Tables and figures

Table 1. Neptunite, hellandite, sörensenite, astrophyllite, epididymite, bavenite and lorenzenite groups [91N1, 99O1, 02D1, 02O1, 03P1, 03P2] as well as some synthetic silicates.

Silicate	Composition	Refs.	Group
Neptunite	$KNa_2Li(Fe,Mg,Mn)_2Ti_2Si_8O_{24}$		VIIID22
Mangan-neptunite	$KNa_2Li(Mn,Fe)_2Ti_2Si_8O_{24}$		VIIID22
Hellandite-(Y)[a)]	$(Ca_3R)Y_2Al□_2[Si_4B_4O_{22}](OH)_2$	91N1, 02O1	VIIID23
Hellandite-(Ce)[a)]	$(Ca_3R)Ce_2Al□_2[Si_4B_4O_{22}](OH)_2$	99O1	VIIID23
Tadzhikite-(Ce)[a)]	$Ca_4Ce_2Ti□_2[Si_4B_4O_{22}](OH)_2$	91N1, 02O1	VIIID23
Mottanaite-(Ce)	$Ca_4(CeCa)AlBe_2[Si_4B_4O_{22}]O_2$	02D1	VIIID23
Ciprianiite	$Ca_4[(Th,U)R]Al□_2[Si_4B_4O_{22}](OH)_2$	02D1	VIIID23
Sörensenite	$Na_4Be_2Sn(Si_3O_9)_2·2H_2O$		VIIID24
Sverigeite	$NaBe_2(Mn,Mg)_2SnSi_3O_{12}(OH)$		VIIID24
Astrophyllite subgroup[a)]			
Astrophyllite	$K_2Na(Fe^{2+},Mn)_7Ti_2Si_8O_{26}(OH)_4F$	03P1, 03P2	VIIID25
Magnesium astrophyllite	$K_2Na[Na(Fe,Mn)_4Mg_2]Ti_2Si_8O_{26}(OH)_4□$	03P1, 03P2	VIIID25
Niobophyllite	$K_2Na(Fe^{2+},Mn)_7(Nb,Ti)_2Si_8O_{26}(OH)_4(F,O)$	03P1, 03P2	VIIID25
Zircophyllite	$K_2(Na,Ca)(Mn,Fe^{2+})_7(Zr,Nb)_2Si_8O_{26}(OH)_4F$	03P1, 03P2	VIIID25
Fe-dominant analog of zircophyllite	$K_2(Na,Ca)(Fe^{2+},Mn)_7(Zr,Nb)_2Si_8O_{26}(OH)_4F$	03P1, 03P2	VIIID25
Hydroastrophyllite	$(H_3O,K)_2Ca(Fe^{2+},Mn)_{5-6}Ti_2Si_8O_{26}(OH)_4F$	03P1, 03P2	VIIID25
Eveslogite	$(Ca,K,Na,Sr,Ba)_{48}[(Ti,Nb,Fe,Mn)_{12}(OH)_{12}$-$Si_{48}]O_{144}(F,OH,Cl)_{14}$	03M1	
Kupletskite subgroup[a)]			
Kupletskite	$K_2Na(Mn,Fe^{2+})_7(Ti,Nb)_2Si_8O_{26}(OH)_4F$	03P1, 03P2	VIIID25
Niobokupletskite	$K_2Na(Mn,Fe^{2+})_7(Nb,Zr,Ti)_2Si_8O_{26}(OH)_4(O,F)$	03P1, 03P2	VIIID25
Cesium kupletskite	$(Cs,K)_2Na(Mn,Fe,Li)_7(Ti,Nb)_2Si_8O_{26}(OH)_4F$	03P1, 03P2	VIIID25
Jinshajiangite	$Na_5Ba_4(Fe,Mn)_{15}Ti_8Si_{15}O_{64}(F,OH)_6$		VIIID25
Epididymite	$NaBeSi_3O_7(OH)$		VIIID26
Eudidymite	$Na_2Be_2Si_6O_{15}·H_2O$		VIIID26
$K_2Be_2Si_6O_{15}$	$K_2Be_2Si_6O_{15}$		
Bavenite	$Ca_4(Al,Be)_4Si_9O_{26}(OH)_2$		VIIID27
Lorenzenite (ramsayite)	$Na_2Ti_2O_3(Si_2O_6)$		VIIID28
Natisite	Na_2TiSiO_5		VIIID28
Na_2ZrSiO_5	Na_2ZrSiO_5		
Li_2TiSiO_5	Li_2TiSiO_5		
Li_2VSiO_5	Li_2VSiO_5		

[a)] The compositions are somewhat different from those reported by [91N1].

Table 2. Atomic sites and thermal parameters [a].

a) Neptunite[6], having monoclinic structure of space group Cc, at 293 K [91K1].

Atom	*x*	*y*	*z*
Na1	0.2669(2)	0.1965(2)	0.3140(4)
Na2	–0.2613(2)	–0.1992(2)	–0.3009(4)
K1	0.000	0.42058(7)	0.25
Li1	0.502(1)	0.4353(5)	0.256(2)
Ti1	0.3425(1)	0.32500(6)	0.1034(2)
Fe1	–0.3376(1)	–0.31623(6)	–0.0961(2)
Ti2	0.0882(1)	0.05243(6)	0.1144(2)
Fe2	–0.0877(1)	–0.06111(6)	–0.1118(2)
Si1	0.1469(2)	0.40781(9)	0.0616(3)
Si1a	–0.1436(2)	–0.40499(9)	–0.0588(3)
Si2	0.5248(2)	0.2258(1)	0.0853(3)
Si2a	–0.5214(2)	–0.22887(9)	–0.0852(3)
Si3	0.7706(2)	0.47294(9)	0.1096(3)
Si3a	–0.7698(2)	–0.47541(9)	–0.1087(3)
Si4	0.8954(2)	0.15005(9)	0.0797(3)
Si4a	–0.8942(2)	–0.14857(8)	–0.0836(3)
O1	0.9575(3)	0.0506(3)	0.0717(5)
O1a	–0.9494(3)	–0.0445(3)	–0.0717(5)
O2	0.4553(3)	0.3241(3)	0.0719(5)
O2a	–0.4563(3)	–0.3296(3)	–0.0668(5)
O3	0.1084(3)	0.1677(3)	0.2583(5)
O3a	–0.1099(3)	–0.1695(3)	–0.2671(5)
O4	0.3708(2)	0.4303(2)	0.2240(4)
O4a	–0.3753(3)	–0.4493(2)	–0.2580(5)
O5	0.2058(3)	0.0740(3)	0.0961(4)
O5a	–0.2090(3)	–0.0792(3)	–0.0901(4)
O6	0.7133(3)	0.3642(3)	0.0386(5)
O6a	–0.7092(3)	–0.3676(3)	–0.0494(5)
O7	0.2138(3)	0.3098(3)	0.0777(5)
O7a	–0.2050(3)	–0.3031(3)	–0.0659(4)
O8	0.8328(3)	0.4933(2)	0.0223(5)
O8a	–0.8325(3)	–0.4893(2)	–0.0198(5)
O9	0.1586(3)	0.4514(3)	0.2226(5)
O9a	–0.1595(3)	–0.4477(3)	–0.2217(5)
O10	0.3969(3)	0.2128(3)	0.2507(5)
O10a	–0.3940(3)	–0.2090(3)	–0.2567(5)
O11	0.4643(3)	0.1161(3)	0.0258(5)
O11a	–0.4597(3)	–0.1200(2)	–0.0275(5)
O12	0.9272(3)	0.2600(2)	0.0248(4)
O12a	–0.9305(3)	–0.2554(2)	–0.0338(5)

Table 2 (cont.)

b) Hellandite[10)], having monoclinic structure, space group P2/a [77M1].

Atom	*x*	*y*	*z*	B_{eq} [Å^2]
M1	0.0	0.0	0.0	1.29
M2	0.04179(4)	0.01878(14)	0.35996(7)	0.94
M3	0.24771(8)	0.00225(37)	0.65957(16)	0.93
M4	0.15428(6)	–0.03944(26)	0.92862(12)	1.02
O1	0.0408(4)	0.2436(14)	0.5635(7)	1.36
O2	0.1757(4)	0.3127(14)	0.7556(7)	1.30
O3	0.0698(4)	–0.3003(15)	0.7357(7)	1.63
O4	0.1312(4)	–0.3268(14)	0.5404(7)	1.42
O5	0.0373(4)	0.1926(13)	0.8669(7)	1.37
O6	0.2457(4)	–0.2345(14)	0.8605(7)	1.46
O7	0.1665(4)	0.2219(13)	0.4475(6)	1.22
O8	0.1303(4)	0.6744(15)	0.3085(7)	1.89
O9	0.1872(4)	0.3281(15)	0.1633(8)	1.96
O10	0.0848(4)	0.7286(15)	0.0388(7)	1.62
O11	0.0526(4)	0.2484(15)	0.1576(7)	1.68
O12	0.25	0.3267(21)	0.0	1.64
O13	0.25	0.6515(20)	0.5	1.31
Si1	0.0999(1)	0.4851(6)	0.6468(6)	1.10
Si2	0.1112(1)	0.4966(6)	0.1616(3)	1.31
B1	0.1708(5)	0.5344(18)	0.4510(9)	0.25(4)
B2	0.2544(4)	0.4527(17)	0.1375(8)	0.18(4)
H	0.047	0.04	0.92	4

c) Sörensenite[18)], having monoclinic structure, space group C2/c [76M1].

Atom	*x*	*y*	*z*
Sn	0.25000	0.25000	0.50000
O1	0.04384(17)	0.47523(34)	0.86797(31)
O2	0.18295(7)	0.04853(34)	0.49599(31)
O3	0.30047(16)	0.22843(33)	0.69123(27)
O4	0.04117(17)	0.04062(33)	0.86873(31)
O5	0.08358(17)	0.23994(30)	0.52567(29)
O6	0.31453(17)	0.05318(37)	0.48462(32)
O7	0.18293(21)	0.26439(42)	0.85100(36)
O8	0.44522(16)	0.25862(29)	0.76059(28)
O9	0.39574(18)	0.05964(37)	0.88396(31)
O10	0.38303(18)	0.42096(35)	0.88275(31)
Si1	0.39711(6)	0.05380(13)	0.50164(11)
Si2	0.38279(6)	0.24309(12)	0.80364(10)
Si3	0.10431(7)	0.03979(12)	0.49490(11)
Be1	0.50000	0.10140(93)	0.75000

Table 2c (cont.)

Atom	*x*	*y*	*z*
Be2	0.50000	0.41538(75)	0.75000
Na1	0.24363(12)	0.45290(25)	0.76492(22)
Na2	0.05320(11)	0.25979(21)	0.69795(20)
H1	0.18779(316)	0.16497(775)	0.88850(546)
H2	0.18751(424)	0.34251(1064)	0.90966(777)

d) Kupletskite[26] [01P1].

Triclinic space group P $\bar{1}$					Monoclinic space group C2/c				
Site	*x*	*y*	*z*	Occupancy	Site	*x*	*y*	*z*	Occupancy
Mn1	0.8500(1)	0.20620(5)	0.47875(6)	0.809(5)	Mn1	0.2527(1)	0.39265(3)	0.00989(3)	0.913(7)
Na1	0.8500(1)	0.20620(5)	0.47875(6)	0.191(5)	Na1	0.2527(1)	0.39265(3)	0.00989(3)	0.087(7)
Mn2	0.27901(9)	0.06668(5)	0.48702(5)	0.974(3)	Mn2	0.7461(1)	0.03613(3)	–0.00589(3)	0.990(3)
Mn3	0.4223(1)	0.35220(5)	0.48391(5)	0.881(5)	Mn3	0.7468(1)	0.17930(3)	–0.00728(3)	0.966(4)
Mg3	0.4223(1)	0.35220(5)	0.48391(5)	0.119(5)					
Mn4	0	0.5	0.5	0.299(3)	Mn4	0.25	0.25	0	0.431(4)
Mg4	0	0.5	0.5	0.201(3)	Mg4	0.25	0.25	0	0.069(4)
Ti	0.0795(1)	0.08598(5)	0.19683(5)	0.948(4)	Ti	–0.4641(1)	0.10716(3)	–0.15196(3)	0.881(4)
Nb	0.0795(1)	0.08598(5)	0.19683(5)	0.052(4)	Nb	–0.4641(1)	0.10716(3)	–0.15196(3)	0.119(4)
Si1	0.6785(2)	0.27194(8)	0.23032(9)	1.00	Si1	0.0417(2)	0.19281(5)	–0.13490(6)	1.00
Si2	0.8128(2)	0.54570(8)	0.25292(9)	1.00	Si2	0.0391(2)	0.32547(5)	–0.12427(6)	1.00
Si3	0.3781(2)	0.67477(8)	0.25541(9)	1.00	Si3	0.9601(2)	0.11053(5)	0.12310(6)	1.00
Si4	0.5081(2)	0.93072(8)	0.23432(9)	1.00	Si4	1.0417(2)	0.02169(5)	–0.13312(6)	1.00
K1a	0.1321(2)	0.2645(1)	0.9961(1)	0.885(4)	K1	–0.5	0.24270(9)	–0.25	0.50
K1b	0.093(3)	0.186(2)	0.998(2)	0.115(4)	K2	0.5	–0.02746(9)	–0.25	0.50
Na	0.5	0	0	0.322(6)	Na	–1.0	0.10683(8)	–0.25	0.381(7)
Ca	0.5	0	0	0.178(6)	Ca	–1.0	0.10683(8)	–0.25	0.199(7)
O1	0.7290(4)	0.3203(2)	0.3824(2)	1.00	O1	0.0676(5)	0.1842(2)	–0.05821(1)	1.00
O2	0.1483(4)	0.1593(2)	0.3675(2)	1.00	O2	0.5672(5)	0.1077(2)	–0.0655(1)	1.00
O3	0.1292(4)	0.3949(2)	0.5948(2)	1.00	O3	0.0672(5)	0.3234(2)	–0.0474(1)	1.00
OH4	0.2935(5)	0.4627(2)	0.3980(2)	1.00	OH4	–0.0652(6)	0.2477(2)	0.0505(1)	1.00
OH5	0.9921(4)	0.1189(2)	0.5951(2)	1.00	OH5	0.4343(6)	0.0391(2)	0.0474(1)	1.00
O6	0.5572(4)	0.2586(2)	0.5921(2)	1.00	O6	0.9289(5)	0.1094(2)	0.0457(1)	1.00
O7	0.5749(4)	0.0133(2)	0.3866(2)	1.00	O7	1.0644(5)	0.0309(2)	–0.0563(1)	1.00
O8	0.0724(4)	0.5917(2)	0.2007(2)	1.00	O8	0.2753(7)	0.3593(1)	–0.1507(2)	1.00
O9	0.2460(5)	0.0417(3)	0.8296(3)	1.00	O9	–0.7252(6)	0.0491(2)	–0.1645(2)	1.00
O10	0.4319(5)	0.4153(2)	0.7994(2)	1.00	O10	–0.2240(7)	0.3557(2)	–0.1510(2)	1.00
O11	0.1297(6)	0.8100(3)	0.8330(3)	1.00	O11	0.2749(6)	0.1660(2)	–0.1663(2)	1.00
O12	0.2646(5)	0.9567(3)	0.1693(3)	1.00	O12	0.7863(6)	0.0486(2)	–0.1655(2)	1.00
O13	0.2665(3)	0.6074(2)	0.8089(2)	1.00	O13	0.0367(7)	0.2615(1)	–0.1542(2)	1.00
O14	0.5721(5)	0.2222(2)	0.8031(3)	1.00	O14	0.9628(7)	0.0464(1)	0.1523(2)	1.00
O15	0.3807(5)	0.1906(3)	0.1672(3)	1.00	O15	–0.2133(6)	0.1660(2)	–0.1666(2)	1.00
F16	0	0	0	0.50	F16	–0.5	0.1064(2)	–0.25	0.50

Table 2 (cont.)

e) Astrophyllite[21], having triclinic structure [00Y1].

Atom	*x*	*y*	*z*	B_{eq} [Å^2]	Occupancy
Fe1	0	0	0	0.92(1)	1.0Fe
Fe2	0.8574(1)	0.7159(1)	0.991(1)	0.73(2)	0.5Fe+0.26Mn+0.19Ca+0.05Na
Fe3	0.7127(1)	0.4272(1)	0.0046(1)	0.64(1)	0.84Fe+0.16Mg
Fe4	0.4296(1)	0.8596(1)	0.9942(1)	0.60(1)	0.84Fe+0.16Mg
Ti	0.5069(1)	0.7373(1)	0.8511(1)	0.62(1)	1.0Ti
Si1	0.0941(1)	0.9053(1)	0.8656(1)	0.64(2)	1.0Si
Si2	0.0742(1)	0.4354(1)	0.1327(1)	0.64(2)	1.0Si
Si3	0.7699(1)	0.8309(1)	0.1247(1)	0.66(2)	1.0Si
Si4	0.7930(1)	0.7973(1)	0.3765(1)	0.61(2)	1.0Si
Na	0	0.25	0.25	1.00(4)	0.73Na+0.27K
K	0.6333(3)	0.5199(1)	0.2480(1)	2.83(3)	0.85K+0.15Na
O1	0.7631(4)	0.8458(2)	0.0478(1)	0.83(4)	O
O2	0.0944(4)	0.8767(2)	0.9429(1)	0.90(4)	O
O3	0.2035(4)	0.7125(2)	0.0460(1)	0.88(4)	O
O4	0.4889(5)	0.2744(2)	0.0639(1)	0.97(4)	O
O5	0.6633(5)	0.0107(2)	0.9500(1)	0.97(4)	OH
O6	0.0557(5)	0.4295(2)	0.0557(1)	0.94(4)	O
O7	0.5	0.25	0.25	1.56(7)	(OH,F)
O8	0.0116(5)	0.7390(2)	0.3485(1)	1.50(5)	O
O9	0.1616(7)	0.0460(2)	0.8453(1)	1.85(6)	O
O10	0.6250(4)	0.5694(2)	0.0468(1)	1.08(5)	(OH)
O11	0.4893(5)	0.7637(3)	0.1519(1)	1.55(7)	O
O12	0.1478(7)	0.0694(2)	0.6525(1)	1.88(8)	O
O13	0.7040(6)	0.6228(3)	0.8360(1)	2.49(9)	O
O14	0.1920(7)	0.1230(3)	0.3346(1)	2.32(8)	O
O15	0.8185(7)	0.8568(3)	0.8341(1)	2.36(8)	O
O16	0.6933(6)	0.1439(3)	0.1673(1)	2.36(8)	O
H1	0.328(5)	0.503(1)	0.597(1)	6.6(1)	H
H2	0.383(5)	0.936(1)	0.412(1)	4.6(1)	H

f) Lorenzenite (ramsayite)[36], having orthorhombic structure, space group Pbcn [87S1].

Atom	*x*	*y*	*z*
Ti	0.1513(1)	0.1322(1)	0.3309(1)
Na	0.0643(1)	0.6450(2)	0.1537(1)
Si	0.3421(1)	0.2961(1)	0.5267(1)
O1	0.0000	0.0060(5)	0.2500
O2	0.1817(2)	0.4407(3)	0.2758(1)
O3	0.3336(2)	0.2967(3)	04152(1).
O4	0.0089(2)	0.2428(3)	0.4280(1)
O5	0.2357(2)	0.0598(3)	0.5670(1)

a) Compositions according to Table 3.

Table 3. Crystal structures and lattice parameters.

Silicate	*T*	Space	Lattice parameters				Refs.
	[K]	group	*a* [Å]	*b* [Å]	*c* [Å]	α, β, γ	
Neptunite[1)]	RT		16.7	12.4	10.0	β = 115°44’	63B3
Neptunite[2)]	RT	C2/c	16.41	12.55	10.03	β = 115.5°	66B1
Neptunite[3)]	RT	Cc	16.46(1)	12.50(1)	10.01(1)	β = 115°26’	66C2
Neptunite[4)]	RT		16.48(3)	12.49(2)	10.00(2)	β = 115.4(1)°	72L1
Neptunite[5)]	15	Cc	16.436(4)	12.436(4)	9.966(3)	β = 115.63(2)°	91K1
	273	Cc	16.426(4)	12.496(3)	9.994(4)	β = 115.58(2)°	
Neptunite[6)]	110	Cc	16.430(3)	12.436(2)	9.963(2)	β = 115.60(1)°	91K1
	293	Cc	16.427(2)	12.478(2)	9.975(1)	β = 115.56(1)°	
	493	Cc	16.426(3)	12.532(2)	9.995(2)	β = 115.51(1)°	
Hellandite[7)]	RT	P2/a	18.824(4)	4.696(1)	10.248(2)	β = 111°26(1)’	72H1
Hellandite[8)]	RT	P2/a	18.911(4)	4.708(1)	10.276(2)	β = 111°31(1)’	72H1
Hellandite[9)]	RT	P2/a	18.845(5)	4.687(1)	10.269(3)	β = 111°36(1)’	72H1
Hellandite[10)]	RT	P2/a	18.99(1)	4.715(5)	10.30(1)	β = 111.4(1)°	77M1
Th-rich hellandite[11)]	RT	P2/a	19.068(8)	4.745(2)	10.289(3)	β = 111.18(3)°	99O1
Mottanaite-(Ce)[12)]	RT	P2/a	19.032(9)	4.746(3)	10.248(5)	β = 110.97(5)°	02D1
Ciprianiite[13)]	RT	P2/a	19.059(5)	4.729(4)	10.291(4)	β = 111.33(2)°	02D1
Tadzhikite[14)]	RT		17.93	4.71	10.39	β = 100°45’	70E1
Sverigeite[15)]	RT	Ibmm or Ibm2	6.818(6)	13.273(8)	10.815(8)		84D1
Sverigeite[16)]	RT	Imma	10.815(8)	13.273(8)	6.818(6)		89R1
Sörensenite[17)]	RT	C2/c orCc	18.58(7)	7.45(3)	12.05(5)	β = 98°09’	65S1
Sörensenite[18)]	RT	C2/c	20.698(17)	7.442(5)	12.037(11)	β = 117.28(6)°	76M1
Astrophyllite[19)]	RT		5.36	11.76	21.08	α = 94.9° β = 90.0° γ=103.2°	63W1
Astrophyllite[19)]	RT		5.368	11.86	21.15	α = 95.1° β = 87.6° γ=103.2°	64N1
Astrophyllite[20)]	RT	A $\bar{1}$	5.36	11.76	21.08	α = 85°08’ β = 90.0 ° γ = 103.13°	67W1
Astrophyllite[21)]	RT	A $\bar{1}$	5.365(2)	11.88(1)	21.03(2)	α = 84.87(6)° β = 92.25(5)° γ=103.01(4)°	00Y1
Astrophyllite[22)]	RT	C2	5.322(1)	23.129(5)	10.842(3)	β = 109.40(2)°	63P1, 98S1
Hydroastrophyllite[23)]	RT		11.86	11.98	5.42	α = 103°25’ β = 95°09’ γ=112°12’	74H1, 75F1
Magnesium astrophyllite[24)]	RT	A2/m	10.56	23.0	5.35	β = 102°	74H1
Magnesium astrophyllite[24)]	RT	A2/m	10.43	23.0	5.35	β = 102°	63P1

Table 3 (cont.)

Silicate	*T*	Space	Lattice parameters				Refs.
	[K]	group	*a* [Å]	*b* [Å]	*c* [Å]	α, β, γ	
Eveslogite[25)]	RT	P2/m	14.069(3)	24.937(5)	44.31(2)	γ= 95.021(4)°	03M1
Kupletskite 1A[26a)]	RT	P $\bar{1}$	5.3925(2)	11.9283(4)	11.7256(4)	α=113.044(1)° β= 94.840(1)° γ=103.064°	01P1
Kupletskite Ma2b2c[26b)]	RT	C2/c	5.4022(2)	23.226(1)	21.1782(9)	α= 90° β= 95.246(1)° γ= 90°	01P1
Niobokupletskite[27)]	RT	P $\bar{1}$	5.4303(9)	11.924(2)	11.747(2)	α= 112.927(3)° β= 94.750(3)° γ= 103.175°	00P1
Cesium kupletskite[28)]	RT	P $\bar{1}$	5.41(1)	11.74(2)	21.16(4)	α= 89° β= 90° γ= 102°23’	71E1
Niobophyllite[29)]	RT	P1 or P $\bar{1}$	5.391	11.88	11.66	α= 113.1° β= 94.5° γ=103.1°	64N1
Jinshajiangite[30)]	RT	C2/m, Cm or C2	10.732	13.847	20.817	β= 95°3’	82H1
Eudidymite[31)]	RT		12.568	7.371	13.976	β= 103°47’	63N1
Eudidymite[32)]	RT		12.62	7.37	13.99	β= 103°43’	47I1
Eudidymite[33)]	RT	C2/c	12.63(1)	7.38(1)	14.02(1)	β= 103°43(5)’	72F1
Epididymite[34)]	RT	Pnma	12.74(1)	13.63(1)	7.33(1)		70R1
$K_2Be_2Si_6O_{15}$	RT	$Cmc2_1$	7.485	15.453	11.148		76N1
Bavenite[35)]	RT	Cmcm	23.19(2)	5.005(9)	19.39(2)		66C1
Lorenzenite[1)]	RT	Pbcn	14.51	8.73	5.22		41K1
Lorenzenite[1)]	RT	Pnca	14.26	8.57	5.09		49B1
Lorenzenite[36)]	RT	Pbcn	8.66	5.18	14.42		55S1
Lorenzenite[1)]	RT	Pnca	14.518(3)	8.976(3)	5.081(5)		69C1
Lorenzenite[36)]	RT	Pbcn	8.707(3)	5.234(4)	14.492(3)		87S1
Lorenzenite[37)]	RT	Pbcn	8.7128(10)	5.2327(5)	14.487(2)		87S1
Natisite[38)]	RT	P4/nmm	6.50(1)		5.07(1)		75M1
Na_2TiSiO_5	RT	P4/nmm	6.480(1)		5.107(1)		78N1
Na_2ZrSiO_5	RT	$P2_1/c$	13.92	5.46	13.70	β= 120°	70T1
Li_2VOSiO_4	RT	P4/nmm	6.3550(9)		4.4490(9)		98R1
La_2TiSiO_5	RT	P4/nmm	6.444(3)		4.399(2)		94Z1

1) Natural sample;
2) $Na_{7.56}K_{3.80}Li_{3.88}Ca_{0.05}Mn_{5.77}Fe^{2+}_{2.15}Fe^{3+}_{0.03}Mg_{0.04}Ti_{7.75}Si_{31.45}Al_{0.66}O_{95.5}(OH,F)_{0.6}$;
3) Composition [%]: SiO_2 – 52.29, TiO_2 – 17.35, FeO – 11.92, MnO – 2.27, MgO – 1.55, CaO – 0.62, K_2O – 5.58, Na_2O – 6.81, Li_2O – 1.63;
4) $Na_{2.1}Li_{0.6}K_{0.9}Fe_{1.45}Mg_{0.38}Mn_{0.18}Ti_{2.0}Si_8O_{24}$;

Table 3 (cont.)

5) $Li_{0.93}Na_{2.00}K_{0.95}Fe_{1.60}Mg_{0.30}Mn_{0.10}Ti_{2.0}Si_{8.03}O_{24}$ – neutron diffraction;
6) Composition as [5] by X-ray analysis;
7) $(Ca_{0.64}R_{1.30}Mn_{0.03}Th_{0.01})(Si_{1.56}Al_{0.35}Fe_{0.11}B_{0.97})O_8 \cdot 1.13H_2O$ (R is a rare-earth element);
8) $(Ca_{1.02}R_{0.93}Mn_{0.05})(Si_{1.61}Al_{0.23}Fe_{0.18}B_{0.98})O_8 \cdot xH_2O$;
9) $(Ca_{0.78}R_{1.06}Mn_{0.02}Mg_{0.06}Ti_{0.02}Th_{0.02})(Si_{1.70}Al_{0.19}Fe_{0.15}B_{1.13})O_8 \cdot 0.78H_2O$;
10) $(Ca_{5.10}Mn_{0.18}Y_{3.00}R_{1.56}\square_{2.16})(Al_{1.12}Fe^{3+}_{0.89})(OH)_4[Si_8B_8O_{38.26}(OH)_{5.74}]$;
11) $(Ca_{8.21}Th_{0.77}U_{0.11}Y_{0.25}La_{0.59}Ce_{1.30}Pr_{0.15}Nd_{0.46}Sm_{0.06}Eu_{0.01}Gd_{0.04}Dy_{0.03}Er_{0.01}Yb_{0.01})(Ti_{0.41}Al_{0.83}Fe^{3+}_{0.65}Mn^{3+}_{0.02}$-$Mg_{0.13})(Si_{8.11}B_{7.98}Be_{0.98}Li_{0.49})$ on the basis of 48 (O+F);
12) $^{M3,4}Ca_4{}^{M2}[R_{1.45}Ca_{0.37}(Th,U)^{4+}_{0.17}Y_{0.01}]^{M1}(Al_{0.50}Fe^{3+}_{0.38}Mg_{0.03}Ti^{4+}_{0.07})^{T}(Be_{1.18}Li_{0.02}\square_{0.37})B_{3.99}Si_{3.98}O_{22}$-$^{O5}(O^{2-}_{1.04}F_{0.53}OH_{0.43})$;
13) $^{M3,4}Ca_4{}^{M2}[R_{0.72}(Th,U)^{4+}_{0.66}Ca_{0.60}Y_{0.02}]^{M1}(Al_{0.48}Fe^{3+}_{0.38}Ti^{4+}_{0.10}Mg_{0.05}Mn^{3+}_{0.02})^{T}(Be_{0.82}\square_{0.60}Li_{0.04})B_{4.00}Si_{4.00}O_{22}$-$^{O5}(O^{2-}_{0.97}OH_{0.54}F_{0.49})$;
14) Composition [%]: SiO_2 – 24.70; TiO_2 – 6.53; ThO_2 – 0.50; Nb_2O_5 – 0.75; R_2O_3 – 32.43; Fe_2O_3 – 1.32; MnO – 0.89; MgO – 0.42; CaO – 18.31; SrO – 0.04; Na_2O – 1.17; B_2O_3 – 12.70;
15) $Na_{4.18}Mg_{4.26}Mn^{2+}_{3.53}Fe^{2+}_{0.09}Zn_{0.31}Be_{8.23}Sn_{4.01}Si_{11.83}O_{48.77}H_{2.83}$;
16) $Na(Mn^{2+},Mg)_2Sn^{4+}[Be_2Si_3O_{12}(OH)]$;
17) Composition [%]: SiO_2 – 49.73; SnO_2 – 20.07; Nb_2O_5 – 0.75; Fe_2O_3 – 0.04; BeO – 8.02; Na_2O – 15.95; K_2O – 0.34; H_2O – 5.24;
18) $Na_4SnBe_2(Si_3O_9)_2 \cdot 2H_2O$;
19) $(Na_{1.059}K_{1.375})(Fe^{2+}_{4.695}Fe^{3+}_{1.062}Mg_{0.096}Mn_{0.634}Cu_{0.068})(Ti_{2.197}Ta_{0.047}Zr_{0.231})(Si_{7.459}Al_{0.177})O_{25.921}(OH)_{5.079}$;
20) $(K_{1.8}Na_{1.2})(Fe_{6.3}Mn_{0.7})(Ti_{1.6}Nb_{0.2}Zr_{0.1}Sn_{0.1})Si_8(O,OH)_{31}$;
21) $Na_2(K_{3.95}Ba_{0.01}Na_{0.04})(Fe^{2+}_{1.52}Fe^{3+}_{0.48})(Fe^{2+}_{2.00}Mn_{1.04}Ca_{0.76}Na_{0.20})(Fe^{2+}_{6.76}Mg_{1.24})(Ti_{3.95}Nb_{0.03}Zr_{0.02})(F_{1.20}OH_{0.80})$-$[(Si_{15.70}Al_{0.30})O_{48}]O_4(OH)_8$;
22) $(K_{1.750}Ca_{0.032})Na_{2.015}(Fe^{2+}_{2.604}Mn_{1.077})Mg_{1.851}Ti_{1.812}[(Si_{3.919}Al_{0.076})O_{12}]_2(OH)_{5.980}F_{0.072}$. In [98S1] monoclinic A2 type structure is given (a = 10.370(3) Å, b = 23.129(5) Å, c = 5.322(1) Å, β = 99.55(2)°. In table are given the data for the C2-type;
23) $(K_{0.31}Ba_{0.02})(H_3O)^+_{1.67}[Na_{0.20}Ca_{0.51}(H_3O)^+_{0.29}](Fe^{3+}_{3.48}Mn^{4+}_{0.44}Mn^{2+}_{1.30}Mg_{0.14})(Ti_{1.38}Nb_{0.43}Ta_{0.04})$-$(Si_{4.92}Al_{0.88}O_{17.40})(OH)_{6.80}(O_{2.61}(OH)_{3.29}F_{1.10})$;
24) $Na_{2.15}K_{1.96}(Fe^{3+}_{0.46}Fe^{2+}_{3.08}Mn_{0.70}Ca_{0.25})Mg_{1.96}Ti_{1.88}(Al_{0.27}Si_{7.81}O_{24})[O_{1.98}(OH)_{1.02}]$-$[(OH)_{3.70}F_{0.30}]$;
25) $(Ca_{22.60}K_{12.32}Na_{10.08}Sr_{1.80}Ba_{1.28}Rb_{0.16})(Ti_{5.56}Nb_{3.36}Mn_{0.96}Fe^{2+}_{0.84}Fe^{3+}_{0.20}Zr_{0.20}Ta_{0.08})(Si_{47.5}Al_{0.44})$-$[O_{139.36}(OH)_{20.64}F_{9.76}Cl_{0.80}]$;
26a) $(K_{1.67}Rb_{0.07}Sr_{0.03}Ba_{0.01}Na_{0.02})(Na_{0.65}Ca_{0.33})(Mn_{5.15}Na_{0.44}Mg_{0.64}Fe^{2+}_{0.77}Ce_{0.01})(Ti_{1.90}Nb_{0.08})(Si_{8.03}Al_{0.06})$-$O_{26}(OH)_{4.20}F_{0.81}$;
26b) $(K_{1.77}Rb_{0.07}Sr_{0.03}Ba_{0.05})(Na_{0.52}Ca_{0.31})(Na_{0.38}Mg_{0.47}Mn_{4.07}Fe^{2+}_{2.06}Ce_{0.02})(Ti_{1.78}Nb_{0.24})(Si_{7.76}Al_{0.28})O_{26}(OH)_{4.23}F_{0.78}$;
27) $(K_{1.84}Rb_{0.13}Cs_{0.01})Na_{0.95}(Mn_{5.40}Zn_{0.73}Fe_{0.53}Na_{0.28}Mg_{0.05})(Nb_{1.33}Zr_{0.40}Ti_{0.24}Ta_{0.04})(Si_{7.71}Al_{0.32})O_{26}(OH)_4(O_{0.89}F_{0.11})$;
28) $(Cs_{1.22}K_{0.35}Na_{1.14}Ca_{0.09})(Mn_{3.99}Fe^{2+}_{2.00}Fe^{3+}_{0.55}Li_{0.44})(Ti_{1.49}Nb_{0.54}Zr_{0.12})(Si_{7.92}Al_{0.15})O_{24}(O_{3.69}(OH)_{2.35}F_{0.96})$;
29) $(Na_{1.079}K_{1.572}Ca_{0.173}R_{0.123})(Fe_{4.439}Mg_{0.053}Mn_{1.862})(Ti_{0.494}Nb_{1.492}Ta_{0.032})(Si_{7.467}Al_{0.235})O_{25.246}F_{0.325}(OH)_{5.429}$;
30) $(Na_{3.36}K_{1.62})(Ba_{2.11}Ca_{1.73}R_{0.09}Sr_{0.02})(Fe^{2+}_{8.77}Mn^{2+}_{6.02}Mg_{0.23})(Ti_{6.57}Nb_{0.26}Zr_{0.18}Al_{0.12}Ta_{0.01})(Si_{14.90}Al_{0.11})O_{64.17}$-$(F_{4.62}OH_{1.21})$;
31) $Na_{0.97}K_{0.02}Be_{1.0}Si_{3.01}O_{7.01}(OH)_{0.99}$;
32) $Na_{1.0}Be_{1.09}Si_{2.93}O_{6.94}(OH)_{1.04}$;
33) $Na_2Be_2Si_6O_{15} \cdot H_2O$;
34) $HNaBeSi_3O_8$;
35) $Ca_4(BeOH)_{2+x}Al_{2-x}Si_9O_{26-x}$ ($0.10 \le x \le 0.84$);
36) $Na_2Ti_2Si_2O_9$ synthetic;
37) $Na_2Ti_2Si_2O_9$ single crystal ;
38) $Na_{1.99}(Ti_{0.99}Mn_{0.01}Fe_{0.01}Nb_{0.01})Si_{1.01}O_5$;
39) Natural sample (California);
40) $(Na_{0.880}K_{1.353}Ca_{0.572}Ba_{0.013})Fe_{1.647}Mg_{0.727}Mn_{4.602}(Ti_{1.808}Nb_{0.150}Zr_{0.061})(Si_{7.012}Al_{0.335})O_{25.131}F_{0.409}(OH)_{5.460}$.

Table 4. Data obtained by ^{57}Fe NGR [97L1].

Silicate	T [K]	Site	δ [1)] [mm/s]	ΔQ [mm/s]	DH [mm/s]	A [%]	β [°]
Neptunite[2)]	293	Fe2(Fe^{2+})	1.15(2)	2.43(5)	0.30(3)	49.4	58(1)[3)]
single crystal		Fe1(Fe^{2+})	1.14(2)	2.72(5)	0.250(1)	46.6	59(2)
k ‖ ***b****		Ti2(Fe^{3+})	0.3(2)	0.28(x)[2)]	0.25(1)	4.0	41(x)[2)]
	400	Fe2(Fe^{2+})	1.07(2)	2.13(5)	0.31(2)	49.4	65(2)
		Fe1(Fe^{2+})	1.05(2)	2.60(6)	0.260(2)	46.6	52(1)
		Ti2(Fe^{3+})	0.2(2)	0.64(x)	0.20(1)	4.0	90(x)
Neptunite	400	Fe2(Fe^{2+})	1.065(7)	2.09(3)	0.29(2)	49.4	
(polycrystal)		Fe1(Fe^{2+})	1.053(8)	2.56(3)	0.22(2)	46.6	
		Ti2(Fe^{3+})	0.11(5)	0.45(x)	0.40(2)	4.0	

1) relative to α-Fe;
2) when the error exceeds the parameter value, an x is marked instead;
3) β is the angle between the ***k***-vector of the incident γ-rays (≅ ***b***) and V_{zz}.

Table 5. Data obtained by the NMR method [90S1].

Sample	Nucleus	Site	δ [1)] [ppm]	DH [Hz]	Remarks
Sörensenite	^{119}Sn		–706	430	Static linewidth 6 kHz
$Na_4SnBe_2(Si_3O_9)_2 \cdot 2H_2O$					
	^{1}H		+5.1	≅1200	
	^{23}Na		–8.9 doublet –20.0	≅1000	Second doublet not resolved in the MAS spectrum
	^{29}Si	Si1	–86.6	50	Relative intensities 1:1:1
		Si3	–88.6	50	
		Si2	–97.0	35	
	^{9}Be		–2.5		

1) Chemical shifts are given with respect to external dilute aqueous $BeSO_4$(^{9}Be), dilute aqueous NaCl(^{23}Na), MeSi(^{1}H, ^{29}Si) and Me_4Sn(^{119}Sn).

Table 6. Refractive indices[1)]

Silicate	n_α	n_β	n_γ	$2V^o$		Refs.
Neptunite[4)]	1.692(1)	1.702(1)	1.734(2)	40°	biaxial, positive	72L1
Neptunite[39)]	1.690	1.699	1.736	49°		34L1
Hellandite[7)]	1.656(2)	1.662(2)	1.668(2)	87°		72H1
Tadzhikite[14)]	1.750		1.763	80°…92°		70E1
Sverigeite[15)]	1.678(4)	1.684(4)	1.699(4)	67(4)°	biaxial, positive	84D1
Sörensenite[17)]	1.576(1)	1.581(1)	1.584(1)	76(5)°	biaxial, negative	65S1
Astrophyllite[19)]	1.676…1.691	1.703… 1.726	1.731… 1.758	70°…88°	biaxial, positive	61F1, 64N1
Astrophyllite[22)]	1.660(2)	1.702(2)	1.725(2)	75°	biaxial, negative	98S1
Hydroastrophyllite[23)]	1.660	1.720	1.728	40°	biaxial, negative	74H1, 75F1
Magnesium astrophyllite[24)]	1.658	1.687 (calc.)	1.710	81.5°…83°	biaxial, negative	74H1
Eveslogite[25)]	1.631(2)	1.641(2)	1.647(2)	$82(2)^0$	biaxial, negative	03M1
Niobokupletskite[27)]	1.718(1)	1.733(1)	1.750(calc.)	$87(2)^0$	biaxial, positive	00P1
Kupletskite[40)]	1.656	1.699	1.731	79°	biaxial, negative	56S1
Cesium kupletskite[28)]	not given	1.726	1.758	75°	biaxial, positive	71E1
Niobophyllite[29)]	1.724	1.760	1.772	60°	biaxial, negative	64N1
Jinshajiangite[30)]	1.729	1.802	1.852	72°	biaxial, positive	82H1
Eudidymite[31)]	1.544	1.545	1.549	23°	biaxial, positive	63N1
Eudidymite[32)]	1.545	1.546	1.551	30°	biaxial, positive	63N1
Natisite[38)]	1.756(2)(ω)		1.680(2)(ε)		uniaxial, negative	75M1
Na_2ZrSiO_5	1.742(3)	1.755(3)	1.742(3)		biaxial, positive	70T1

1) Compositions according to Table 3.