Tables and figures

Table 1. Silicates from milarite group[1)] [91N1] (cyclosilicates group VIIIC10).

Silicate	Composition
Armenite	$BaCa_2[Al_6Si_9O_{30}] \cdot 2H_2O$
Brannockite	$KSn_2[Li_3Si_2O_{30}]$
Chayesite	$K(Mg,Fe^{2+})_2[(Mn,Fe^{2+})_2Fe^{3+}Si_{12}O_{30}]$
Darapiosite	$KNa_2Zr[Li(Mn,Zn)_2Si_{12}O_{30}]$
Eifelite	$KNa_3Mg[Mg_3Si_{12}O_{30}]$
Merrihueite	$(K,Na)_2(Fe,Mg)_2[(Fe,Mg)_3Si_{12}O_{30}]$
Milarite	$KCa_2[AlBe_2Si_{12}O_{30}] \cdot H_2O$
Osumilite	$(K,Na)(Fe,Mg)_2[(Al,Fe)_3(Si,Al)_{12}O_{30}]$
Osumilite-Mg	$(K,Na)(Mg,Fe)_2[(Al,Fe)_3(Si,Al)_{12}O_{30}]$
Poudretteite	$KNa_2[B_3Si_{12}O_{30}]$
Roedderite	$(Na,K)_2(Mg,Fe)_2[(Mg,Fe)_3Si_{12}O_{30}]$
Sogdianite [99C1]	$[\square,Na]_2K(Zr,Ti^{4+},Fe^{3+},Al)_2[Li_3Si_2O_{30}]$
Sugilite	$(Na,K)_3(Fe^{3+},Mn,Al)_2[Li_3Si_{12}O_{30}]$
Yagiite	$(Na,K)_{1.5}Mg_2[(Al,Mg,Fe)_3(Si,Al)_{12}O_{30}]$
Synthetic silicates of milarite type	$A_xM_3M'_2Si_{12}O_{30}$ with M = $Mg^{2+},Zn^{2+},Cu^{2+},Li^+$ and M′ = Mg^{2+},Cu^{2+},Fe^{2+}; $MMg_2Al_6Si_9O_{30}$ with M = Sr,Ba; $Mg_2Al_4Si_{11}O_{30}$; $K_2Mg_5Si_{12}O_{30}$ etc (see Table 3)

1) In [99C1] two other members of Li-bearing members of the milarite group were mentioned: berezanskite and dusmatovite. For compositions see Table 5.

Table 2. Atomic sites and thermal parameters.

a) Milarite[9)], having hexagonal structure (at room temperature), space group P6/mcc [80C1].

Site	Equipoint	Atomic coordinates			B_{eq}
		x	*y*	*z*	[Å^2]
A	4c	1/3	2/3	1/4	1.90(4)
B	4d	1/3	2/3	0	1.91(2)
C	2a	0	0	1/4	1.48(5)
T1	24m	0.0819(1)	0.3359(1)	0.11244(7)	0.66(2)
T2	6f	0	1/2	1/4	0.35(6)
O1	12l	0.0951(5)	0.3828(5)	0	1.46(7)
O2	24m	0.1953(3)	0.2758(7)	0.1345(2)	1.37(5)
O3	24m	0.1153(3)	0.4722(3)	0.1808(2)	0.90(4)

9) See Table 4.

Table 2 (cont.)

b) Sugilite[34)], having P6/mcc type structure [88A3].

Site	Occupation	Atomic coordinates			B_{eq}
		x	*y*	*z*	[Å^2]
A	83% Fe, 17% Al	1/3	2/3	¼	0.412(7)
B’	49% Na	½	2/3	0.0134(7)	1.7(1)
C	K	0	0	¼	1.52(1)
T2	Li	½	½	¼	1.44(7)
T1	Si	0.23633(5)	0.35620(5)	0.38678(3)	0.566(7)
O1		0.1383(2)	0.3972(2)	0	1.36(3)
O2		0.2232(2)	0.2774(2)	0.13775(9)	1.24(2)
O3		0.1665(1)	0.5091(1)	0.17032(8)	0.92(2)

c) Osumilite, $BaMg_2Al_6Si_9O_{30}$, having hexagonal structure (at room temperature), space group P6/mcc [95W1].

Site	Atomic coordinates			B_{eq}
	x	*y*	*z*	[Å^2]
A(Mg)	1/3	2/3	1/4	0.53(5)
C(Ba)	0	0	1/4	1.847(6)
T1(Si,Al)	0.10461(6)	0.35270(6)	0.10916(3)	0.629(6)
T2(Al)	1/2	1/2	1/4	0.53(1)
O1	0.1205(3)	0.4016(3)	0	1.41(4)
O2	0.2134(2)	0.2807(2)	0.1367(1)	1.86(3)
O3	0.1386(2)	0.4951(2)	0.17939(9)	0.90(2)

d) Roedderite[30)], having space group $P\bar{6}2c$, at 300 K [89A1].

Site	Population	Atomic coordinates			B_{eq}
		x	*y*	*z*	[Å^2]
A	0.95 Mg + 0.05 Fe	1/3	2/3	0.5035(2)	0.70(1)
T2		0.4969(2)	0	0	0.68(1)
B1′	0.46(1) Na	1/3	2/3	0.2713(3)	1.9(1)
B2′	0.05(1) Na	1/3	2/3	0.7713[a)]	1.9[a)]
C	0.94(1) K	0	0	0	1.59(1)
T1		0.2390(1)	0.3535(1)	0.64031(6)	0.436(5)
T11	Si	–0.2356(1)	–0.3513(1)	0.63996(6)	0.44[a)]
O1		0.1427(5)	0.3994(5)	0.25	1.22(3)
O11		–0.1217(4)	–0.3916(5)	0.25	1.22[a)]
O2		0.2147(2)	0.2713(3)	0.3862(2)	1.13(2)
O22		–0.2235(2)	–0.2819(3)	0.3807(2)	1.13[a)]
O3		0.1588(3)	0.4990(2)	0.4204(2)	0.76(1)
O33		–0.1534(3)	–0.4959(3)	0.4229(2)	0.76[a)]

[a)] Constrained parameters.
[30)] See Table 4.

Table 2 (cont.)

e) Armenite[2)], refined in space group Pnc2 [99A1].

Site	Atomic coordinates			B_{eq}
	x	*y*	*z*	[Å^2]
Ba	0.25003(7)	0.75472(3)	0.06890(6)	1.165(6)
Ca1	0.4182(1)	0.2475(2)	0.0516(3)	1.11(1)
Ca2	0.0825(1)	0.2536(2)	0.0931(2)	1.11(1)
T_d1Si	0.2956(1)	0.4581(3)	0.2070(2)	0.36(5)[b)]
T_d2Al	0.1302(2)	–0.0512(3)	–0.2970(2)	0.70(5)[b)]
T_d3Si	0.5830(2)	0.3321(3)	0.2066(2)	0.49(5)[b)]
T_d4Si	0.2081(2)	0.0460(3)	0.2103(3)	0.77(5)[b)]
T_d5Al	0.3722(2)	0.9560(2)	0.2081(2)	0.49(5)[b)]
T_d6Si	0.0857(2)	0.6609(3)	–0.2940(2)	0.54(5)[b)]
T_d7Al	0.5889(2)	0.3328(3)	0.4352(3)	0.62(5)[b)]
T_d8Al	0.0851(2)	0.6725(3)	–0.0662(3)	0.64(5)[b)]
T_d9Si	0.2890(2)	0.4547(3)	0.4313(3)	0.42(5)[b)]
T_dASi	0.1252(2)	0.5325(3)	0.4324(2)	0.61(5)[b)]
T_dBSi	0.3721(1)	0.9602(2)	0.4370(2)	0.44(4)[b)]
T_dCSi	0.2090(2)	0.4597(3)	–0.0622(3)	0.72(5)[b)]
T_c1Al	0.2511(3)	0.2530(1)	0.0719(3)	0.48(2)[b)]
T_c2Al	0	0	0.0659(4)	0.33(7)[b)]
T_c3Si	0	1/2	0.0674(4)	0.34(7)[b)]
T_c4Si	1/2	0	0.0747(4)	0.82(8)[b)]
T_c5Al	1/2	1/2	0.0746(4)	0.78(8)[b)]
O11	0.3851(4)	0.9925(8)	0.3276(4)	1.0(2)[b)]
O12	0.2941(5)	0.4229(9)	0.3191(5)	1.3(2)[b)]
O13	0.1077(4)	–0.0104(7)	–0.1780(4)	1.0(2)[b)]
O14	0.4415(4)	0.6622(8)	0.3188(5)	1.1(2)[b)]
O15	0.2049(5)	0.0820(8)	0.3245(5)	1.1(2)[b)]
O16	0.9397(5)	0.1609(8)	0.3166(5)	1.2(2)[b)]
O21	0.2079(3)	0.4973(5)	0.4604(5)	1.0(1)[b)]
O22	0.1249(1)	0.7918(6)	–0.3221(5)	1.3(1)[b)]
O23	0.1152(3)	0.8234(6)	–0.0376(5)	1.1(1)[b)]
O24	0.3564(3)	0.5622(5)	0.1863(4)	1.1(1)[b)]
O25	0.3380(3)	0.9270(5)	–0.0399(4)	1.0(1)[b)]
O26	0.1464(3)	0.9455(5)	0.1867(4)	1.1(1)[b)]
O27	0.3807(3)	0.7995(5)	0.1792(5)	0.8(1)[b)]
O28	0.2195(3)	0.5204(5)	0.1741(5)	0.8(1)[b)]
O29	0.2907(3)	0.4994(6)	–0.0353(5)	1.2(1)[b)]
O210	0.2831(3)	0.9818(6)	0.1796(5)	1.2(1)[b)]
O211	0.3784(3)	0.6875(6)	–0.0349(5)	1.0(1)[b)]
O212	0.1604(3)	0.5806(5)	–0.0386(4)	0.77(9)[b)]
O31	0.0700(4)	0.4677(7)	0.1324(5)	0.9(1)[b)]
O32	0.0718(3)	0.4439(6)	–0.5030(5)	0.7(1)[b)]
O33	0.1925(4)	0.1708(7)	0.1470(6)	0.7(1)[b)]
O34	–0.0183(4)	0.1294(7)	0.1362(6)	1.2(2)[b)]
O35	0.1876(4)	0.3388(7)	0.0042(6)	0.8(1)[b)]
O36	–0.0113(4)	0.3736(7)	0.0046(6)	1.3(2)[b)]
O37	0.4832(3)	0.8764(6)	0.0086(5)	0.4(1)[b)]
O38	0.4871(3)	0.6373(6)	0.1404(5)	0.2(1)[b)]
O39	0.3119(4)	0.3350(7)	0.1419(6)	0.8(1)[b)]

Table 2 (cont.)

Site	Atomic coordinates			B_{eq}
	x	*y*	*z*	[Å^2]
O310	0.3069(4)	0.3352(7)	0.4989(6)	0.8(1)[b)]
O311	0.4311(3)	0.0444(6)	0.1370(5)	0.9(1)[b)]
O312	0.4258(4)	0.0405(7)	0.5061(5)	0.9(1)[b)]
W1	0.4252(5)	0.2516(7)	0.3738(6)	2.0(2)[b)]
W2	0.0725(5)	0.2635(8)	0.2683(8)	2.8(2)[b)]
CC[c)]	0.255(3)	0.753(7)	–0.195(4)	1.58[b)]

b) Atoms refined isotropically. T_c represents ring-connecting tetrahedra. T_d are double-ring tetrahedra;
c) The CC site is occupied by 0.11(1) O.
For footnotes [2),9),30),34)] see Table 4.

Table 3. Site occupancies in some milarite group silicates [80C1, 91H1].

Site	Equipoint	Site symmetry	CN[a)]	Occupancies
T1	24m	1	4	Si, Al
T2	6f	222	4	Li, Be, B, Mg, Al, Si, Mn^{2+}, Zn
A	4c	32	6	Al, Fe^{3+}, Sn^{4+}, Mg, Zr, Fe^{2+}, Ca, Na, Y, R[b)]
B	4d	$\bar{6}$	9	Na, H_2O, □, Ca (?), K (?)
C[c)]	2a	62	12	K, Na, Ba, □, Ca (?)
D	2b	6/m	18	□, ?

a) Coordination;
b) Rare-earth element;
c) In [95W1] osumilites were prepared with C site occupied by M = Ba,Sr in $MMg_2Al_6Si_9O_{30}$ osumilites and empty in $Mg_2Al_4Si_{11}O_{30}$ osumilites.

Table 4. Crystal structures and lattice parameters.

Silicate	*T* [K]	Space group	Lattice parameters [Å] *a*	*b*	*c*	Refs.
Armenite[1)] pseudohexagonal (average structure)	RT	P6/mcc	10.69		13.90	60T1,75B1
Armenite[2)]	RT	Pnna	13.874(2)	18.660(2)	10.697(1)	92A1
Armenite[2)]	RT	Pnc2	18.660(2)	10.697(1)	13.874(2)	99A1
Brannockite[3)]	RT	P6/mcc	10.002(2)		14.263(3)	88A1,88A3
Chayesite[4)]	RT	P6/mcc	10.153(4)		14.388(6)	89V1
Darapiosite[5)]	RT	P6/mcc	10.32		14.39	75S1
Eifelite[6)]	RT	P6/mcc	10.137(5)		14.223(6)	83A1
Merrihueite[7)]	RT	P6/mcc	10.222(2)		14.152(2)	72K1
Merrihueite[8)]	RT	P6/mcc	10.16(6)		14.32(6)	65D1
Milarite[9)]	RT	P6/mcc	10.420(2)		13.810(9)	80C1
Milarite[10)]	RT	P6/mcc	10.428(6)		13.675(9)	80C1

Table 4 (cont.)

Silicate	*T* [K]	Space group	Lattice parameters [Å] *a*	*b*	*c*	Refs.
Milarite[11)]	RT	P6/mcc	10.417(5)		13.688(7)	80C1
Milarite[12)]	RT	P6/mcc	10.40		13.80	64C1, 75B1
Milarite[13)]	RT	P6/mcc	10.410(1)		13.845(3)	91H1
Milarite[14)]	RT	P6/mcc	10.404(4)		13.825(5)	91H1
Milarite[15)]	RT	P6/mcc	10.415(3)		13.763(5)	91H1
Milarite[16)]	RT	P6/mcc	10.396(1)		13.781(4)	91H1
Milarite[17)]	RT	P6/mcc	10.342(2)		13.777(6)	91H1
Milarite[18)]	RT	P6/mcc	10.340(1)		13.758(2)	91H1
Osumilite[19)]	RT	P6/mcc	10.086		14.325	88A3
Osumilite[20)]	RT	P6/mcc	10.150(2)		14.286(2)	88A3
Osumilite[21)]	RT	P6/mcc	10.071(2)		14.303(2)	88A3
Osumilite[22)]	RT	P6/mcc	10.155(1)		14.284(4)	69B1
Osumilite[23)]	RT	P6/mcc	10.17		14.34	53M1, 56M1
Osumilite[24)]	RT	P6/mcc	10.078(2)		14.317(6)	62S1
Osumilite[25)]	RT	P6/mcc	10.0912(5)		14.336(1)	82G1
Osumilite[26)]	RT	P6/mcc	10.1037(8)		14.329(2)	82G1
Osumilite[27)]	RT	P6/mcc	10.087(2)		14.333(5)	81O1
Osumilite (synthetic) ($BaMg_2Al_6Si_9O_{30}$)	RT	P6/mcc	10.129(2)		14.340(2)	95W1
Osumilite (synthetic) ($SrMg_2Al_6Si_9O_{30}$)	RT	P6/mcc	10.1273(5)		14.2274(8)	95W1
Osumilite (synthetic) ($Mg_2Al_4Si_{11}O_{30}$)	RT	P6/mcc	10.058(2)		14.336(3)	95W1
Osumilite-Mg[28)]	RT	P6/mcc	10.078(2)		14.319(2)	88A2
Poudretteite[29)]	RT	P6/mcc	10.239(1)		13.485(3)	87G1
Roedderite[30)]	100	$P\bar{6}2c$	10.139(3)		14.269(4)	89A1
Roedderite[30)]	300	$P\bar{6}2c$	10.141(2)		14.286(3)	89A1
Sogdianite[31)]	RT	P6/mcc	10.09		13.98	68D1
Sogdianite[32)]	RT	P6/mcc	10.083(5)		14.24(1)	75B1
Sogdianite[33)]	RT	P6/mcc	10.053(1)		14.211(2)	99C1
Sugilite[34)]	RT	P6/mcc	10.009(2)		14.006(3)	88A3
Sugilite[35)]	RT	P6/mcc	10.007		14.000	76K1
Yagiite[36)]	RT	P6/mcc	10.09(1)		14.29(3)	69B2
$K_2Mg_5Si_{12}O_{30}$	RT	P6/mcc	10.21_1		14.15_2	80N1
$K_2Mg_3Mg_2Si_{12}O_{30}$	RT	P6/mcc	10.222(2)		14.152(2)	72K1
$K_2Mg_3Cu_2Si_{12}O_{30}$	RT	P6/mcc	10.16_9		14.18_2	80N1
$K_2Mg_3Fe_2Si_{12}O_{30}$	RT	P6/mcc	10.22_0		14.17_6	80N1
$K_2Mg_3Zn_2Si_{12}O_{30}$	RT	P6/mcc	10.19_9		14.14_5	80N1
$Na_2Mg_5Si_{12}O_{30}$	RT	P6/mcc	10.15_1		14.22_8	80N1
$Na_2Mg_3Cu_2Si_{12}O_{30}$	RT	P6/mcc	10.09_6		14.25_0	80N1
$Na_2Mg_3Fe_2Si_{12}O_{30}$	RT	P6/mcc	10.15_5		14.25_9	80N1
$Na_2Mg_3Zn_2Si_{12}O_{30}$	RT	P6/mcc	10.14_5		14.21_6	80N1
$NaKMg_5Si_{12}O_{30}$	RT	P6/mcc	10.15_2		14.28_0	80N1
$NaKMg_3Cu_2Si_{12}O_{30}$	RT	P6/mcc	10.08_8		14.30_2	80N1
$RbNaMg_5Si_{12}O_{30}$	RT	P6/mcc	10.13_5		14.37_6	80N1
$RbNaMg_3Cu_2Si_{12}O_{30}$	RT	P6/mcc	10.07_2		14.42_6	80N1
$RbNaMg_3Fe_2Si_{12}O_{30}$	RT	P6/mcc	10.13_1		14.40_8	80N1
$K_3Mg_4LiSi_{12}O_{30}$	RT	P6/mcc	10.25_3		14.04_0	80N1
$Na_3Mg_4LiSi_{12}O_{30}$	RT	P6/mcc	10.15_5		14.15_8	80N1

1) Natural sample corresponding to formula $BaCa_2Al_6Si_9O_{30}(H_2O)_2$;
2) Natural sample, Rémigny, Quebec, Canada;
3) Natural sample from Foot Mine, North Carolina, having the end-member composition $KSn_2Li_3Si_{12}O_{30}$ [73W1];
4) $(K_{1.14}Na_{0.10})(Mg_{3.29}Fe^{2+}{}_{0.67}Mn_{0.04})(Fe^{3+}{}_{0.64}Fe^{2+}{}_{0.29}Al_{0.04}Ti_{0.03})Si_{12.00}O_{30.00}$;
5) $(K_{1.23}Na_{1.08}Ca_{0.11}Li_{0.58})Li_{0.73}(Zn_{1.10}Mn_{1.31})(Zr_{0.46}Fe_{0.26}Nb_{0.07})Si_{12}(O,OH)_{30}$;
6) $KNa_2Mg_{4.5}Si_{12}O_{30}$;
7) Natural sample;
8) $(K_{0.94}Na_{0.76}Ca_{0.06})(Fe_{3.85}Mg_{1.27}Mn_{0.08}Al_{0.04})Si_{12}O_{30.11}$;
9) Natural sample, King Mountain; $Ca_{4.00}K_{2.00}(Na_{0.12}Ca_{0.15}H_2O_{1.85})Si_{23.88}Al_{1.86}Be_{4.23}O_{30}$;
10) Natural sample, Vezna, $Ca_{4.00}K_{2.00}(Na_{0.49}K_{0.33}Ca_{0.03}H_2O_{2.24})Si_{24.07}Al_{0.89}Be_{5.08}O_{30}$;
11) Natural sample, Vezna; composition not mentioned;
12) $Ca_2K(Be_{2.3}Al_{0.7})Si_{12}O_{29.7}(OH)_{0.3}(H_2O)_{0.70}$;
13) $Ca_{2.03}K_{1.05}Na_{0.06}Mn_{0.04}Al_{1.11}Be_{2.06}Si_{11.83}O_{30}(H_2O)_{1.20}$;
14) $Ca_{1.96}K_{1.07}Na_{0.17}Y_{0.03}Al_{0.87}Be_{2.19}Si_{11.95}O_{30}(H_2O)_{1.29}$;
15) $Ca_{1.67}K_{0.86}Na_{0.62}Al_{1.38}Be_{1.72}Si_{11.90}O_{30}(H_2O)_{1.65}$;
16) $Ca_{2.08}K_{0.96}Na_{0.16}Mn_{0.02}Al_{0.67}Be_{2.33}Si_{12.00}O_{30}(H_2O)_{1.68}$;
17) $Ca_{1.42}K_{1.05}Na_{0.05}Y_{0.47}Al_{0.30}Be_{2.61}Si_{12.09}O_{30}$;
18) $Ca_{1.15}K_{1.06}Na_{0.02}Y_{0.62}Al_{0.05}Be_{2.82}Si_{12.13}O_{30}$;
19) Natural sample, Antarctica;
20) Natural sample, Hayasaki;
21) Natural sample, Eifel B93;
22) $(Ca_{0.005}Na_{0.31}K_{0.78})(Mg_{0.92}Fe_{0.92}Mn_{0.16})(Si_{10.22}Al_{4.41}Fe^{3+}{}_{0.37})O_{30}\cdot H_2O$;
23) Natural sample, Osumi province: $(K,Na,Ca)_{0.98}(Fe,Mg)_{2.00}(Mg,Al,Mn)_{2.95}(Si,Al)_{12}O_{30}$;
24) Natural sample;
25) $Na_{0.01}Ca_{0.01}Mg_{1.725}Mn_{0.003}Fe_{0.136}Al_{0.272}Ti_{0.002}Si_{1.861}O_6$;
26) $Na_{0.09}K_{0.925}Ca_{0.018}Ba_{0.010}Mg_{1.882}Mn_{0.003}Fe_{0.380}Ti_{0.013}Al_{2.743}Si_{10.120}Al_{1.880}O_{30}$;
27) $KMg_2(Al_{2.75}Mg_{0.25})(Al_{1.75}Si_{10.25})O_{30}$;
28) Natural sample, $(K,Na)(Mg,Fe)_2[(Al,Fe)_3(Si,Al)_{12}O_{30}]$;
29) $K_{1.00}(Na_{1.87}K_{0.04})B_{3.05}Si_{12.14}O_{30}$;
30) $Na_{1.15}K_{1.0}(Mg_{4.66}Fe_{0.12}Mn_{0.10}Ti_{0.01})Si_{12}O_{30}$;
31) $K_{1.1}Na_{0.9}Li_{2.6}Fe^{2+}{}_{0.2}Fe^{3+}{}_{0.2}Al_{0.2}Ti_{0.4}Zr_{0.8}Si_{12}O_{30}$;
32) $K(Na_{0.95}K_{0.05})(Zr_{0.8}Fe^{3+}{}_{0.6}Ti_{0.4}Fe^{2+}{}_{0.2})(Li_{2.55}Al_{0.15}\square_{0.30})Si_{12}O_{30}$;
33) $K(\square_{1.15}Na_{0.85})(Zr_{0.76}Ti^{4+}{}_{0.38}Fe^{3+}{}_{0.73}Al_{0.13})[Li_3Si_{12}O_{30}]$;
34) $K_{1.00}Na_{1.96}(Fe,Mn)_{1.66}Al_{0.34}Li_{3.00}Si_{12}O_{30}$;
35) $^{C}(K_{0.81}Na_{0.19})^{B}(H_2O_{0.91}Na_{0.64})_2{}^{A}(Fe^{3+}_{1.32}Na_{0.59}Ti_{0.06}Fe^{2+}_{0.03})_2{}^{T2}(Li_{2.12}Al_{0.59}Fe^{3+}{}_{0.29})_3Si_{12}O_{30}$;
36) $K_{0.30}Na_{1.20}Mg_{2.00}(Mg_{0.60}Fe_{0.34}Ti_{0.10}Al_{1.96})(Si_{10.22}Al_{1.78})O_{30}$;
37) $^{[12]}(Na_{0.10}K_{0.89}Fe^{2+}{}_{0.37})^{[6]}(Mg_{1.43}Fe^{2+}{}_{0.53}Mn_{0.01})^{[4]}(Al_{2.66})^{[4]}(Si_{10.3}Al_{1.70})O_{30}$;
38) Osumilite[37)] heated at 813°C, 15 h;
39) $^{[12]}(Na_{0.06}K_{0.69}Fe^{2+}{}_{0.10})^{[6]}(Mg_{0.75}Fe^{2+}{}_{1.01}Fe^{3+}{}_{0.06}Ti_{0.01}Mn_{0.17})^{[4]}(Al_{2.66}Fe^{3+}{}_{0.23})^{[4]}(Si_{10.3}Al_{1.70})O_{30}$;
40) $K_{1.15}Na_{0.05}Ca_{2.09}Al_{0.63}Be_{2.37}Si_{12}O_{30}\cdot 0.6H_2O$;
41) $K_{1.10}Na_{0.16}Ca_{2.00}Mn_{0.02}Al_{0.66}Be_{2.34}Si_{12}O_{30}\cdot 0.77H_2O$;
42) Natural sample, Wasenalp, Valais, Switzerland;
43) Natural sample, Rémigny, Quebec, Canada;
44) $Na_2Mg_5Si_{12}O_{30}$;
45) $K_{0.93}Na_{0.09}Ca_{0.02}Ba_{0.01}Mg_{1.88}Fe_{0.38}Ti_{0.01}Al_{4.62}Si_{10.12}O_{30}$;
46) Composition [wt %]: 60.6-SiO_2; 22.0-Al_2O_3; 3-MgO; 9.4-FeO; 1.0-MgO; 0.7-Na_2O; 3.2-K_2O (total iron was reported as FeO);
47) Natural sample, Foot Mine;
48) Natural crystal; composition close to sample[6)].

Table 5. Endmember formulae for the Li-bearing members of the milarite group [99C1].

Silicate	A[a)]	B[a)]	C	T2[b)]	T1[c)]
Brannockite	Sn^{4+}	□	K	Li	Si
Berezanskite	Ti^{4+}	□	K	Li	Si
Sogdianite	Zr^{4+}	□	K	Li	Si
Sugilite	Fe^{3+}	Na	K	Li	Si
Darapiosite	Mn^{2+}	Na	K	Zn_2Li_1	Si
Dusmatovite	Mn^{2+}	K	K	Zn_2Li_1	Si

[a)] Multiplicity of 2; [b)] Multiplicity of 3; [c)] Multiplicity of 12.

Table 6. Data obtained from ^{57}Fe NGR spectra.

Sample[02)]	T [K]	Site	δ[1)] [mm/s]	ΔQ [mm/s]	DH [mm/s]	A [%]	Refs.
Osumilite[37)]	RT	Fe^{2+}	1.20	2.35	0.42	68	78G1, 82G1
		Fe^{2+}	1.14	1.86	0.42	32	
Osumilite[37)]	RT	Fe^{2+}	1.21	2.41	0.38	53	78G1
		Fe^{2+}	1.16	2.03	0.38	35	
		Fe^{2+}	1.17	1.48	0.38	12	
Osumilite[38)]	RT	Fe^{2+}	1.22	2.34	0.34	51	78G1
		Fe^{2+}	1.19	1.88	0.34	30	
		Fe^{2+}	1.26	1.41	0.34	19	
Osumilite[39)]	RT	Fe^{2+}	1.19	2.33	0.33	45	78G1
		Fe^{2+}	1.20	1.86	0.33	20	
		Fe^{2+}	1.21	1.40	0.33	15	
		Fe^{3+} (tetr.)	0.25	1.71	0.33	16	
		Fe^{3+} (oct)	0.40	0.60	0.33	4	
Osumilite[26)]	RT	Fe^{2+}	1.19(3)	2.33(3)	0.45(2)	61(5)	82G1
		Fe^{2+}	1.13(3)	1.70(3)	0.45(2)	34(2)	
		Fe^{3+}	0.42(4)	0.73(4)	0.45(2)	5(2)	

[1)] Relative to α-Fe; [2)] For footnotes (composition) of the samples see Table 4.

Table 7. ^{29}Si chemical shifts[a)] obtained from MAS NMR spectra.

Sample[c)]	Tetra-hedron	Chemical shifts [ppm] and intensities				Refs.
		4Al	3Al 1Si	2Al 2Si	1Al 3Si	
Milarite[40)]	T_d				–104.8 (1Be,Al)3Si	99A1
Milarite[41,b)]	T_d				–104.3 (1Be,Al)3Si	
Armenite[42)]	T_c	–82.3 (~ 12 %)				99A1
	T_d		–95.0 (~ 44 %)	–101.8 (≅ 44 %)		
Armenite[43)]	T_c	–82.5 (6 %)				99A1
	T_d		–95.0 (59 %)	–101.8 (35 %)		
Roedderite[44)]	T_d				–100.6 (1Mg 3Si)	90H1

[a)] As compared to ^{29}Si in $Si(CH_3)_4$; [b)] After 24 h heat treatment at 800°C the bands remain broad and centered at –104.5 ppm. [c)] For footnotes (composition) of the samples see Table 4.

Table 8. H_2O vibrations in armenite and milarite determined from FTIR data [99A1].

Peak positions [cm^{-1}]	⊥ ***c***	‖ ***c***	Assignment
Armenite [42)]			
5105	weak	weak, broad	$\nu_2\nu_3$
≅3620	strong, shoulder	weak, shoulder	ν_3/ν_1
≅ 3420	very strong, broad[a)]	very strong, narrow[a)]	ν_1/ν_3
3250	very weak	weak, narrow	$2\nu_2$
1645	weak, narrow	strong, narrow	ν_2
Milarite[40)]			
5195	weak	–	$\nu_2\nu_3$
≅ 3600	strong, shoulder	weak, shoulder	$\nu_3\nu_1$
≅ 3520	very strong[a)]	strong, narrow	$\nu_1\nu_3$
3220	very weak	weak	$2\nu_2$
1625	medium, narrow	very strong, narrow[a)]	ν_2

[a)] Peaks are off scale;
[40)], [42)] See Table 4 for composition.

Table 9. Refractive indices.

Sample[c)]	Refractive indices		2*V*°		Refs.
	$n(\varepsilon)$	$n(\omega)$			
Armenite				biaxial negative	41N1
Chayesite[4)]	1.578(1)	1.575(1)		uniaxial positive	89V1
Darapiosite[5)]	1.575(2)	1.580(2)		uniaxial negative	75S1
Eifelite[6)]	1.5458(5)	1.5445(5)		uniaxial positive	83A1
Eifelite[48)]	1.5443(5)	1.5430(5)		uniaxial positive	83A1
Merrihueite[8)]	n_s = 1.559…1.592		5…10°	uniaxial or biaxial[a)]	65D1
Milarite (natural)	1.529	1.532	small	biaxial negative[b)]	34L1
Milarite[9)]	1.537	1.5385		sector zoning	80C1
Milarite[10)]	1.546	1.549		uniaxial	80C1
Milarite[11)]	1.552	1.555		uniaxial	80C1
Osumilite[22)]	1.546	1.550			69B1
Osumilite[7)]	1.549…1.551	1.545…1.547		uniaxial positive	56M1
$BaMg_2Al_6Si_9O_{30}$ (synthetic osumilite)	1.5500(10) (n_o)	1.5575(10) (n_e)			95W1
$SrMg_2Al_6Si_9O_{30}$ (synthetic osumilite)	1.5379(10) (n_o)	1.5466(10) (n_e)			95W1
Poudretteite[29)]	1.532(1)	1.516(1)			87G1
Roedderite	1.548	1.534			80H1
Roedderite(natural)	1.542	1.537			66F1
Yagiite[36)]	1.544(2)	1.536(2)		uniaxial positive	69B2

[a)] Variable Fe content;
[b)] Becomes uniaxial negative at high temperatures;
[c)] For footnotes (composition) of the samples see Table 4.