1%
CuO	23.9	7.3
As ₂ O ₅	41.2	41.5
Fe ₂ O ₃	tr.	0.5
MgO	tr.	—
CaO	non.	—
H ₂ O (+)	3.2	2.8
H ₂ O (−)	0.2	0.6
Insol.	0.5	—
Total	100.8	99.8

1. Kitabira mine, Ōda town, Miné county, Yamaguti Pref.: In oxidized zone of contact dep.: Analyst, H. MINATO, J. Miner. Soc. Japan, **1**, (1953) 135.
2. Mitaté mine, Iwato village, Nisiusuki county, Miyazaki Pref.: In oxidized zone of contact dep.: ditto.

(64) *Abukumalite*

δ	4.567 (21°C)
SiO ₂	22.70%
TiO ₂	0.00
Al ₂ O ₃	0.75
Fe ₂ O ₃	0.79
Ce ₂ O ₃	4.47
[Ce] ₂ O ₃	5.76
[Y] ₂ O ₃	46.91
ThO ₂	0.51
ZrO ₂	0.00

UO ₂	0.00
FeO	1.44
MnO	3.67
MgO	0.10
CaO	9.58
P ₂ O ₅	1.73
H ₂ O (+)	0.68
H ₂ O (—)	0.15
CO ₂	0.10
F	0.50
—F=O	—0.21
Total	99.58
	(99.63)

Iizaka, Kawamata town, Daté country, Hukusima Pref.: In pegmatite: Analyst, S. HASEGAWA: K. ŌMORI and S. HASEGAWA, J. Jap. Ass. M.P.G., **37**, (1953) 27.

(65) *Pyromorphite*

	1.	2.	3.	4.	5.	6.
δ	6.78 (15.5°C)	—	7.02	7.07	7.06	6.94
PbO	82.7%	83.5%	83.4%	82.0%	82.3%	80.9%
P ₂ O ₅	15.0	14.9	15.1	15.5	14.8	16.4
Cl	2.5	2.6	2.5	2.5	2.5	2.4
Total	100.2	101.0	101.0	100.0	99.6	99.7

1. Taikyû mine, Minamisiribesi village, Isoya county, Siribesi Prov. Hokkaidô: In “Kurokô” (Black ore) deposit: Analyst, T. ISHIMORI: K. MUTA and T. ISHIMORI, J. Miner. Soc. Japan, **1**, (1953) 122.
2. Zien mine, Kuwabara county, Miyagi Pref.: In oxidized zone of epithermal zinc vein: Analyst, H. WAKI: T. ISHIMORI, H. WAKI and K. MUTA, J. Miner. Soc. Japan, **2**, (1955) 177.
3. Mikura mine, Minamiizu town, Kamo county, Sizuoka Pref.: In clay of epithermal gold silver vein: Analyst, H. WAKI: ditto.
4. Nabeto mine, Komatu city, Isikawa Pref.: In oxidized zone of copper vein with quartz: Analyst, S. SUGIURA, J. Miner. Soc. Japan, **2**, (1954) 44.
5. Ogoya mine, Komatu city, Isikawa Pref.: In oxidized zone of copper vein: Analyst, H. WAKI: T. ISHIMORI, H. WAKI and K. MATA, Ibid, **2**, (1955) 177.
6. Kato mine, Kato town, Munakata county, Hukuoka Pref.: In oxidized zone of mesothermal deposit: ditto.

	7.	8.	9.
δ	7.14	7.02	6.81
PbO	81.5%	82.2%	83.3%
P ₂ O ₅	11.2	14.4	15.0
As ₂ O ₅	6.2	—	—
Cl	2.5	2.5	2.4
Total	101.4	99.1	100.7

7. Arseniferous: Kan'nondaki old adit, Umé village, Minamiamabé county, Ōita Pref.: ditto.
- 8, 9. Nisisuzuyama mine, Taniyama town, Kagosima county, Kagosima Pref.: In oxidized zone of tin vein: ditto.

(66) *Mimetite*

	1.	2.	3.	4.	5.
δ	—	7.02	—	—	—
PbO	75.9%	76.9%	74.6%	69.8%	73.1%
As ₂ O ₅	20.3	18.8	23.3	16.2	17.2
Cl	2.3	2.3	2.4	2.0	2.3
P ₂ O ₅	1.9	2.1	—	0.4	—
Insol in HNO ₃	—	—	—	2.2	1.3
Total	100.4	100.1	100.3	97.3	93.9

(99.6)

1. Akaiwa No. 1 adit, Titibu mine, Ōtaki village, Titibu county, Saitama Pref.: In oxidized zone of contact deposit: Analyst, H. WAKI: T. ISHIMORI, H. WAKI and K. MUTA, J. Miner. Soc. Japan, **2**, (1955) 177.
2. Akaiwa No. 2 Adit, the same mine: ditto.
3. Nariaisai old adit, Sasu, Izuhara town, Simoagata county, Nagasaki Pref.: Secondary mineral of galena: Analyst, T. ISHIMORI: ditto.
- 4, 5. Nariaisai, the same locality: ditto.

(67) *Torbernite*

UO ₃	62.31%
CuO	8.21
P ₂ O ₅	15.75
H ₂ O (+)	} 13.73
H ₂ O (—)	
Total	100.00

Totimoto, Tamura town, Tamura county, Hukusima Pref.: In pegmatite: Analyst, K. KIMURA, K. KURODA, K. NAGASHIMA & S. BANDO, J. Chem. Soc. Japan, **77**, (1956) 327.

(68) *Zeunerite*

CuO	8.9%
UO ₃	56
As ₂ O ₅	22
H ₂ O	[13.1]
Total	100

Miyosi mine, Kurasiki city, Okayama Pref.: In pneumatolytic quartz vein in greisen: Analyst, K. NAGASHIMA: K. HENMI, J. Miner. Soc. Japan, **2**, (1955) 186.

K. KIMURA, K. KURODA, K. NAGASHIMA & S. BANDO (J. Chem. Soc. Japan **77**, (1956) 227.) reported that it is "metazeunerite".

(69) *Autunite*

	1.	2.	3.	4.	5.
UO ₃	59.92%	59.92%	61.21%	59.2%	61.3%
CaO	6.40	6.40	6.21	6.5	6.3
P ₂ O ₅	15.95	15.95	14.85	15.3	14.2
H ₂ O (+)	8.67	8.67	} 17.73	18.1	18.2
H ₂ O (—)	7.65	7.65			
SiO ₂	0.09	0.09	—	—	—
Al ₂ O ₃	0.13	0.13	—	—	0.0
Fe ₂ O ₃	0.17	0.17	—	—	0.0
MgO	0.14	0.14	—	—	—
CuO	—	0.32	—	—	—
Pb, Sn, Cu	0.32	—	—	—	—
Mn, Th, Rare earths	0.00	0.00	—	—	—
Total	99.24	99.44	100.00	99.1	100.0
	(99.44)				

1. Minamiyamagata, Isikawa town, Isikawa county, Hukusima Pref.: In pegmatite: Analyst, K. NAGASHIMA (1953): K. SAKURAI & K. NAGASHIMA, J. Miner. Soc. Japan **1**, (1954) 358.
2. The same chemical analysis was reported by K. KIMURA, K. KURODA, K. NAGASHIMA & S. BANDO, J. Chem. Soc. Japan, **77**, (1956) 327.
3. Totimoto, Tamura town, Tamura county, Hukusima Pref.: In pegmatite: Analyst, K. KIMURA, K. KURODA, K. NAGASHIMA & S. BANDO, loc. cit.
4. Ningyô pass between Tottori & Okayama Pref.: In Tertiary sediments: Analyst, T. SOMA, J. Miner. Soc. Japan, **3**, (1957) 215.
5. Nisiyama, Kanetaké village, Sawara county, Hukuoka Pref.: In pegmatite: Analyst, K. KIMURA, K. KURODA, K. NAGASHIMA & S. BANDO, loc. cit.

(70) *Cucoxenite*

P ₂ O ₅	18.07%
Fe ₂ O ₃	42.12
H ₂ O (+)	22.46
H ₂ O (—)	16.76
SiO ₂	non.
Al ₂ O ₃	0.64
MnO	non.
MgO	tr.
CaO	tr.
Na ₂ O	0.19
K ₂ O	0.66
SO ₃	0.41

Insol.	0.68
Total	100.03
	(101.99)

Isiyasuba deposit, Suwa iron mine, Tino town, Suwa county, Nagano Pref.: In limonite deposit: Analyst, H. MINATO: Res. Comm. of Minerals for New Pract. Applications: Kali, phosphor and arsenic associated with limonite deposits, (1953) 103.

VIII. Tungstate and Molybdate Minerals

(71) *Scheelite*

δ	6.07 ($^{27^{\circ}\text{C}}_{4^{\circ}\text{C}}$)
CaO	19.72%
WO ₃	79.83
SiO ₂	0.30
Al ₂ O ₃	0.05
Fe ₂ O ₃	0.24
FeO	0.11
MnO	none
MgO	0.13
H ₂ O(+)	0.08
H ₂ O(−)	0.13
Total	100.59

Sekihata, Isikawa town, Isikawa county, Hukusima Pref.: In skarn: Analyst, K. YOKOYAMA: K. ÔMORI, K. ÔTSUKA and K. YOKOYAMA, J. Jap. Ass. M. P. G., 39, (1955) 131.

(72) *Powellite*

MoO ₃	69.7%
CaO	26.0
WO ₃	1.5
SiO ₂	0.1
FeO	1.2
MgO	1.0
Ig. loss	0.9
Total	100.4

Kokurobé mine, Simoniikawa county, Toyama Pref.: Pale green. Secondary mineral of molybdenite: Analyst, H. ÔTSUKA: K. HENMI & H. ÔTSUKA, J. Miner. Soc. Japan, 3, (1957) 234.

IX. Silicate Minerals

(73) *Fayalite*

SiO ₂	29.71%
FeO	63.21
MnO	2.85
MgO	1.94
CaO	0.76
H ₂ O (+)	1.37
H ₂ O (—)	0.46
Total	100.30

Ôsunaba, Harao Island, Okayama city, Okayama Pref.: In granite: Analyst, H. TAKEDA & Y. SATO, J. Miner. Soc. Japan, 2, (1956) 472.

(74) *Tephroite*

	1.	2.
δ	3.87±0.01	—
SiO ₂	31.48%	25.20%
TiO ₂	nil	tr.
Al ₂ O ₃	tr.	—
Fe ₂ O ₃	0.23	—
FeO	0.17	1.22
MnO	60.66	59.80
MgO	6.58	2.97
CaO	nil	2.97
H ₂ O (+)	0.38	—
H ₂ O (—)	nil	4.60
CO ₂	—	—
F	0.07	—
Insol.	—	4.28
Total	99.57	99.20
		(99.70)

1. Noda-Tamagawa mine, Noda town, Kunohé county, Iwaté Pref.: Tephroite intergrown with hausmannite and carbonate: Analyst, W. H. HERDSMAN: E. D. LEE, Stanford Univ. Publ., Univ. Ser. Geol. Sci., 5, (1955) 33.
2. Ôasi mine, Kanuma city, Totigi Pref.: Colour, gray white. In contact manganese deposit: Analyst, T. YOSHIMURA, Manganese deposits in Japan, (1952) 116.

(75) *Garnet*

	1.	2.	3.	4.	5.	6.
δ	—	3.83 _(^{16°C}/_{4°C})	4.24 _(^{11°C}/_{4°C})	4.249	—	—
SiO ₂	36.00%	35.12%	36.04%	36.34%	36.86%	37.66%

TiO ₂	n.d.	tr.	tr.	0.18	0.61	0.42
Al ₂ O ₃	8.87	1.51	20.20	20.11	21.95	20.30
Fe ₂ O ₃	19.23	29.44	2.10	1.56	2.47	1.75
FeO	1.22	0.74	22.12	23.50	14.01	29.62
MnO	1.06	0.57	18.76	17.51	16.22	2.87
MgO	0.24	tr.	0.12	tr.	1.21	3.88
CaO	34.18	32.28	0.62	0.52	5.95	2.50
NaO	—	—	—	—	n.d.	n.d.
K ₂ O	—	—	—	—	n.d.	n.d.
H ₂ O (+)	—	0.19	0.15	0.21	n.d.	n.d.
H ₂ O (—)	—	0.23	0.11	0.25	0.18	0.26
Total	100.80	100.08	100.22	100.18	99.46	99.26

1. Kamaisi mine, Kamaisi city, Iwaté Pref.: In skarn: Analyst, B. YOSHIKI & K. KOMATA, Rep. Res. Lab. Asahi Glass Co. **4**, (1954) 21.: And. 59.1%, Gr. 34.4%, Alm. 3.0%, Sp. 2.5%, Pyr. 0.8% Total 99.8%.
2. Andradite: Okita, Daitô town, Higashiiwai county, Iwaté Pref.: In skarn: Analyst, S. HASEGAWA, J. Jap. Ass. M.P.G., **39**, (1955) 201.
3. Ôhari, Marumori town, Igu county, Miyagi Pref.: Associated with allanite in pegmatite: Analyst, S. HASEGAWA, Sci. Rep. Tohoku Univ. III Ser. **5**, (1957), 367.
4. Kasuya mine, Isikawa town, Isikawa county, Hukusima Pref.: In pegmatite: Analyst, S. HASEGAWA: K. ÔMORI & S. HASEGAWA, J. Jap. Ass. M.P.G., **40**, (1956) 4; Alm: Sp: Gr=57.0: 41.6: 1.4.
5. Pyralspite: Hottiyuka, Samegawa village, Higasisirakawa county, Hukusima Pref.: In pyralspite bearing biotite gneiss: Analyst, T. MIYASHIRO: A. MIYASHIRO, *Geochimica et Cosmochimica Acta*, **4**, (1953), 185.
6. Pyralspite: Nyûzyô, Tôno town, Isiki county, Hukusima Pref.: In pyralspite bearing biotite schist: loc. cit.

	7.	8.	9.	10.	11.	12.
δ	—	—	—	4.01±0.02	4.33	—
SiO ₂	36.00%	37.80%	36.16%	36.52%	36.73%	40.50%
TiO ₂	0.40	0.10	0.15	0.60	0.09	0.10
Al ₂ O ₃	20.82	20.60	20.10	21.20	18.51	21.17
Fe ₂ O ₃	2.85	1.32	3.10	0.87	2.48	2.14
FeO	26.53	24.32	23.69	4.62	25.54	11.55
MnO	12.18	16.04	17.07	31.52	13.61	0.26
MgO	0.86	0.32	0.40	0.38	0.32	14.56
CaO	0.27	0.20	0.22	3.76	1.77	9.23
Na ₂ O	none	none	none	—	—	0.26
K ₂ O	none	none	none	—	—	0.13
H ₂ O (+)	—	—	—	—	0.68	H ₂ O 0.15
H ₂ O (—)	0.28	0.12	0.09	—	0.09	—
Total	100.19	100.82	100.98	99.47	99.82	100.05

- 7, 8, 9. Yamanoo, Makabé town, Makabe county, Ibaragi Pref.: In pegmatite: Analyst, N. SHIMODA, J. Chem. Soc. Japan, **76**, (1955) 1252.
10. Kinkô (Kinkyô) mine, Iwakuni city, Yamaguti Pref.: In manganese ores

being associated with pyroxmangite or rhodonite: Analyst, W. H. HERDSMAN: D. L. LEE, Stanford Univ. Publ. Univ. Ser. Geol. Sci., 5, (1955) 16; Sp. 74, Alm. 13, Gr. 11, Pyr. 2, Total 100%.

11. Tateiwa mine, Hôzyô town, Onsen county, Ehimé Pref.: In pegmatite: Analyst, Y. UMEGAKI, T. HABARA & A. SOEDA, J. Sci. Hiroshima Univ. Ser. C. 2, (1957) 42.
12. Higasiakaisiyama, Doi town, Uma county, Ehimé Pref.: In eclogite: Analyst, Z. KURIYAMA: T. BAMBA, J. Geol. Soc. Japan, 59, (1953) 441.

(76) *Zircon*

	1.	2.
δ	3.95 ₇ ($\frac{800}{400}$)	—
SiO ₂	27.13%	30.01%
TiO ₂	tr.	0.10
Al ₂ O ₃	0.48	1.60
Fe ₂ O ₃	0.45	} 2.26
FeO	—	
MnO	tr.	0.08
MgO	tr.	0.18
CaO	tr.	0.09
[Ce] ₂ O ₃	0.37	0.13
[Y] ₂ O ₃	10.14	3.10
ThO ₂	1.03	2.44
PO ₂	1.75	—
U ₃ O ₈	—	0.66
(Zr, Hf)O ₂	51.68	52.94
(Nb, Ta) ₂ O ₅	—	1.15
P ₂ O ₅	3.37	0.99
H ₂ O (+)	3.12	2.97
H ₂ O (—)	0.32	1.11
Total	99.84	99.81

1. A variety of zircon containing rare earths & P₂O₅: Hayamadaké, Tokiwa town, Tamura county, Hukusima Pref.: In pegmatite: Analyst, S. HASEGAWA: K. ÔMORI and S. HASEGAWA, J. Jap. Ass. M.P.G., 41, (1957) 7.; Sci. Rep. Tôhokuk Univ. III Ser. 5, (1957) 369.
2. A variety of zircon containing rare earths & P₂O₅: Hattiyôwa, Kitayamato village, Ikoma county, Nara Pref.: In pegmatite: Analyst, J. TAKUBO, T. UEDA, S. NISHIMURA and K. MASUTOMI, J. Geol. Soc. Japan, 59, (1953) 50.

(77) *Thorogummite*

	1.	2.	3.
SiO ₂	17.30%	16.20%	22.93%
TiO ₂	none	0.10	n.d.
Al ₂ O ₃	0.64	4.70	6.03
Fe ₂ O ₃	12.40	8.80	10.94
FeO	—	1.67	—

MnO	tr.	0.20	0.16
MgO	0.05	0.27	0.29
CaO	0.22	3.02	0.99
ThO ₂	43.23	29.68	28.52
[Ce] ₂ O ₃	0.53	0.45	0.42
[Y] ₂ O ₃	3.76	9.61	6.95
(Nb, Ta) ₂ O ₅	—	0.45	—
UO ₃	3.12	—	—
U ₃ O ₈	—	2.00	2.79
ZrO ₂	0.32	0.86	2.07
PbO	—	tr.	—
P ₂ O ₅	0.74	2.08	1.18
CO ₂	0.53	0.77	n.d.
H ₂ O (+)	6.05	7.43	7.61
H ₂ O (—)	10.45	11.88	7.86
Res.	—	—	0.85
Total	99.34	100.25 (100.17)	99.59

1. Hayamadaké, Tokiwa town, Tamura county, Hukusima Pref.: In pegmatite: Analyst, S. HASEGAWA: K. OMORI and S. HASEGAWA, J. Jap. Ass. M.P.G., **41**, (1957) 6.; Sci. Rep. Tôhoku Univ. III. Ser. **5**, (1957) 370.
2. Tateiwa, Hôzô town, Onsen county, Ehimé Pref.: In pegmatite: Analyst, J. TAKUBO, T. UEDA, S. NISHIMURA and K. MASUTOMI, J. Geol. Soc. Japan, **59**, (1953) 56.
3. Tateiwa mine, Syobu, Hôzyô town, Onsen county, Ehimé Pref.: In pegmatite: Analyst, Y. UMEGAKI, T. HABARA and A. SOEDA, J. Sci. Hiroshima Univ., Ser. C, **2**, (1957) 40.

(78) *Datolite*

	1.	2.
SiO ₂	37.64%	36.38%
CaO	34.90	34.20
B ₂ O ₃	21.31	19.18
H ₂ O (+)	5.66	6.82
H ₂ O (—)	—	0.10
Al ₂ O ₃	0.32	0.50
FeO	} 0.22	} 0.80
Fe ₂ O ₃		
MgO	0.60	1.28
Na ₂ O	n.d.	n.d.
K ₂ O	n.d.	n.d.
Total	100.65	99.26

- 1, 2. Ginziki, Obira mine, Ogata town, Ōno county, Ōita Pref.: (1) fresh sample, (2) partly decomposed sample: Analyst, N. TANAKA: K. KINOSHITA & M. MIYASHITA, J. Mining Inst. Kyushu, **27**, (1954) 330.

(79) *Gadolinite*

	1.	2.
δ	4.5(25°C)	—
SiO ₂	23.09%	22.91%
TiO ₂	0.07	—
ZrO ₂	0.03	—
SnO ₂	0.31	—
ThO ₂	0.25	0.59
Al ₂ O ₃	0.62	0.70
Fe ₂ O ₃	1.83	1.90
Ce ₂ O ₃	0.41	} 3.05
Ce ₂ O ₃	2.21	
Y ₂ O ₃	48.05	48.40
FeO	12.21	11.13
MnO	0.32	0.46
MgO	0.31	0.40
CaO	1.16	0.63
BeO	9.21	9.49
(Na, K) ₂ O	0.02	—
H ₂ O (+)	0.45	0.73
H ₂ O (—)	0.13	0.03
Total	100.68	100.42

- 1, 2. Takehinata, Kôhu city, Yamanashi Pref.: In pegmatite: Analyst, (1)...K. NAGASHIMA (1950), (2)...J. TAKUBO (1950): K. SAKURAI and K. NAGASHIMA, J. Miner. Soc. Japan, 1, (1954) 360.

(80) *Titanite*

δ	3.510
SiO ₂	30.65%
TiO ₂	37.64
Al ₂ O ₃	2.95
Fe ₂ O ₃	0.71
[Y] ₂ O ₃	none
FeO	none
MnO	0.10
MgO	none
CaO	27.05
Ig. loss	0.45
Total	99.55

- Isikawa town, Isikawa county, Hukusima Pref.: In pegmatite: Analyst, S. HASEGAWA: K. ÔMORI & S. HASEGAWA, J. Jap. Ass. M.P.G., 37, (1953) 213.

(81) *Yttrotitanite*

	1.	2.	3.	4.	5.
δ	3.93	3.67	3.55	3.54	—

SiO ₂	27.64%	28.19%	28.29%	32.06%	31.02%
TiO ₂	32.01	34.55	37.63	37.38	31.06
Al ₂ O ₃	3.80	3.01	4.32	0.07	4.11
Fe ₂ O ₃	6.30*	1.50*	2.56	0.07	2.19
ΣCe ₂ O ₃	—	0.10	1.30	—	0.19
ΣY ₂ O ₃	8.53**	6.82	1.30	0.75**	6.18
ThO ₂	—	—	—	ZrO ₂ 0.13	0.09
FeO	—	—	—	1.81	—
MnO	—	—	—	0.02	0.64
MgO	0.97	0.25	0.19	1.12	0.61
CaO	19.54	24.51	24.96	25.84	22.34
Na ₂ O	—	0.45	0.31	tr.	0.18
K ₂ O	—	0.21	0.14	tr.	0.42
H ₂ O (+)	—	—	—	—	0.86
H ₂ O (—)	—	—	—	—	0.17
Ig. loss	1.45	0.23	0.11	0.91	—
Total	100.37	100.88	100.05	100.09	100.06
	(100.24)	(99.82)	(101.11)	(100.16)	

* Total iron. ** Total rare earth.

1. Kaihōsaku, Tōwa village, Adati county, Hukusima Pref.: In pegmatite: Analyst, K. KIMURA & K. MORINAGA: K. KIMURA, T. KAWAI, K. MORINAGA, K. NAGASHIMA & H. SHIBATA, Bull. Chem. Soc. Japan, **74**, (1953) 693.
2. Suisyōyama, Kawamata town, Daté county, Hukusima Pref.: In pegmatite: Analyst, K. NAGASHIMA: loc. cit.
3. Sono, Seto city, Aiti Pref.: In aplite: Analyst, K. NAGASHIMA: loc. cit.
4. Hō, Yosiki county, Gihu Pref.: In pegmatite: Analyst, T. KAWAI & H. SHIBATA: loc. cit.
5. Mategata, Hagata village, Oti county, Ehimé Pref. In pegmatite: Analyst, J. TAKUBO, T. UEDA, S. NISHIMURA & K. MASUTOMI, J. Geol. Soc. Japan, **59**, (1953), 52.

(82) *Yttrialite*

	1.	2.	3.	4.
δ	4.560 ^(33°C)	4.235 ^(16°C) _{4°C}	4.022 ^(16°C) _{4°C}	—
SiO ₂	30.10%	28.84%	28.50%	8.87%
TiO ₂	tr.	0.00	tr.	0.23
Al ₂ O ₃	1.40	0.41	2.43	4.33
Fe ₂ O ₃	0.15	0.75	1.81	} 4.47
FeO	2.20	2.32	1.17	
MnO	1.19	1.58	2.02	0.19
MgO	0.41	0.09	0.74	0.75
CaO	0.98	0.54	3.52	4.13
Ce ₂ O ₃	3.88	1.57	—	—
[Ce] ₂ O ₃	3.49	—	2.59	2.27
[Y] ₂ O ₃	43.80	45.14	46.06	34.30
[La] ₂ O ₃	—	3.18	—	—

Sc ₂ O ₃	—	0.00	—	—
(Nb, Ta) ₂ O ₅	—	0.08	0.92	0.33
ThO ₂	7.43	10.15	5.95	10.61
ZrO ₂	0.21	0.24	0.31	0.60
UO ₂	3.92	4.56	—	—
U ₃ O ₈	—	—	0.72	tr.
PbO	—	n.d.	0.05	n.d.
P ₂ O ₅	—	0.35	1.12	1.13
CO ₂	0.15	0.10	0.70	9.85
H ₂ O (+)	0.32	0.29	1.53	10.63
H ₂ O (—)	0.13	0.15	0.26	7.73
Total	99.76	100.34	100.40	100.21

1. Suisyôyama, Iizaka, Kawamata town, Daté county, Hukusima Pref.: In pegmatite: Analyst, S. HASEGAWA (1952): K. ÔMORI and S. HASEGAWA, J. Jap. Ass. M.P.G., **37**, 1953) 24.
2. The same locality: Analyst, T. UEDA and S. NISHIMURA, J. Geol. Soc. Japan, **30**, (1954) 133.
3. Komenono, Tateiwa, Hôzyô town, Onsen county, Ehimé Pref.: In pegmatite: Analyst, J. TAKUBO, T. UEDA, S. NISHIMURA and K. MASUTOMI, J. Geol. Soc. Japan, **59**, (1953) 55.
4. Intermediate of yttrialite and thorogummite: The same locality: Orange-yellow color, waxy; op.cit.57.

(83) *Lawsonite*

SiO ₂	38.81%
TiO ₂	0.12
Al ₂ O ₃	32.02
Fe ₂ O ₃	0.21
FeO	0.28
MnO	tr.
MgO	0.16
CaO	17.81
Na ₂ O	0.18
K ₂ O	0.21
H ₂ O (+)	10.67
H ₂ O (—)	0.36
Total	100.83

Eastern part of Kwantô Mountain Land: In schistose rock and chert: Analyst, Y. SEKI, J. Jap. Ass. M.P.G., **41**, (1957) 161.

(84) *Clinozoisite*

SiO ₂	42.65%
TiO ₂	0.13
Al ₂ O ₃	29.84

Fe ₂ O ₃	0.95
FeO	0.00
MnO	0.03
MgO	1.71
CaO	19.00
Na ₂ O	1.14
K ₂ O	1.19
H ₂ O (+)	2.59
H ₂ O (—)	0.85
Total	100.08

Arai, Minato town, Titibu county, Saitama Pref.: Small vein in serpentine:
Analyst, K. NAGASHIMA (1955): K. SAKURAI & K. NAGASHIMA, J. Miner. Soc. Japan,
2, (1956) 476.

(85) *Epidote*

	1.	2.	3.	4.	5.
δ	—	3.43 ($^{28}_{4}\text{C}$)	3.4	3.42 ($^{18}_{4}\text{C}$)	—
SiO ₂	39.29%	36.92%	36.89%	37.21%	37.17%
TiO ₂	—	tr.	nil	—	tr.
Al ₂ O ₃	18.85	22.25	20.94	17.62	18.69
Fe ₂ O ₃	9.89	15.21	15.92	14.73	14.74
FeO	2.21	0.57	0.20	1.34	1.21
MnO	—	0.75	0.13	5.13	4.25
MgO	2.99	tr.	0.14	0.06	0.24
CaO	24.72	23.11	23.00	21.31	21.95
Na ₂ O	—	—	n.d.	—	—
K ₂ O	—	—	n.d.	—	—
H ₂ O (+)	—	1.16	1.93	—	—
H ₂ O (—)	—	0.16	0.13	—	—
H ₂ O	—	—	—	2.06	1.98
Ig. loss	2.51	—	—	—	—
Total	100.46	100.13	99.28	99.51 (99.46)	100.25

1. Kamaisi mine, Kamaisi city, Iwaté Pref.: In skarn of iron magmatic deposit:
Analyst, B. YOSHIKI & K. KOMATA, Rep. Res. Lab. Asahi Glass Co., 4, (1954), 21.
2. Izumo mine, Hutase, Tamura town, Tamura county, Hukusima Pref.: In pegma-
tite: Analyst, H. KONNO: K. YOKOYAMA, Sci. Rep. Tohoku Univ. III Ser. 5, (1957),
380.
3. Takeshi, Nagano Pref.: In druse of concretion which is found in volcanic tuff:
Analyst, J. ITO, Miner. J., 1, (1953), 65.
- 4, 5. Manganiferous Epidote: Kakinomata mine, Kagami village, Tosa county, Kôti
Pref.: Analyst, F. HIROWATARI, (3)...1953, (4)...1955: J. Miner. Soc. Japan,
2, (1956) 335.

(86) *Piedmontite*

SiO ₂	38.34%
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Al ₂ O ₃	18.08
Fe ₂ O ₃	10.49
FeO	0.25
Mn ₂ O ₃	9.10
MgO	tr.
CaO	22.26
H ₂ O (+)	1.07
H ₂ O (—)	0.10
Total	99.69

Toné, Muramatsu village, Nisisonoki county, Nagasaki Pref.: In sericite schist:
Analyst, F. HIROWATARI, J. Miner. Soc. Japan, 2, (1954) 35.

(87) *Allanite*

	1.	2.	3.	4.	5.	6.
δ	3.94 ₇ (¹³ C/ ₄)	3.94 ₃	3.92 ₂ (²³ C/ ₄)	3.87 ₆	3.86 ₆	3.86 ₂
SiO ₂	29.69%	30.32%	29.75%	30.63%	30.46%	30.22%
TiO ₂	1.16	0.04	0.12	0.19	0.26	0.38
Al ₂ O ₃	14.18	15.89	15.17	14.94	15.90	16.94
Fe ₂ O ₃	6.75	3.77	7.15	3.60	3.68	2.97
FeO	8.34	10.81	10.81	11.83	10.35	10.50
MnO	5.78	6.06	2.95	2.40	1.66	1.58
MgO	tr.	0.32	0.09	0.39	tr.	0.05
CaO	7.14	4.28	6.29	8.59	8.12	10.39
Ce ₂ O ₃	7.79	7.44	11.03	8.06	6.90	7.50
[Ce] ₂ O ₃	—	—	10.71	—	—	—
[Y] ₂ O ₃	0.71	1.85	1.85	3.48	5.06	3.43
[La] ₂ O ₃	14.28	14.74	—	11.68	12.10	11.55
ThO ₂	1.80	1.70	1.40	1.62	2.06	1.53
SnO ₂	0.09	none	0.33	none	none	none
BeO	—	tr.	0.23	n.d.	0.08	0.13
P ₂ O ₅	none	tr.	0.09	n.d.	tr.	tr.
CO ₂	none	tr.	0.08	tr.	tr.	tr.
H ₂ O (+)	1.89	2.13	1.85	1.74	2.64	2.19
H ₂ O (—)	0.21	0.24	0.29	0.31	0.36	0.33
Total	99.81	99.59	100.19	99.46	99.63	99.69

1. Mitaiti, Iwaizumi town, Simohei county, Iwaté Pref.: In pegmatite: Analyst, S. HASEGAWA; K. ÔMORI & S. HASEGAWA, J. Jap. Ass. M.P.G., 39, (1955) 97.
2. Ôhari, Marumori town, Igu county, Miyagi Pref.: In pegmatite: Analyst, S. HASEGAWA, Sci. Rep. Tôhoku Univ. III Ser. 5, (1957) 360.
3. Kutibutoyama, Kawamata town, Daté county, Hukushima Pref.: In pegmatite: Analyst, S. HASEGAWA; K. ÔMORI & S. HASEGAWA, loc. cit.
4. Suisyôyama, the same town: In pegmatite: Analyst, S. HASEGAWA, loc. cit.
5. Fuzamata, the same town: In pegmatite: ditto.
6. Ôsawa, Tôwa village, Adati county, Hukushima Pref.: In pegmatite: ditto.

	7.	8.	9.	10.	11.	12.
δ	3.90 ₃	3.9C ₂	3.83 ₀ (^{15°C} / _{4°C})	—	3.64 ₃ (^{8.5°C} / _{4°C})	
SiO ₂	30.57%	30.68%	30.60%	30.54%	30.06%	29.5%
TiO ₂	0.26	0.12	0.40	1.10	0.17	0.5
Al ₂ O ₃	15.98	16.76	14.99	17.48	15.91	10.5
Fe ₂ O ₃	4.50	3.42	4.89	4.19	5.47	}18.8
FeO	11.37	10.65	11.71	9.22	10.57	
MnO	2.84	4.69	1.70	0.58	1.40	2.4
MgO	0.07	0.08	0.10	0.85	0.14	1.3
CaO	7.96	5.99	7.94	11.00	8.21	12.0
Ce ₂ O ₃	8.06	6.77	9.36	9.94	6.01	}12.1
[Ce] ₂ O ₃	—	—	—	10.55	9.54	
[Y] ₂ O ₃	3.06	4.67	2.40	0.63	6.85	
[La] ₂ O ₃	11.68	10.89	11.70	—	—	—
ThO ₂	1.06	1.63	1.80	1.27	2.22	2.0
SnO ₂	none	none	—	0.41	—	—
BeO	0.15	0.10	—	—	—	—
P ₂ O ₅	tr.	tr.	tr.	—	—	—
CO ₂	tr.	tr.	—	—	0.34	—
H ₂ O (+)	1.95	2.68	2.11	1.59	2.10	9.9
H ₂ O (—)	0.33	0.36	0.46	0.88	0.50	2.1
Total	99.84	99.49	100.16	100.23	99.75*	100.8 (101.1)

* S=0.26

7. Mihara-Kitatozawa, the same locality: ditto.
8. Nitto-Kitatozawa, the same locality: ditto.
9. Hayamagadakè, Tokiwa town, Tamura county, Hukusima Pref.: In pegmatite: Analyst, S. HASEGAWA; K. ÔMORI & S. HASEGAWA, J. Jap. Ass. M.P.G., **41**, (1957) 5.
10. Daimonziyama, Kyôto city, Kyôto Pref.: In biotite granite: Analyst, T. UEDA, Mem. Coll. Sci., Univ. Kyôto, Ser. B, **22**, (1955) 146.
- 11, 12. Hattyôïwa, Kitayamato village, Ikoma county, Nara Pref.: (1) In pegmatite, (2) closely associated with fergusonite and zircon: Analyst, J. TAKUBO, Y. UKAI, S. NISHIMURA & K. MASUTOMI, J. Geol. Soc. Japan, **59**, (1953) 48.

	13.
δ	3.82
SiO ₂	30.21%
TiO ₂	0.16
Al ₂ O ₃	15.93
Fe ₂ O ₃	4.45
FeO	12.38
MnO	1.62
MgO	0.13
CaO	7.41
Ce ₂ O ₃	8.12
[Ce] ₂ O ₃	11.99
[Y] ₂ O ₃	2.93

[La] ₃ O ₂	—
ThO ₂	1.84
SnO ₂	0.18
BeO	n.d.
P ₂ O ₅	tr.
CO ₂	n.d.
H ₂ O (+)	1.32
H ₂ O (—)	0.65
Total	100.32

13. Tateiwa mine, Hôzyô town, Onsen county, Ehimé Pref.: In pegmatite: Y.
UMEGAKI, T. HABARA & A. SOEDA, J. Sci., Hiroshima Univ. Ser. C, 2, (1957) 37.

(88) *Tscheffkinite*

	1.	2.
δ	4.381(^{85}C) _(^{45}C)	4.381(^{85}C) _(^{45}C)
SiO ₂	19.10%	19.35%
TiO ₂	19.87	19.06
Al ₂ O ₃	6.01	6.13
Fe ₂ O ₃	} 6.07	1.33
FeO		6.19
MnO	1.01	0.70
MgO	0.81	0.20
CaO	5.04	4.71
Ce ₂ O ₃	17.57	19.02
[Ce] ₂ O ₃	16.30	18.51
[Y] ₂ O ₃	6.96	3.49
[Nb, Ta] ₂ O ₅	0.07	0.23
ThO ₂	0.20	0.59
SnO ₂	0.06	0.09
H ₂ O (+)	0.55	0.25
H ₂ O (—)	0.34	0.21
Total	99.93	100.06
	(99.96)	

- Siroisi, Kôbe, Ômiya town, Naka county, Kyôto Pref.: In pegmatite: Analyst,
J. TAKUBO and S. NISHIMURA, J. Miner. Soc. Japan, 1, (1953) 53.

(89) *Pumpellyite*

	1.	2.
SiO ₂	38.09%	37.99%
TiO ₂	n.d.	n.d.
Al ₂ O ₃	23.53	24.89
Fe ₂ O ₃	3.20	3.86
FeO	1.18	2.29
MnO	0.50	0.42

MgO	3.58	1.54
CaO	22.96	21.72
Na ₂ O	0.48	0.67
K ₂ O	0.11	0.20
H ₂ O (+)	6.56	6.64
H ₂ O (−)	0.21	0.37
Total	100.40	100.49 (100.59)

1. Sadaminé, Takasino village, Titibu county, Saitama Pref.: In non-spotted crystalline schist: Analyst, not stated: Y. SEKI & S. YOKOYAMA, J. Jap. Ass. M.P.G., 41, (1957) 231.
2. Watiba, Tukikawa, Higasititibu village, same county: ditto.

(90) *Axinite*

	1.	2.	3.
δ	—	3.37	3.39
SiO ₂	41.76%	40.37%	40.45%
TiO ₂	0.27	0.07	0.05
Al ₂ O ₃	16.92	18.73	19.48
Fe ₂ O ₃	1.52	1.92	0.37
FeO	8.48	—	0.43
MnO	2.99	18.27	19.07
MgO	1.66	0.73	0.58
CaO	19.71	15.77	14.56
B ₂ O ₃	4.95	4.58	4.63
Na ₂ O	0.13	—	—
K ₂ O	0.00	—	—
CO ₂	—	n.d.	n.d.
H ₂ O (+)	1.91	0.98	0.77
H ₂ O (−)	0.32	0.02	0.06
Total	100.62	101.44	100.45

1. Kan-nonyama, Itinoseki city, Iwaté Pref.: In metamorphic rocks: Analyst, K. YAGI: M. WATANABE & K. YAGI, Sci. Rep. Tōhoku Univ. III. 4, (1953) 164.
2. Mangan-axinite: Ananai mine, Ōtoyo village, Nagaoka county, Kōti Pref.: Orange yellow colour: Analyst, T. YOSHIMURA, Manganese deposits in Japan, (1952) 119.
3. Mangan-axinite: Nirao mine, Kamiurao village, Kami county, Kōti Pref.: Blue white colour: Analyst, T. YOSHIMURA, loc. cit.

(91) *Beryl*

δ	2.698(^{26°C} / _{4°C})
SiO ₂	66.51%
TiO ₂	none
Al ₂ O ₃	17.78
Fe ₂ O ₃	0.39

FeO	none
MgO	0.03
CaO	0.21
BeO	14.59
Total alkali	0.13
H ₂ O (+)	0.59
H ₂ O (—)	0.14
Total	100.37

Ameda, Daitô village, Ishikawa county, Hukusima Pref.: In pegmatite: Analyst, K. YOKOYAMA: K. ÔMORI and K. YOKOYAMA, J. Miner. Soc. Japan, **1**, (1953) 224.

(92) *Cordierite*

	1.	2.
SiO ₂	44.64%	46.75%
TiO ₂	n.d.	none
Al ₂ O ₃	29.96	33.64
Fe ₂ O ₃	2.72	0.72
FeO	11.02	4.89
MnO	1.86	0.31
MgO	3.08	10.43
CaO	0.02	0.04
Na ₂ O	2.05	0.24
K ₂ O	0.75	0.56
P ₂ O ₅	n.d.	0.02
H ₂ O (+)	3.85	2.63
H ₂ O (—)	—	0.10
Total	99.95	100.33

1. Iron rich Cordierite: Sugama, Tamagawa village, Isikawa county, Hukusima Pref.: In pegmatite: Analyst, Chem. Lab. Geol. Surv. Japan: M. SAMBONSUGI, Proc. Japan Acad. **33**, (1957), 194; A. MIYASHIRO, Am. J. Sci., **255**, (1957), 47.
2. Hitati mine, Hitati city, Ibaragi Pref.: In cordierite quartz vein: Analyst, H. HARAMURA: T. IYAMA, Miner. J. **1**, (1956) 374.

(92) *Tourmaline*

	1.	2.	3.	4.	5.	6.
SiO ₂	35.46%	36.31%	34.43%	35.06%	34.85%	34.96%
TiO ₂	0.39	0.14	0.09	0.44	0.26	0.68
Al ₂ O ₃	33.31	31.79	36.98	34.54	33.09	32.10
Fe ₂ O ₃	16.25	16.87	18.48	16.23	16.20	19.10
MnO	0.10	0.12	0.36	0.13	0.11	0.20
MgO	1.91	2.03	0.33	1.22	2.48	2.28
CaO	0.35	0.14	0.43	0.08	0.16	0.01
Na ₂ O	1.50	1.60	1.36	1.38	1.26	1.36
K ₂ O	0.24	0.25	0.22	0.14	0.18	0.19
B	7.99	7.98	7.88	7.73	7.65	7.05

- 1, 2, 3, 4, 5, 6. Sakihama, Okirai, Sanriku village, Kesen county, Iwaté Pref.: In pegmatite: Analyst, N. SHIMODA, J. Chem. Soc. Japan, **77**, (1956) 1002.

	7.
SiO ₂	38.42%
Al ₂ O ₃	37.32
Fe ₂ O ₃	0.69
B ₂ O ₃	9.45
FeO	0.51
MgO	6.83
CaO	0.24
Na ₂ O	0.92
K ₂ O	tr.
Li ₂ O	n.d.
H ₂ O (+)	3.19
H ₂ O (—)	1.92
Total	99.49

7. Kanekura mine, Yamanouti town, Simotakai county, Nagago Pref.: White color. In "Rôseki" deposit: Analyst, H. TAKESHI, J. Miner. Soc. Japan, **1**, (1953) 106.

(94) *Osumilite** (New Mineral)

δ	2.64
SiO ₂	50.78%
TiO ₂	0.01
Al ₂ O ₃	24.85
Fe ₂ O ₃	1.95
FeO	9.97
MnO	0.40
MgO	6.68
CaO	0.61
Na ₂ O	1.00
K ₂ O	1.42
H ₂ O (+)	1.73
H ₂ O (—)	0.27
Total	99.67

Sakkabira, Tarumizu town, Kimotuki county, Kagosima Pref.: In volcanic rock: Analyst, H. MINATO: A. MIYASHIRO, Am. Miner. **41**, (1956) 107.

(95) *Pigeonite*

	1.	2.
SiO ₂	50.56%	49.30%

* Osumilite was found in a volcanic rock and is named after the province Ôsumi. The crystal was black, prismatic or tabular. It is dihexagonal-dipyramid (6/m 2/m 2/m=D_{6h}), Space group P 6/mc c=D_{6h}², a₀=10.17Å, c₀=15.34Å, a₀:c₀=1:1.410. Uniaxial positive. ω_{Na} =1.545–1.547, ε_{Na} =1.549–1.551, $\varepsilon-\omega$ =0.004. Dichroic with ω =light blue, ε =colorless. Chemical formula (K, Na, Ca)(Mg, Fe⁺²)₂(Al, Fe⁺³, Fe⁺²)₂(Si, Al)₁₂O₃₀·H₂O.

TiO ₂	0.58	0.60
Al ₂ O ₃	1.41	0.68
Fe ₂ O ₃	0.12	3.83
FeO	23.17	23.17
MnO	0.54	2.44
MgO	16.10	15.38
CaO	7.05	3.14
Na ₂ O	0.26	n.d.
K ₂ O	0.23	n.d.
P ₂ O ₅	n.d.	n.d.
SrO	n.d.	—
H ₂ O (+)	n.d.	n.d.
H ₂ O (—)	0.07	n.d.
Total	100.09	98.54

1. Pigeonite: Hakoné volcano, upper course of the Sukumogawa valley near the confluence of Kiwadazawa, SE caldera wall of Hakoné volcano, Kanagawa Pref.: Microphenocrysts in hypersthene-olivine andesite of Hakoné volcano: Analyst, K. NAGASHIMA: H. KUNO, Am. Miner. **40**, (1955) 76.
2. Ferro-pigeonite: N.E. of Yumoto, eastern flank of Hakoné volcano, Kanagawa Pref.: In remelted quartz diorite, an ejected block in pumice of Hakone volcano: Analyst, T. KATSURA: H. KUNO, op. cit. 77.

(96) *Diopside*

	1.	2.
SiO ₂	55.45%	53.42%
TiO ₂	—	0.12
Al ₂ O ₃	1.16	0.68
Fe ₂ O ₃	0.27	1.36
FeO	3.66	2.01
MnO	—	0.07
MgO	15.07	15.99
CaO	24.20	25.75
Na ₂ O	0.02	0.12
K ₂ O	—	0.06
P ₂ O ₅	—	0.03
Cr ₂ O ₃	—	0.56
NiO	—	0.016*
V ₂ O ₅	—	0.004*
H ₂ O (+)	0.52	0.16
H ₂ O (—)	0.14	0.01
Total	100.49	100.34

1. Kanagasaki, Ōta village, Titibu county, Saitama Pref.: Diopside vein in serpentine: Analyst, T. ASHIZAWA: K. SAKURAI & T. ASHIZAWA, J. Miner. Soc. Japan, **1**, (1953) 145.
2. Kamisano, Nambu town, Minamikoma county, Yamanashi Pref.: Phenocryst in basalt: Analyst, HARAMURA: H. KUNO, J. Geol. Soc. Japan, **63**, (1957), 524.

* Determined as Ni & V respectively and they are not included in the Total.

(97) *Augite (Salite)*

	1.	2.	3.	4.	5.	6.
SiO ₂	51.44%	50.72%	51.20%	50.8%	50.87%	49.79%
TiO ₂	0.75	0.15	0.27	0.2	0.48	0.43
Al ₂ O ₃	2.09	0.98	2.71	2.5	3.22	4.92
Fe ₂ O ₃	1.01	0.35	2.76	0.7	0.49	0.79
FeO	6.73	21.10	4.94	13.6	7.51	5.88
MnO	0.21	0.37	0.05	0.4	0.07	0.00
MgO	16.45	12.23	15.43	17.4	14.14	14.84
CaO	19.94	13.35	22.62	14.3	23.87	22.70
SrO	n.d.	0.09	n.d.	n.d.	—	—
Na ₂ O	0.32	0.33	0.24	n.d.	0.32	} 0.20
K ₂ O	0.17	0.13	0.12	n.d.	0.10	
P ₂ O ₅	n.d.	n.d.	n.d.	n.d.	n.d.	tr.
H ₂ O (+)	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
H ₂ O (—)	0.36	0.09	0.06	n.d.	0.05	0.00
Total	99.47	99.89	100.40	99.9	101.12	99.55

1. Augite: Yugurazawa-Pass, Sengokubara, north caldera wall of Hakoné volcano, Kanagawa Pref.: Phenocryst in hypersthene-olivine-augite andesite: Analyst, K. NAGASHIMA: H. KUNO, Am. Miner. **40**, (1955) 74.
2. Augite: Hatusima, Atami city, Sizuoka Pref.: Augite in groundmass of olivine basalt of the Hatusima basalt group: ditto.
3. Augite: East of Tyôzyagahama, west of Usami, Itô city, Sizuoka Pref.: Phenocryst in olivine augite basalt: ditto.
4. Augite: Taga volcano, Awarada-Pass, West of Usami, the same city: Analyst, Y. KONISHI: H. KUNO, loc. cit.
5. Salite: Hakoné volcano, just west of Odawara, Kanagawa Pref.: In hypersthene-salite dacite pumice of Hakoné volcano: Analyst, K. NAGASHIMA: H. KUNO, op. cit. 73.
6. Salite: Taga volcano, SW. of Wadaki near Aziro, Atami city, Sizuoka Pref.: In olivine eucrite, an ejected block in tuff.: Analyst, Y. KONISHI: H. KUNO, ditto.

	7.	8.	9.
SiO ₂	49.68%	49.72%	49.98%
TiO ₂	0.56	0.73	0.27
Al ₂ O ₃	0.78	0.59	0.04
Fe ₂ O ₃	3.29	3.74	1.64
FeO	18.15	18.12	23.22
MnO	0.59	0.78	0.27
MgO	16.19	16.44	12.73
CaO	9.90	9.56	11.11
SrO	n.d.	n.d.	0.16
Na ₂ O	0.65	0.42	0.29
K ₂ O	0.15	0.07	0.16
P ₂ O ₅	n.d.	n.d.	n.d.

H ₂ O (+)	0.10	0.17	n.d.
H ₂ O (—)	0.00	0.00	0.12
Total	100.04	100.34	99.99

7. Subcalcic augite: Western rim of the crater, Mihara-yama, Ōsima island, Tōkyō: In groundmass of hypersthene augite basalt, extruded in September, 1950: Analyst, J. OSSAKA: H. KUNO, op. cit. 75.
8. Subcalcic augite: Western caldera floor, Mihara-yama, the same island: In groundmass of hypersthene basalt, extruded in 1778 from the Miharayama crater: Analyst, J. OSSAKA: ditto.
9. Subcalcic ferroaugite: Sea cliff at Okada, the same island: In groundmass of coarse-grained segregation vein in hypersthene-olivine basalt lava of the Okada basalt group: Analyst, K. NAGASHIMA: H. KUNO, ditto.

(98) *Orthopyroxene*

	1.	2.
SiO ₂	50.26%	52.22%
TiO ₂	0.16	0.08
Al ₂ O ₃	3.13	0.43
Fe ₂ O ₃	0.65	0.70
FeO	26.54	25.91
MnO	0.76	0.83
MgO	16.36	18.54
CaO	1.76	1.28
Na ₂ O	0.24	n.d.
K ₂ O	0.13	n.d.
P ₂ O ₅	n.d.	tr.
H ₂ O (+)	n.d.	n.d.
H ₂ O (—)	n.d.	n.d.
Total	99.99	99.99

1. Kaziya, SE foot of Hakoné volcano, Kanagawa Pref.: Phenocrysts in augite bearing hypersthene dacite (Obsidian): Analyst, K. NAGASHIMA; H. KUNO, Am. Miner. 39, (1954) 33.
2. Hirogawara near Yugawara, Asigarasimo county, Kanagawa Pref.: Phenocrysts in augite bearing hypersthene dacite: Analyst, Y. KONISI: H. KUNO, ditto.

(99) *Dannemorite*

	1.	2.
SiO ₂	47.40%	45.97%
Al ₂ O ₃	1.96	1.94
FeO	23.15	19.34
MnO	14.07	22.32
MgO	7.45	3.29
CaO	1.07	2.05

H ₂ O (—)	0.10	0.66
Ig. loss	4.42	4.39
FeS	0.36	—
Total	99.98	99.96

- 1, 2. Rengé mine, Iwakuni city, Yamaguti Pref.: (1)...dark green, acicular fibrous, (2)...greenish, silky luster, fibrous: Analyst, H. SHIROZU: T. YOSHIMURA, Manganese deposits in Japan, (1952) 111.

(100) *Actinolite*

SiO ₂	58.74%
Al ₂ O ₃	3.32
Fe ₂ O ₃	0.86
FeO	4.24
MnO	tr.
MgO	19.81
CaO	11.60
Ni ₂ O	tr.
CuO	tr.
Na ₂ O	0.25
H ₂ O (+)	0.74
H ₂ O (—)	0.07
Total	99.63

- Daishôzi, Yorii town, Oosato county, Saitama Pref.: Actinolite lens in crystalline schist: Analyst, T. ASHIZAWA: K. SAKURAI and T. ASHIZAWA, J. Miner. Soc. Japan, 1, (1953) 146.

(101) *Riebeckrichterite*

	1.	2.
δ	3.20	3.12
SiO ₂	51.73%	52.57%
TiO ₂	0.21	0.18
Al ₂ O ₃	1.66	1.14
Fe ₂ O ₃	} 5.78	} 7.22
FeO		
MnO	12.64	11.99
MgO	14.21	13.95
CaO	5.30	2.46
Na ₂ O	5.71	7.27
K ₂ O	2.65	3.67
H ₂ O	1.30	1.64
Total	101.19	102.09

- 1, 2. Noda-Tamagawa mine, Noda town, Kunohé county, Iwaté Pref.: In manganese deposit: (1)...yellow black colour, (2)...yellow brown colour: Analyst, T. YOSHIMURA, Manganese deposits in Japan, (1952), 113.

(102) *Riebeckite*

SiO ₂	55.62%
TiO ₂	0.26
Al ₂ O ₃	4.54
Fe ₂ O ₃	12.99
FeO	3.53
MnO	1.25
MgO	11.98
CaO	1.95
Na ₂ O	5.58
K ₂ O	0.36
P ₂ O ₅	0.07
H ₂ O (+)	1.96
H ₂ O (−)	0.00
Total	100.09

Magnesioriebeckite: Bizan, Tokushima city, Tokushima Pref.: In aegirine-bearing crystalline schist of Sambagawa-Mikabu zone: Analyst, H. HARAMURA: A. MIYASHIRO & M. IWASAKI, J. Geol. Soc. Japan, **63**, (1957) 701.

(103) *Hornblende*

	1.	2.	3.	4.	5.
SiO ₂	43.01%	41.54%	44.07%	40.96%	40.01%
TiO ₂	1.02	0.65	1.70	0.99	3.80
Al ₂ O ₃	11.85	7.93	12.37	11.70	35.50
Fe ₂ O ₃	3.55	6.56	0.18	5.32	2.18
FeO	12.72	21.84	10.23	13.30	0.83
MnO	0.66	0.53	0.18	0.69	—
MgO	11.62	3.21	14.20	11.06	0.27
CaO	12.55	13.86	12.42	12.72	0.00
Na ₂ O	1.54	0.81	1.00	1.06	—
K ₂ O	0.11	1.60	0.30	1.27	—
P ₂ O ₅	—	n.d.	n.d.	n.d.	—
H ₂ O (+)	2.13	1.53	2.85	1.50	—
H ₂ O (−)	0.05	0.38	0.03	0.06	3.49
Ig. loss	—	—	—	—	13.60
F	—	n.d.	n.d.	0.13	—
—O=F	—	Cl. n.d.	—	−0.06	—
Total	100.81	100.44	99.53	100.70	99.68

1. Hornblende: Miyamori district, Iwaté Pref.: In monoclinic pyroxene hornblendite: Analyst, E. MISHIMA: Y. SEKI, J. Jap. Ass. M.P.G., **41**, (1957) 25.
2. Hastingsitic hornblende: Kannonyama, Itinoseki city, Iwaté Pref.: In metamorphic rock: Analyst, K. YAGI: M. WATANABE & K. YAGI, Sci. Rep. Tôhoku Univ. III. Ser. 4, (1953) 166.
3. Bluish green hornblende: Kamiyama, Isizumi, Tahito village, Isiki county, Huku-

- sima Pref.: In amphibolite: Analyst, T. MIYASHIRO: A. MIYASHIRO, Jap. J. Geol. Geogr. 23, ((1953) 91.
4. Bluish green hornblende: Domeki, Miyamoto, Hurutono village, Higasisirakawa county, Hukusima Pref.: In clinohypersthene-rich lens in amphibolite: ditto.
 5. Hornblende: Sinmei pass near Tazimi city, Gihu Pref.: In clay mass: Analyst, K. MASUTOMI & K. YAMASAKI, J. Earth Sc., Nagoya Univ. 1, (1953) 5.

(104) *Pargasite*

SiO ₂	45.37%
TiO ₂	0.29
Al ₂ O ₃	13.32
Fe ₂ O ₃	0.52
FeO	3.97
MnO	0.09
MgO	18.94
CaO	10.23
Na ₂ O	2.63
K ₂ O	1.75
H ₂ O (+)	1.74
H ₂ O (—)	0.72
F	0.27
—O=F	—0.11
Total	99.64
	(99.73)

Isikamiyama, Kumamoto city, Kumamoto Pref.: In druse of hornblende bearing augite hypersthene dacite rock: Analyst, H. MATSUMOTO, J. Jap. Ass. M.P.G., 38, (1954) 26.

(105) *Anthophyllite*

SiO ₂	37.01%
TiO ₂	0.45
Al ₂ O ₃	19.47
Fe ₂ O ₃	2.57
FeO	33.51
MnO	2.16
MgO	0.19
CaO	0.03
Na ₂ O	1.08
K ₂ O	0.04
H ₂ O (+)	2.63
H ₂ O (—)	0.48
F	0.12
—O=F ₂	—0.05
Total	99.57
	(99.69)

Aluminian Ferroanthophyllite: Southern Kitakami Mountainland, N.E. Japan: In hornfels. It contains 6% of thuringite impurity: Analyst, H. HARAMURA & M. KAMADA: Y. SEKI & M. YAMASAKI, *Am. Miner.* **42**, (1957) 516.

(106) *Rhodonite (Penwithite)*

	1.	2.	3.
δ	3.60 $\pm$ 0.02	3.57 $\pm$ 0.01	—
SiO ₂	46.09%	46.58%	36.17%
TiO ₂	nil	nil	—
Al ₂ O ₃	0.26	0.25	5.46
Fe ₂ O ₃	0.52	tr.	0.67
FeO	3.08	1.66	—
MnO	44.53	44.89	35.21
MgO	1.08	1.52	2.92
CaO	3.50	4.46	4.86
ZnO	0.26	0.21	BaO 2.21
Na ₂ O	} nil or tr.	} nil	—
K ₂ O			—
H ₂ O	0.86	0.58	13.81
Total	100.18	100.15	101.31

1. Kaso mine, Kanuma city, Totigi Pref.: Associated with tephroite and small amount of pyrrhotite: Analyst, W. H. HERDSMAN: E. D. LEE, Stanford Univ. Publ., Univ. Ser. Geol. Sci., **5**, (1955) 19.
2. X mine, Nagano Pref.: Analyst, H. HERDSMAN: loc. cit. 21.
3. Weathered rhodonite (Penwithite): Ananai mine, Ōtoyo village, Nagaoka county, Kôti Pref.: Analyst, Y. ABE: T. YOSHIMURA, Manganese deposits in Japan (1952) 124.

(107) *Pyroxmangite*

	1.	2.	3.	4.	5.
δ	3.56($\frac{4^{\circ}\text{C}}{4^{\circ}\text{C}}$)	—	—	3.69 $\pm$ 0.01	3.61 $\pm$ 0.01
SiO ₂	47.33%	5.14%	46.40%	45.74%	47.56%
TiO ₂	tr.	—	tr.	nil	nil
Al ₂ O ₃	0.21	0.13	tr.	doubtful tr.	0.37
Fe ₂ O ₃	3.69	23.17	4.65	"	0.29
FeO	12.50	—	11.08	0.39	1.28
MnO	29.22	40.40	29.98	52.42	45.53
MgO	3.92	0.32	3.74	0.68	3.84
CaO	2.21	tr.	2.24	0.46	0.68
BaO	—	0.09	—	—	—
ZnO	—	—	—	doubtful tr.	0.23
Na ₂ O	—	—	1.21	} 0.05	} nil
K ₂ O	—	—	0.36		
H ₂ O(+)	0.54	11.23	} 0.30	0.19	} 0.49
H ₂ O(−)	0.23	11.47		0.13	

O		—	8.14	—	—	—
Total		99.85	100.09	99.96	100.06	100.27

1. Mitaiti, Iwaizumi town, Simohei county, Iwaté Pref.: In pegmatite: Analyst, S. HASEGAWA: K. ÔMORI and S. HASEGAWA, J. Jap. Ass. M.P.G., **39**, (1955) 98.
2. Alteration product of pyroxmangite from the above locality; loc. cit.
3. Kamiotomo, Iwaizumi town, Simohei county, Iwaté Pref.: In pegmatite: Analyst, K. NAGASHIMA (1954): K. SAKURAI, K. NAGASHIMA and S. TAKASU, J. Miner. Soc. Japan, **2**, (1956) 408-409.
4. Ajiro mine, Ajiro village, Motosu county, Gihu Pref.: Analyst, W. H. HERDSMAN: E. D. LEE, Stanford Univ. Publ., Univ. Ser Geol. Sci., **5**, (1955) 26.
5. Kinko (Kinkyo) mine, Iwakuni city, Yamaguchi Pref.: loc. cit.

(108) *Pectolite*

SiO		53.97%
Al ₂ O ₃		0.22
Fe ₂ O ₃		0.64
CaO		33.72
Na ₂ O		9.47
K ₂ O		—
H ₂ O(+)		2.71
H ₂ O(—)		0.14
Total		100.87

Awashima, Awashimaura village, Iwahuné county, Niigata Pref.: In magnetite vein in dolerite: Analyst, E. SORITA (1947): K. SAKURAI, J. Miner. Soc. Japan, **2**, (1954) 55.

(109) *Inesite*

SiO ₂		44.71%
Al ₂ O ₃		0.20
Fe ₂ O ₃		0.15
MnO		37.12
MgO		0.42
CaO		7.31
H ₂ O(+)		6.12
H ₂ O(—)		3.30
Total		99.33

Takehasi, Kawazu mine, Simoda town, Kamo county, Sizuoka Pref.: In quartz rhodonite vein penetrating through the gold-silver deposits: Analyst, H. KANEKO (1952): S. TAKASU, Miner. J. **1**, (1955) 246.

(110) *Apophyllite*

	1.	2.
δ	2.438(21°C)	—

SiO ₂	53.25%	52.03%
Al ₂ O ₃	0.81	0.00
Fe ₂ O ₃	tr.	0.29
MnO	non	—
MgO	0.73	tr.
CaO	24.32	25.64
Na ₂ O	0.19	0.65
K ₂ O	4.12	5.03
H ₂ O(+)	16.02	—
H ₂ O(—)	0.48	—
F	0.16	—
—O=F ₂	—0.07	—
Ig. loss	—	16.77
Total	100.01	100.41

1. Sinyama, Kamaisi mine, Kamaisi city, Iwaté Pref.: In contact iron deposit: Analyst, H. MINATO: H. MINATO, N. WADA and S. TSURUSHIMA, J. Miner. Soc. Japan, **1**, (1954) 418.
2. Kamioka mine, Yosiki county, Gifu Pref.: In contact lead and zine deposit: Analyst, M. KOIZUMI, Miner. J. **1**, (1953) 39. This mineral had been misnamed "Stilbite" by the collector.

(111) *Muscovite*

	1.	2.	3.	4.
SiO ₂	45.01%	44.84%	45.00%	45.80%
TiO ₂	0.90	0.10	0.20	tr.
Al ₂ O ₃	33.78	34.00	34.98	21.21
Fe ₂ O ₃	2.63	1.99	1.33	2.78
FeO	0.09	1.06	1.10	6.18
MnO	tr.	tr.	0.48	4.80
MgO	0.70	0.27	tr.	0.57
CaO	0.25	0.44	tr.	0.72
Na ₂ O	1.08	1.38	0.90	1.29
K ₂ O	8.77	8.86	9.41	8.89
Li ₂ O	—	—	—	2.59
(Rb, Cs) ₂ O	—	—	—	2.04
H ₂ O(+)	5.10	4.74	5.70	0.44
H ₂ O(—)	2.25	2.56	1.20	0.38
F	0.20	0.28	0.30	5.78
O=F ₂	—0.08	—0.10	—0.12	—2.43
Total	100.68	100.42	100.48	101.04

- 1, 2, 3. Yamanoo, Makabé town, Makabé county, Ibaragi Pref.: In pegmatite: Analyst, N. SHIMODA, J. Chem. Soc. Japan **76**, (1955) 1249.
4. Minagi, Syôwa town, Kibi county, Okayama Pref.: Muscovite zone of pegmatite: Analyst, Y. UKAI, S. NISHIMURA and Y. HASHIMOTO, Miner. J. **2**, (1956) 32.

(112) *Sericite*

	1.	2.	3.
d	2.78	—	2.855($^{18^{\circ}\text{C}}$ $^{4^{\circ}\text{C}}$)
SiO ₂	47.65%	46.46%	42.46%
TiO ₂	0.10	0.38	—
Al ₂ O ₃	37.03	34.19	40.71
Fe ₂ O ₃	0.01	0.55	0.53
FeO	tr.	0.17	—
MnO	tr.	non	0.06
MgO	0.04	1.75	0.81
CaO	tr.	non	0.28
Na ₂ O	0.76	0.73	1.01
K ₂ O	9.02	6.65	8.06
P ₂ O ₅	0.02	1.34	—
H ₂ O (+)	4.97	7.07	5.58
H ₂ O (—)	0.73	1.45	0.45
Total	100.33	100.69	99.95

1. Yozi pass, Nanmoku village, Kanra county, Gunma Pref.: White powder with silky luster. Hydrothermal alteration product of quartz diorite: Analyst, H. KODAMA (1957): H. KODAMA, Miner. J. 2, (1957) 154.
2. Kambe mine, Ôuda town, Uda county; Nara Pref.: Sericite deposit in biotite granite: Analyst, H. MINATO (1951): B. TAMAMUSHI & T. SHIRAI, Sci. Rep. Gen. Educ. Univ. Tokyo, 4, (1954) 36.
3. Uku mine, Abu town, Abu county, Yamaguti Pref.: In "Rôseki" deposit embedded in liparite: Analyst, T. TOMISAKA and G. SHIBUYA, Yamaguchi J. Sci., 6, (1955) 58.

(113) *Glaucconite*

δ	2.52(17°C)
SiO ₂	49.30%
Al ₂ O ₃	5.13
Fe ₂ O ₃	18.78
FeO	2.31
MgO	3.54
CaO	0.59
Na ₂ O	} 5.88
K ₂ O	
Lg. loss	6.14
H ₂ O (—)	8.51
Total	100.18

Oga Peninsula, Akita Pref.: In glauconite sandstone (Boring core): Analyst, S. HONDA, J. Miner. Soc. Japan, 3, (1957) 126.

(114) *Biotite*

	1.	2.	3.	4.	5.	6.
<i>d</i>	—	—	—	2.5-3	—	—
SiO ₂	37.69%	34.59%	35.96%	33.92%	35.88%	36.01%
TiO ₂	1.53	2.69	1.96	2.91	0.35	2.74
Al ₂ O ₃	18.19	22.64	18.37	13.88	18.52	18.65
Fe ₂ O ₃	3.53	1.67	2.10	3.39	8.85	3.46
FeO	14.86	14.98	15.10	26.66	13.67	16.36
MnO	—	—	—	1.35	0.42	0.05
MgO	11.08	10.35	11.66	4.86	9.06	8.31
CaO	0.87	0.63	0.77	0.75	0.09	0.11
Na ₂ O	0.78	1.23	0.80	1.70	0.82	0.97
K ₂ O	6.21	6.50	8.08	7.46	6.24	8.57
H ₂ O (+)	4.91	3.20	4.28	3.53	5.72	2.21
H ₂ O (—)	0.15	0.88	0.16	0.16	0.72	1.89
Total	99.80	99.35	99.24	100.57	100.35	99.33
					(100.34)	

- 1, 2, 3. Upper stream of Satunai river, Tokachi Prov. Hokkaidô: (1)...In breccia bearing quartz dioritic migmatite, (2)...in banded gneiss, (3)...In coarse granitic migmatite: Analyst, K. KIZAKI: K. KIZAKI, J. Geol. Soc. Japan, 59, (1954) 213.
4. Myôgô-hô, Kawasaki town, Sibata county, Miyagi Pref.: As an ingredient mineral of hornblende biotite granite: Analyst, H. MINATO (1954); H. MINATO, Y. TAKANO and T. ICHIMURA, Miner. J. I, (1954) 143.
5. Nyûzyô, Iritôno, Tôno town, Isiki county, Hukusima Pref.: In pyralspite bearing biotite schist: Analyst, T. MIYASHIRO: A. MIYASHIRO, Geoch. Cosmoch. Acta 4, (1953) 185.
6. Hottiyuka, Samegawa village, Higasisirakawa county, Hukusima Pref.: In pyralspite bearing biotite gneiss: ditto.

	7.	8.	9.	10.	11.	12.
SiO ₂	31.18%	34.09%	33.31%	32.51%	34.03%	34.01%
TiO ₂	0.86	1.05	2.38	2.05	2.03	1.65
Al ₂ O ₃	20.64	21.85	15.58	16.62	17.20	17.46
Fe ₂ O ₃	10.23	13.16	12.11	11.59	9.98	11.01
FeO	18.51	11.79	21.51	22.80	21.92	20.57
MnO	0.19	0.39	0.83	0.90	0.88	0.87
MgO	5.37	2.10	1.81	1.62	1.51	0.82
CaO	0.57	0.41	0.55	2.07	1.52	1.27
Na ₂ O	0.65	0.78	1.64	1.24	1.24	2.30
K ₂ O	4.89	7.40	5.88	4.87	6.50	6.33
Li ₂ O	—	—	n.d.	n.d.	n.d.	n.d.
H ₂ O (+)	5.74	5.15				
H ₂ O (—)	1.16	2.19				
F	0.16	0.41				

-F=½O		-0.06	-0.17
Total		100.09	100.58
			(100.60)

7, 8. Yamanoo, Makabé town, Makabé county, Ibaragi Pref.: In pegmatite: Analyst, N. SHIMODA, J. Chem. Soc. Japan, **76**, (1955) 1249.

9, 10, 11, 12, 13. Hukuzawa, Naegi, Nakatugawa city, Gihu Pref.: (9) in granite near pegmatite, (10), (11) in coarse granite, (12) in pegmatite: Analyst, N. SHIMODA, Ibid, **78**, (1957) 1127.

	13.	14.	15.	16.	17.	18.
SiO ₂	34.45%	34.52%	27.48%	35.93%	35.00%	32.76%
TiO ₂	3.10	3.01	1.60	1.43	1.55	1.63
Al ₂ O ₃	14.58	15.10	19.03	16.01	16.02	15.83
Fe ₂ O ₃	9.99	8.09	16.90	7.20	11.38	12.32
FeO	20.28	24.34	21.13	23.52	19.48	20.36
MnO	0.96	1.01	1.52	1.19	1.10	1.29
MgO	0.55	2.30	1.78	2.15	2.96	2.60
CaO	1.35	0.55	1.09	0.80	0.31	4.13
Li ₂ O	n.d.	} 1.30	} 0.03	} 0.71	-----	
Na ₂ O	2.27				1.29	0.70
K ₂ O	6.84	6.95	0.71	5.85	5.39	5.68
H ₂ O (+)		2.30	7.90	4.34		
H ₂ O (-)		0.82	1.50	0.80		
F		1.10	0.43	0.64		
-F=½O		-0.46	-0.18	-0.27		
Total		100.93	100.92	100.30		

10, 15, 16. Kitahira, Siga town, Siga county, Siga Pref.: (14) in granite, (15) in pegmatite, (16) in granite: Analyst, N. SHIMODA, J. Chem. Soc. Japan, **77**, (1956) 1159.

17, 18, 19, 20, 21. Minamihira, the same town: (17) (18) (19) (20) in pegmatite, (21) in granite: Analyst, N. SHIMODA, Ibid **78**, (1957) 1130.

	19.	20.	21.	22.
SiO ₂	34.32%	32.31%	33.25%	37.71%
TiO ₂	1.48	1.94	2.17	0.54
Al ₂ O ₃	15.88	17.22	15.23	15.30
Fe ₂ O ₃	11.59	11.04	10.40	2.91
FeO	20.22	21.93	21.73	24.55
MnO	1.45	1.55	1.13	1.07
MgO	2.13	2.15	2.70	1.65
CaO	3.10	3.38	2.96	1.50
Na ₂ O	0.98	0.97	0.95	0.64
K ₂ O	5.06	5.20	5.71	6.29
Li ₂ O				1.55
(Rb, Cs) ₂ O				0.58
H ₂ O (+)				0.91
H ₂ O (-)				2.20

F	5.00
—O=F ₂	—2.11
Total	100.29

22. Minagi, Syôwa town, Kibi county, Okayama Pref.: Analyst, Y. UKAI, S. NISHIMURA & Y. HASHIMOTO, *Miner. J.* **2**, (1956) 32.

(115) *Lepidomelane*

	1.	2.	3.
SiO ₂	31.40%	34.90%	36.05%
TiO ₂	0.69	1.22	0.21
Al ₂ O ₃	14.96	19.31	19.10
Fe ₂ O ₃	20.29	16.24	8.41
FeO	12.92	9.58	15.39
MnO	0.74	0.85	1.38
MgO	3.99	1.74	0.00
CaO	0.31	0.46	2.29
Na ₂ O	none	0.65	2.36
K ₂ O	4.87*	6.49	7.79
Li ₂ O	0.62	—	tr.
H ₂ O (+)	6.50	6.94	
H ₂ O (—)	3.50	1.64	
F	0.48	—	
—F=1/20	—0.20	—	
Total	101.07	100.02	

* contains Rb, Cs.

1. Sakihama, Sanriku village, Kesen county, Iwaté Pref.: In pegmatite: Analyst, N. SHIMODA, *J. Chem. Soc. Japan*, **74**, (1953) 883.
2. Ôhari, Marumori town, Igu county, Miyagi Pref.: In pegmatite: Analyst, S. HASEGAWA, *Sci. Rep. Tôhoku Univ. III. Ser.* **5**, (1957) 368.
3. Hukazawa, Naegi, Nakatugawa city, Gihu Pref.: In pegmatite: Analyst, N. SHIMODA, *J. Chem. Soc. Japan*, **78**, (1957) 1127.

(116) *Lepidolite*

	1.	2.	3.	4.
SiO ₂	50.42%	50.60%	50.83%	51.37%
TiO ₂	0.28	0.70	tr.	tr.
Al ₂ O ₃	20.77	23.42	23.70	21.61
Fe ₂ O ₃	0.37	1.07	—	—
FeO	none	0.26	1.24	0.90
MnO	2.77	0.75	0.97	2.05
MgO	0.21	none	0.46	0.49
CaO	0.46	0.22	0.24	0.68
Na ₂ O	0.04	0.56	1.06	0.47
K ₂ O	11.83	11.57	9.88	11.99

Li ₂ O	5.89	5.81	5.51	4.99
(Rb, Cs) ₂ O	—	—	1.64	0.76
H ₂ O (+)	0.47	0.77	0.90	0.70
H ₂ O (—)	1.41	1.22	0.12	0.30
F	7.92	6.79	6.96	6.72
—O=F ₂	—	—	—2.93	—2.83
—½O=F	—3.33	—2.86	—	—
Total	99.51	100.88	100.58	100.20

- 1, 2. Sakihama, Sanriku village, Kesen county, Iwaté Pref.: In pegmatite: Analyst, N. SHIMODA, J. Chem. Soc. Japan, **74**, (1953) 883.
 3, 4. Minagi, Syôwa town, Kibi county, Okayama Pref.: (1) In pegmatite, (2) In lepidolite zone of pegmatite: Analyst, Y. UKAI, S. NISHIMURA & Y. HASHIMOTO, Miner. J. **2**, (1956) 32.

(117) *Zinnwaldite*

	1.	2.	3.	4.	5.	6.
SiO ₂	45.98%	32.49%	41.04%	38.69%	45.84%	53.44%
TiO ₂	0.22	0.32	0.37	0.61	0.16	0.95
Al ₂ O ₃	18.04	17.48	21.34	19.76	20.32	16.99
Fe ₂ O ₃	3.56	9.13	3.38	3.46	9.80	0.92
FeO	6.00	24.51	10.97	20.32	1.61	1.95
MnO	2.46	0.64	3.24	2.72	2.05	2.97
MgO	1.50	0.42	0.05	0.06	0.00	0.16
CaO	1.80	0.73	0.90	0.82	0.45	1.40
Na ₂ O	0.25	0.33	tr.	tr.	1.14	1.25
K ₂ O	9.91	5.42	8.34	8.10	10.36	9.05
Li ₂ O	4.57	0.73	3.19	1.12	3.24	3.47
Rb ₂ O	—	0.13	1.61	0.55	—	2.27
Cs ₂ O	—	0.09	1.61	0.20	—	0.74
H ₂ O (+)	0.86	5.53	2.11	2.81	—	0.46
H ₂ O (—)	1.14	1.14	2.11	1.00	—	0.36
F	5.66	2.40	5.71	3.03	—	7.85
—½O=F	—2.38	—1.01	—2.36	—1.27	—	—3.30
Total	99.57	100.28	100.23	100.98	—	100.93
		(100.48)		(101.98)		

1. Sakihama, Sanriku village, Kesen county, Iwaté Pref.: In pegmatite: Analyst, N. SHIMODA, J. Chem. Soc. Japan, **74**, (1953) 883.
 2. Iizaka, Kawamata town, Date county, Hukusima Pref.: In pegmatite: op. cit. 880.
 3. Kurobira, Miyamoto, Kôhu city, Yamanasi Pref.: In pegmatite: loc. cit.
 4. Motozawa, Yamaguti village, Nisitikuma county, Nagano Pref.: In pegmatite: loc. cit.
 5. Hukuzawa, Naegi, Nakatugawa city, Gihu Pref.: In pegmatite: Analyst, N. SHIMODA, Ibid. **78**, (1957) 1127.
 6. Kanmuriyama, Suizawa village, Mié county, Mié Pref.: In pegmatite: Analyst, N. SHIMODA, Ibid. **74**, (1953) 880.

	7.	8.
SiO ₂	39.03%	38.78%
TiO ₂	tr.	0.17
Al ₂ O ₃	19.57	8.84
Fe ₂ O ₃	1.40	19.61
FeO	4.58	5.00
MnO	3.86	2.91
MgO	4.75	0.54
CaO	8.13	0.94
Na ₂ O	0.46	1.06
K ₂ O	7.91	10.34
Li ₂ O	2.92	3.30
(Rb, Cs) ₂ O	1.00	3.29
H ₂ O(+)	2.49	1.30
H ₂ O(−)	1.06	0.54
F	5.19	6.40
−O=F ₂	−2.19	−2.69
Total	100.16	100.31

7, 8. Minagi, Syôwa town, Kibi county, Okayama Pref.: In pegmatite: Analyst, Y. UKAI, S. NISHIMURA and Y. HASHIMOTO, *Miner. J.* **2**, (1956) 32.

(118) *Hydrobiotite*

SiO ₂	42.05%
Al ₂ O ₃	25.98
Fe ₂ O ₃	8.00
FeO	1.46
MnO	tr.
MgO	3.38
CaO	tr.
Na ₂ O	n.d.
K ₂ O	5.34
H ₂ O(+)	9.68
H ₂ O(−)	3.39
Total	99.28

Ôgoé town, Tamura county, Hukusima Pref.: In sub-soil derived from granodiorite: Analyst, J. MASUI, *Jap. Ass. P.M.G.* **38**, (1954) 172.

(119) *Stilpnomelane*

δ	2.81 _o (110°C)
SiO ₂	43.67%
TiO ₂	tr.
Al ₂ O ₃	1.02
Fe ₂ O ₃	31.37
FeO	8.86

MnO	2.56
MgO	0.71
CaO	2.04
Na ₂ O	0.17
K ₂ O	0.40
H ₂ O (+)	6.94
H ₂ O (—)	2.48
Total	100.22

Obira mine, Ogata town, Ôno county, Ôita Pref.: Analyst, H. SHIROZU, J. Miner. Soc. Japan, **2**, (1955) 117.

(120) *Montmorillonite*

SiO ₂	53.69%
TiO ₂	0.23
Al ₂ O ₃	17.87
Fe ₂ O ₃	1.65
FeO	0.66
MgO	2.63
CaO	2.04
Na ₂ O	0.20
K ₂ O	0.27
H ₂ O (+)	5.90
H ₂ O (—)	15.55
Total	100.69

Wanibuti mine, Hirata city, Simané Pref.: In aureole around the gypsum deposits.: Analyst, T. SAKAMOTO and T. SUDO, Miner, J. **1**, (1956) 353.

(121) *Vermiculite*

SiO ₂	42.41%
Al ₂ O ₃	13.87
Fe ₂ O ₃	} 18.92
FeO	
MnO	1.02
MgO	8.42
CaO	10.31
Na ₂ O	n.d.
K ₂ O	n.d.
H ₂ O (+)	n.d.
H ₂ O (—)	4.50
Total	98.45

Ononiimati, Ono town, Tamura county, Hukusima Pref.: Alteration product of biotite in hornblende-biotite granite: Analyst, Chem. Lab. Fac. Art, & Lit. Hukusima Univ.: M. SAMBONSUGI, J. Jap. Ass. M.P.G., **39**, (1955) 83.

(122) *Saponite*

	1.	2.
SiO ₂	39.68%	47.02%
TiO ₂	0.37	0.00
Al ₂ O ₃	3.93	5.54
Fe ₂ O ₃	19.82	0.83
FeO	1.12	0.07
MnO	0.19	0.00
MgO	11.21	25.52
CaO	2.37	0.82
Na ₂ O	—	0.28
K ₂ O	—	0.17
H ₂ O (+)	6.16	4.00
H ₂ O (—)	15.11	16.04
Total	99.96	100.29

1. Iron Saponite: Moniwa, Oidé, Sendai city, Miyagi Pref.: As a cementing material among the sand grain from Tertiary iron sand bed: Analyst, J. OSSAKA: T. SUDO, J. Geol. Soc. Japan, **60**, (1954) 22.
2. Wakamatu mine, Tari village, Hino county, Tottori Pref.: Filling the fissures of serpentine and chromite bodies: Analyst, J. KITAHARA, J. Jap. Ass. M.P.G., **41**, (1957) 150.

(123) *Chlorite*

	1.	2.	3.	4.	5.	6.
δ	—	—	—	—	—	2.699
SiO ₂	31.67%	25.76%	38.84%	27.10%	27.35%	40.61%
TiO ₂	—	—	0.29	0.36	—	—
Al ₂ O ₃	4.94	21.26	18.12	19.32	19.59	9.94
Fe ₂ O ₃	12.70	6.75	3.70	5.10	8.10	2.11
FeO	12.53	14.60	n.d.	17.63	13.57	—
MnO	2.28	—	none	tr.	0.39	MnO ₂ 1.03
MgO	20.88	18.64	31.48	17.70	15.15	33.14
CaO	3.39	0.90	1.19	0.54	0.21	0.55
Na ₂ O	—	—	none	—	—	} 1.04
K ₂ O	—	—	none	—	—	
Li ₂ O	—	—	none	—	—	
Rb ₂ O	—	—	none	—	—	—
Cs ₂ O	—	—	none	—	—	—
P ₂ O ₅	—	—	—	—	—	—
H ₂ O (+) }	11.52	10.33	6.83	11.72	14.53	lg. loss 11.33
H ₂ O (—) }		1.32	none	0.65	2.56	—
F	—	—	0.58	—	—	—
—O=½F	—	—	—0.25	—	—	—
Total	99.81	99.56	100.88	100.12	101.45	99.75
	(99.91)		(100.78)			

1. Mangan-chlorite: Kaso mine, Kanuma city, Totigi Pref.: Interstitial fillings of rhodonite crystals: Analyst, F. HIROWATARI: T. YOSHIMURA, Manganese deposits in Japan, (1952) 139.
2. Hitati mine, Hitati city, Ibaragi Pref.: Dark green colored powdery masses in epidote-chlorite-chlorite-quartz-albite vien in so-called metadiorite: Analyst, H. SATO & T. SUDO, Miner. J. **1**, (1956) 396.
3. Chlorite (?): Maki, Hotaka town, Minamiazumi county, Nagano Pref.: In limestone contact: Analyst, N. SHIMODA, J. Chem. Soc. Japan, **74**, (1953) 880.
- 4, 5. Yugasima mine, Kamikano village, Tagata county, Sizuoka Pref.: In propylite: Analyst, T. FUJIWARA, J. Miner. Soc. Japan, **3**, (1957) 211.
6. Wanibuti mine, Hirata city, Simané Pref.: Waterwashed sample: Analyst, S. KAWANAMI: Y. SHIRAKI, J. Ceram. Ass. Japan, **61**, (1953) 485.

	7.	8.
δ	—	3.10
SiO ₂	29.07%	24.56%
TiO ₂	0.32	none
Al ₂ O ₃	21.82	16.07
Fe ₂ O ₃	0.83	5.10
FeO	3.67	34.66
MnO	—	1.42
MgO	29.90	6.16
CaO	0.19	0.30
Na ₂ O	tr.	—
K ₂ O	tr.	—
H ₂ O(+)	10.76	11.93
H ₂ O(−)	2.76	0.54
Total	99.32	100.74

7. Magnesium rich chlorite: The same locality: In the innermost fringe of the altered aureole around the gypsum deposits: Analyst, T. SAKAMOTO and T. SUDO, Miner. J. **1**, (1956) 349.
8. Iron rich chlorite: Syôgasé, Ino town, Agawa county, Kôti Pref.: Dark green films either the outer boundary of the fire brick silica stone deposit or filling fissures in the wall rocks: Analyst, H. SHIROZU, Ibid. **1**, (1955) 225.

(124) *Leuchtenbergite*

δ	2.623(4°C)	2.648(4°C)
SiO ₂	31.15%	30.44%
Al ₂ O ₃	17.12	18.13
Fe ₂ O ₃	2.90	3.38
FeO	0.56	0.57
MnO	0.00	0.00
MgO	34.57	34.22
CaO	tr.	0.17
Cr ₂ O ₃	tr.	tr.
Alk.	n.d.	n.d.

H ₂ O (+)	12.82	12.70
H ₂ O (—)	0.50	0.30
Total	99.62	99.91

- 1, 2. Hinokami mine, Hakunan town, Hino county, Tottori Pref.: Analyst, J. KITAHARA, J. Jap. Ass. M.P.G., **39**, (1955) 173.

(125) *Ganophyllite*

	1.	2.	3.
δ	2.71	—	—
SiO ₂	42.29%	40.96%	42.68%
Al ₂ O ₃	5.75	5.27	6.97
Fe ₂ O ₃	2.43	3.34	0.23
FeO	2.91	0.41	—
MnO	29.75	33.16	35.22
MgO	1.53	2.42	1.57
CaO	tr.	5.50	2.53
BaO	2.15	—	—
Na ₂ O	0.58	0.04	—
K ₂ O	0.83	0.23	—
SO ₃	1.04	—	—
H ₂ O (+)	8.84	6.43	} 9.43
H ₂ O (—)	2.28	3.37	
Total	100.38	101.13	98.63

1. Ōzu mine, Ōzu city, Ehime Pref.: In manganese deposit: Analyst, F. HIROWATARI: T. YOSHIMURA, H. SHIROZU and F. HIROWATARI, J. Miner. Soc. Japan, **2**, (1955) 110.
2. Nagakawara adit, Ananai mine, Ōtoyo village, Nagaoka county, Kōti Pref.: In manganese deposit: loc. cit.
3. Matukabu adit of the same mine: Analyst, Y. ABE (1952): T. YOSHIMURA, Manganese deposits in Japan, (1952) 121.

(126) *Chloritoid*

SiO ₂	24.79%
Al ₂ O ₃	40.37
FeO	25.87
Fe ₂ O ₃	n.d.
MnO	tr.
CaO	0.43
MgO	0.17
Na ₂ O	n.d.
K ₂ O	n.d.
Ig. loss	8.63
Total	100.26

East of Masuzawa station, Utiyama, Miyamori village, Kamihei county, Iwaté Pref.: In Chloritoid phyllite: Analyst, H. KIDO: Y. SEKI, Sci. Rep. Saitama Univ., Ser. Ser. B. **1**, No. 3 (1954) 234.

(127) *Kaolinite*

	1.	2.	3.
SiO ₂	45.80%	44.96%	49.86%
TiO ₂	—	0.06	—
Al ₂ O ₃	39.55	39.16	32.66
Fe ₂ O ₃	0.57	0.56	0.77
FeO	0.18	0.21	0.32
MgO	0.14	0.19	0.27
CaO	0.41	0.17	none
Na ₂ O	—	—	0.72
K ₂ O	0.03	—	2.81
H ₂ O (+)	13.92	13.98	10.00
H ₂ O (—)	0.17	1.22	2.07
Total	100.77	100.51	99.48

1. Mikawa mine, Mikawa village, Higasikambara county, Niigata Pref.: In hydrothermal copper-lead-zinc vein: Analyst, K. NAGASAWA, J. Earth Sci., Nagoya Univ. **1**, (1953) 13.
2. Namera mine, Yuno village, Saba county, Yamaguti Pref.: In kaolinitic "Roseki" deposit: Analyst, G. SHIBUYA & T. MITSUDA, Yamaguchi J. Sci., No. 8 (1957) 95.
3. Matugatani mine, Nami, Hôhu city, Yamaguti Pref.: In pegmatite deposit: Analyst, G. SHIBUYA & T. TOMISAKA, Ibid., 94.

(128) *Dickite*

SiO ₂	45.62%
Al ₂ O ₃	38.92
Fe ₂ O ₃	1.03
MgO	tr.
CaO	0.12
Na ₂ O	—
K ₂ O	0.08
H ₂ O (+)	} 13.98
H ₂ O (—)	
Total	99.75

Akimoto, Unoma, Hokugô village, Higasiusuki county, Miyazaki Pref.: In antimony deposit: Analyst, H. MATSUKUMA & N. TANAKA, Bull. Fac. Eng. Kyushu Univ. **27**, (1955) 185.

(129) *Garnierite*

SiO ₂	40.00%
Fe ₂ O ₃	} 2.64
FeO	
MgO	23.42

CaO	1.74
NiO	6.17
Cr ₂ O ₃	tr.
Na ₂ O	n.d.
K ₂ O	n.d.
H ₂ O (+)	} 25.42
H ₂ O (-)	
Total	[99.39]

Wakasa mine, Hongô village, Ôi county, Hukui Pref.: Analyst, K. KINOSHITA, N. TANAKA & M. MIYAHISA, Bull. Fac. Eng. Kyushu Univ. **27**, (1954) 64.

(130) *Halloysite*

	1.	2.
SiO ₂	45.60%	39.78%
TiO ₂	2.58	—
Al ₂ O ₃	32.20	34.69
Fe ₂ O ₃	1.99	0.55
FeO	0.85	—
MgO	0.08	0.28
CaO	0.15	0.36
Na ₂ O	—	0.16
K ₂ O	—	0.57
H ₂ O (+)	—	H ₂ O 22.78
H ₂ O (-)	5.30	$\left[\begin{array}{ll} - 80^{\circ} & 9.13 \\ 80 - 500^{\circ} & 0.84 \\ 500 - 600^{\circ} & 12.19 \\ 600 - 1000^{\circ} & 0.62 \end{array} \right]$
Ig. loss.....	11.32	
Total	100.12	
		99.17

1. Hydrated halloysite: Sinmei pass near Tazima city, Gifu Pref.: In concretionary nodule of bog iron ore, so called "eagle stone": Analyst, K. MUSUTOMI & K. YAMASAKI, J. Earth Sci. Nagoya Univ. **1**, (19953) 5.
2. Hydrated halloysite: Wazima city, Isikawa Pref.: Analyst, K. KASAMA: S. SUGIURA, Sci. Rep. Kanazawa Univ. **3**, (1955), 189.

(131) *Hisingerite*

	1.	2.	3.
SiO ₂	34.33%	34.36%	35.61%
Fe ₂ O ₃	37.87	45.95	45.47
FeO	6.52	2.14	1.08
MgO	1.54	0.77	0.78
CaO	1.88	0.99	1.82
H ₂ O (+)	8.93	6.86	6.48
H ₂ O (-)	7.54	8.35	8.25
S	1.36	0.38	0.23
Total	99.97	99.42	99.49
		(99.80)	(99.72)

1. Akagané mine, Esasi town, Esasi county, Iwaté Pref.: In contact deposit: Analyst, S. NAGAI: T. TAKEUCHI and M. NAMBU, Bull. Res. Inst., Minear. Metall. 8, No. 1 (1952) 13.
- 2, 3. Kawayama mine, Mikawa village, Kuga county, Yamaguti Pref.: In cupriferous pyrrhotite deposit. (2)...brown colour. (3)...black colour.: Analyst, S. NAGAI: ditto.

(132) *Bementite*

δ	2.82
SiO ₂	31.09%
Al ₂ O ₃	2.55
Fe ₂ O ₃	0.10
FeO	1.47
MnO	50.75
MgO	1.65
CaO	1.13
Zn	n.d.
O	0.30
H ₂ O (+)	8.19
H ₂ O (—)	2.29
Total	99.52

Tokuzawa mine, Nisiaizu town, Yama county, Hukusima Pref.: As veinlets of very fine grained aggregates traversing tephroite ores. It contains as impurity about 2 vol. % of tephroites: Analyst, F. HIROWATARI (1955): H. SHIROZU and F. HIROWATARI, J. Jap. Ass. M.P.G., **39**, (1955) 244.

(133) *Plagioclase (Albite, Andesine, Labradorite, Anorthite)*

	1.	2.	3.	4.	5.	6.
SiO ₂	65.66%	66.11%	65.68%	66.14%	61.92%	64.40%
TiO ₂	none	none	none	none	none	none
Al ₂ O ₃	20.92	21.07	21.29	21.00	23.68	22.28
Fe ₂ O ₃	0.13	0.06	0.10	0.08	0.10	0.20
MnO	none	tr.	tr.	tr.	tr.	tr.
MgO	none	none	none	none	none	none
CaO	1.04	0.96	1.53	1.08	4.07	2.95
Na ₂ O	9.80	9.94	8.72	10.42	6.54	7.12
K ₂ O	1.54	1.66	2.04	1.10	3.34	1.46
H ₂ O (+)	0.84	0.21	0.26	0.32	0.40	1.04
H ₂ O (—)	0.28	0.13	0.20	0.18	0.11	0.25
Total	100.21	100.14	99.82	100.32	100.16	99.70
	7.	8.	9.	10.	11.	12.
SiO ₂	63.58%	65.51%	67.85%	64.94%	65.84%	63.96%
TiO ₂	none	none	—	—	—	—

Al ₂ O ₃	21.80	18.98	19.93	20.66	20.84	22.37
Fe ₂ O ₃	0.08	0.10	0.52	0.89	0.44	0.56
MnO	tr.	0.01	0.05	0.05	—	tr.
MgO	none	none	0.10	0.07	0.28	0.07
CaO	1.85	0.18	0.26	1.96	0.35	2.75
Na ₂ O	5.16	3.41	9.84	9.64	2.53	9.03
K ₂ O	6.84	11.67	1.06	0.97	9.38	0.93
H ₂ O (+)	0.32	0.21	0.35	0.59	Ig. loss 0.26	0.14
H ₂ O (—)	0.18	0.12	0.07	0.14	—	0.32
Total	99.81	100.19	100.03	99.91	99.92	100.13

1. Albite: Ôhari, Marumori town, Igu county, Miyagi Pref.: In pegmatite: Analyst, not stated: K. ÔMORI, J. Jap. Ass. M.P.G., **41**, (1957) 213.
2. Feldspar (An₅): The same locality: Associated with allanite in pegmatite: Analyst, S. HASEGAWA, Sci. Rep. Tohoku Univ. III Ser. **5**, (1957) 365.
3. Feldspare (An₀): Kutibutoyama, Kawamata town, Date county, Hukusima Pref.: Associated with allanite in pegmatite: ditto.
4. Feldspar (An₅₀): Huzamata, the same locality: ditto.
5. Feldspar (An₂): Ôsawa, Tôwa village, Adati county, the same Pref.: ditto.
6. Feldspar (An₁₀): Miharu-Kitazawa, the same locality: ditto.
7. Feldspar (An₁₇): Nittô-Kitazawa, the same locality: ditto.
8. Feldspar (An₂): Hayamadaké, the same locality: ditto.
9. Albite (white): Sayama, Taira village, Higasitonami county, Toyama Pref.: In pegmatite: Analyst, J. TAKUBO, T. UEDA, & S. NISHIMURA, J. Miner. Soc. Japan, **1**, (1954), 278.
11. Feldspar: Eiziyama, Turusato, Doki city, Gihu Pref.: Analyst, K. HUKUO & H. SUZUKI, Bull. Nagoya Inst. Techn. No. **7** (1955) 3.
12. Albite (pale brown): Hattayôwa, Kitayamato village, Ikoma county, Nara Pref.: Analyst, J. TAKUBO, T. UEDA, S. NISHIMURA & K. MASUTOMI, J. Geol. Soc. Japan, **59**, (1953) 47.
13. Albite (white): ditto.

	13.	14.	15.	16.	17.	18.
SiO ₂	63.88%	65.25%	65.61%	68.16%	67.05%	65.42%
Al ₂ O ₃	23.08	20.56	19.55	20.56	20.70	22.17
Fe ₂ O ₃	0.38	—	—	—	—	0.48
MnO	tr.	—	—	—	—	tr.
MgO	0.11	0.14	0.47	0.18	1.03	0.14
CaO	3.10	0.76	0.20	0.06	1.14	1.54
Na ₂ O	9.31	6.12	5.22	10.20	9.60	9.01
K ₂ O	0.87	6.98	7.97	0.51	0.10	0.73
H ₂ O (+)	0.37	0.10	0.18	0.12	n.d.	0.60
H ₂ O (—)	0.24	—	—	—	—	0.23
Total	100.72	99.91	99.20	99.79	99.62	100.32
	(101.34)					

- 14, 15, 16, 17. Feldspar: Minagi, Syôwa town, Kibi county, Okayama Pref.: In pegmatite; (14) in biotite zone, (15) in moscovite zone, (16) in zinnwaldite zone;

(8) in lepidolite zone: Analyst, Y. Ukai, S. NISHIMURA & Y. HASHIMOTO, *Miner. J.* **2**, (1956) 31.

18. Albite: Komenono, Hôzyô town, Onsen county, Ehime Pref.: In pegmatite: Analyst, J. TAKUBO, T. UEDA, S. NISHIMURA & K. MASUTOMI, *J. Geol. Soc. Japan*, **59** (1953) 54.

	19.	20.
SiO ₂	63.35%	44.49%
Al ₂ O ₃	22.03	32.46
Fe ₂ O ₃	0.80	2.08
MgO	0.35	3.27
CaO	1.52	17.91
Na ₂ O	8.02	—
K ₂ O	2.88	—
H ₂ O(+)	0.59	—
H ₂ O(−)	0.49	—
Total	100.03	100.21

19. Labradorite: Taira village, Higasitonami county, Toyama Pref.: In pegmatite: Analyst, J. TAKUBO, T. UEDA & S. NISHIMURA, *J. Miner. Soc. Japan*, **1**, (1954) 279.
20. Anorthite: Miyakezima, Tôkyô: Volcanic ejecta: Analyst, B. YOSHIKI, S. KOIDE & M. WAKI, *Rep. Res. Lab. Asahi Glass Co.* **3**, (1953) 139.

(134) *Orthoclase (Adularia, Perthite, Microcline-Perthite)*

	1.	2.	3.	4.	5.	6.
δ	2.585 ^(11°C) _(4°C)	2.565 ^(8°C) _(4°C)	—	—	—	—
SiO ₂	61.12%	64.77%	65.51%	63.98%	64.37%	66.62%
TiO ₂	—	none	none	—	—	—
Al ₂ O ₃	20.58	19.03	18.98	19.23	19.28	17.84
Fe ₂ O ₃	0.29	0.13	0.10	0.59	0.86	0.56
MnO	—	tr.	0.01	0.16	—	—
MgO	none	none	none	0.09	0.14	0.24
CaO	0.16	0.15	0.18	0.69	0.27	0.80
BaO	3.36	—	—	—	—	—
Na ₂ O	0.41	1.74	3.41	2.01	2.27	2.31
K ₂ O	13.87	13.75	11.67	12.75	12.60	10.10
H ₂ O(+)	—	0.20	0.21	0.48	0.26	0.32
H ₂ O(−)	—	0.16	0.12	0.09	0.28	0.46
Ig. loss	0.30	—	—	—	—	—
Total	100.12	99.93	100.19	100.03	100.33	99.25
	(100.09)			(100.07)		

1. Barium-adularia: Isagosawa mine, Yanagawa village, Iwaté county, Iwaté Pref.: In hematite deposit: Analyst, H. SHIROZU: T. YOSHIMURA, H. SHIROZU & M. KIMURA, *Mem. Fac. Sci., Kyushu Univ. Ser. D.* **4**, (1954) 163.
2. Perthite: Terazi, Iwaizumi town, Simohei county, Iwaté Pref.: In pegmatite: Analyst, S. HASEGAWA: K. ÔMORI & S. HASEGAWA, *J. Jap. Ass. M.P.G.*, **39**, (1955) 94.

3. Microcline-perthite: Hayamadaké, Tokiwa town, Tamura county, Hukusima Pref.: In pegmatite: Analyst, S. HASEGAWA: K. ÔMORI & S. HASEGAWA, Ibid, 4 (1957) 3.
4. Orthoclase: Soyama, Taira village, Higasonami county, Toyama Pref.: In pegmatite. Colour, peach-red: Analyst, J. TAKUBO, T. UEDA & S. NISHIMURA, J. Miner. Soc. Japan, 1 (1954) 278.
5. Microcline-perthite: op. cit. 279.
6. Orthoclase perthite: op. cit. 279.

	7.	8.	9.	10.	11.	12.
δ	—	—	—	2.578 (^{16}O)	2.586 (^{16}O)	—
SiO ₂	65.19%	65.00%	64.26%	65.13%	65.50%	65.34%
Al ₂ O ₃	20.22	20.81	19.47	18.07	19.20	19.66
Fe ₂ O ₃	0.66	0.91	tr.	0.50	0.73	0.54
MnO	0.09	—	—	—	—	—
MgO	tr.	—	—	0.70	tr.	0.29
CaO	0.56	0.29	0.72	0.61	0.46	0.36
Na ₂ O	4.71	3.52	3.21	1.18	3.52	3.67
K ₂ O	8.53	9.62	11.93	14.28	10.50	10.41
H ₂ O (+)	0.12	0.19	0.63	0.35	0.37	0.58
H ₂ O (—)	0.12	0.22	0.10	0.08	0.03	—
Total	100.20	99.84	100.32	100.90	100.31	100.85
		(100.56)				

7. Perthite: Ôro, Ômiya town, Naka county, Kyôto Pref.: In pegmatite: Analyst, M. TATEKAWA, Mem. Coll. Sci., Univ. Kyôto, Ser. B. 22, (1955) 206.
- 8, 9. Perthite: Taniuti, the same town: In pegmatite: ditto.
10. Adularia: Banda, Tôzi town, Kozima county, Okayama Pref.: Overgrowth on orthoclase crystal: Analyst, T. TOMISAKA, K. HENMI & G. SHIBUYA, J. Miner. Soc. Japan, 3, (1956) 45.
- 11, 12. Orthoclase: The same locality: ditto.

	13.	14.	15.	16.	17.
SiO ₂	65.20%	63.55%	64.23%	64.42%	64.45%
Al ₂ O ₃	19.57	18.93	19.52	19.39	20.18
Fe ₂ O ₃	0.03	0.48	1.35	1.40	0.29
MnO	—	—	tr.	tr.	0.15
MgO	none	0.80	0.07	0.33	0.03
CaO	0.42	tr.	0.79	0.82	0.15
Na ₂ O	2.90	3.30	2.12	1.68	2.01
K ₂ O	11.80	12.71	10.70	11.42	12.90
H ₂ O (+)	0.12	0.58	0.11	0.30	0.20
H ₂ O (—)	0.44	0.25	0.28	0.05	0.05
Total	100.53	100.60	99.17	99.81	100.41

13. Orthoclase: Nagano, Ôuti town, Yosiki county, Yamaguchi Pref.: In pegmatite: Analyst, T. TOMISAKA, & A. MURAKAMI & G. SHIBUYA, Yamaguchi J. Sci., 7, (1956) 47.
14. Microcline: Kagamiyama, the same locality: In pegmatite: op. cit. 49.

15. Microcline-perthite (pale red colored): Mategata, Hagata village, Oti county, Ehime Pref.: In pegmatite: Analyst, J. TAKUBO, T. UEDA, S. NISHIMURA & K. MASUTOMI, J. Geol. Soc. Japan, 59, (1953) 51.
 16. Microcline-perthite (white): ditto
 17. Orthoclase-perthite (white): ditto.

(135) *Mesolite*

	1.	2.
SiO ₂	45.97%	45.70%
Al ₂ O ₃	27.00	27.16
CaO	10.10	9.67
Na ₂ O	4.98	4.24
Ig. loss	12.78	13.36
Total	100.83	100.13

- 1, 2. Nisioda, Sioda town, Tiisagata county, Nagano Pref.: Analyst, M. KOIZUMI, Miner. J. 1, (1953) 39.

(136) *Thomsonite*

SiO ₂	36.94%
Al ₂ O ₃	32.47
MgO	tr.
CaO	12.92
Na ₂ O	5.18
K ₂ O	none
Ig. loss	13.50
Total	100.98 (101.01)

- Maze, Iwamuro village, Nisikanbara county, Niigata Pref.: In druse of basalt: Analyst, HAYASHI: M. KOIZUMI, Miner. J. 1, (1953) 39.

(137) *Laumontite*

	1.	2.	3.	4.
δ	—	2.37	—	—
SiO ₂	52.83%	50.66%	53.82%	52.30%
Al ₂ O ₃	20.72	21.65	20.85	21.52
Fe ₂ O ₃	—	0.63	—	—
CaO	11.52	10.52	11.41	11.76
MgO	—	0.20	—	—
Na ₂ O	—	0.45	—	—
K ₂ O	—	1.12	—	—
H ₂ O	—	13.97	—	—
Ig. loss	14.45	—	14.77	14.40
Total	99.52	99.20	100.85	99.98

1. Asio mine, Kamitoga county, Totigi Pref.: Analyst, M. KOIZUMI, Miner. J. 1, (1953) 39.
2. Yamano, Makabé town, Makabé county, Ibaragi Pref.: In druse of pegmatite with orthoclase-perthite: Analyst, T. TOMISAKA, Yamaguchi J. Sci., 5, (1954), 2.
3. Yugawara, Simoasigara county, Kanagawa Pref.: Analyst, M. KOIZUMI, loc. cit.
4. Syūzenzi, Tagata county, Sizuoka Pref.: Analyst, M. KOIZUMI, loc. cit.

(138) *Stilbite*

	1.	2.
δ	—	2.122 ($^{20^{\circ}\text{C}}$ / $_{4^{\circ}\text{C}}$)
SiO ₂	56.80%	56.45%
Al ₂ O ₃	15.57	16.19
Fe ₂ O ₃	tr.	0.82
MgO	—	0.84
CaO	8.12	7.65
Na ₂ O	1.17	} n.d.
K ₂ O	—	
H ₂ O (>160°C) ...	9.88 (>150°C)	8.28
H ₂ O (<160°C) ...	2.62 (<150°C)	3.01
H ₂ O (<110°C) ...	6.11	6.91
Total	100.27	100.15

1. Sôgô, Abu town, Abu county, Yamaguchi Pref.: In dolerite dyke: Analyst, G. SHIBUYA, Yamaguchi J. Sci., 7, (1956) 50.
2. Kamigô, Oouti town, Yosiki county, Yamaguti Pref.: Stilbite veinlet in fine grained gabbro; Analyst, S. SHIBUYA & H. MATSUZATO, Yamaguti J. Sci., 8 (1957), 97.

(139) *Chabazite*

	1.	2.	3.
δ	—	—	2.00±0.001
SiO ₂	47.44%	43.65%	49.9%
Al ₂ O ₃	20.20	26.06	19.2
Fe ₂ O ₃	—	1.02	—
FeO	—	—	small amount
MgO	—	—	tr.
CaO	10.09	6.65	8.0
Na ₂ O	1.34	4.12	} n.d.
K ₂ O	—	—	
H ₂ O (+)	—	18.56	—
Ig. loss	21.00	—	21.2
Total	100.67	100.06	98.3
	(100.07)		

1. Mitaki, Sendai city, Miyagi Pref.: Analyst, M. KOIZUMI, Miner. J. 1, (1953), 39.

This mineral had been misnamed "Gmelinite" by the collector.

2. Mazé, Iwamuro village, Nisikanbara county, Niigata Pref.: Transparent coating on apophyllite and analcite crystals: Analyst, E. SORITA (1948): K. SAKURAI & E. SORITA, J. Miner. Soc. Japan, **3**, (1957), 325.
3. Miyanotaira, Hinatawada, Ômé city, Tôkyô: In fissure of schalstein: Analyst, T. ASHIZAWA: K. SAKURAI & T. ASHIZAWA, J. Miner. Soc. Japan, **1**, (1953), 70.

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