

$K(K_{0.58}Na_{0.42})_2Zn_3Mn_{1.5}Si_{12}O_{30}$	$hP100$	$(184) P6_{cc} - d^7cb^2a$
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**$K(K_{0.58}Na_{0.42})_2Zn_3Mn_{1.5}Si_{12}O_{30}$**  [1], milarite-(Zn)

Structural features:  $Si_{12}O_{30}$  units (double 6-rings formed by twelve vertex-linked  $SiO_4$  tetrahedra) share vertices with  $ZnO_4$  tetrahedra and  $MnO_6$  octahedra to form a 3D-framework; K in the columns formed by superposed double 6-rings, (K,Na) between  $MnO_6$  octahedra.

Nadezhina T.N. et al. (1990) [1]

$K_{2.16}Mn_{1.50}Na_{0.84}O_{30}Si_{12}Zn_3$

$a = 1.0525$ ,  $c = 1.4218$  nm,  $c/a = 1.351$ ,  $V = 1.3640$  nm<sup>3</sup>,  $Z = 2$

site	Wyck.	sym.	$x$	$y$	$z$	occ.	atomic environment
Si1	12d	1	0.0963	0.3284	0.3666		tetrahedron O <sub>4</sub>
Si2	12d	1	0.0972	0.3366	0.1415		tetrahedron O <sub>4</sub>
O3	12d	1	0.1097	0.3659	0.251		non-colinear Si <sub>2</sub>
O4	12d	1	0.138	0.481	0.085		single atom Si
O5	12d	1	0.14	0.483	0.418		non-colinear SiZn
O6	12d	1	0.264	0.067	0.39		non-colinear Si <sub>2</sub>
O7	12d	1	0.276	0.064	0.112		non-colinear Si <sub>2</sub>
Zn8	6c	2..	$\frac{1}{2}$	0	0.0		tetrahedron O <sub>4</sub>
Mn9	4b	3..	$\frac{1}{3}$	$\frac{2}{3}$	0.0036	0.75	octahedron O <sub>6</sub>
M10	4b	3..	$\frac{1}{3}$	$\frac{2}{3}$	0.247		tricapped trigonal prism O <sub>9</sub>
K11	2a	6..	0	0	0.0		hexagonal prism O <sub>12</sub>

M10 = 0.58K + 0.42Na

Transformation from published data: origin shift 0 0 0.25

Experimental: single crystal, diffractometer, X-rays, R = 0.033

Remarks: Natural specimen from the Dara-i-Pioz glacier, southern Tian Shan, Tajikistan. 62.61 wt.%  $SiO_2$ , 15.24 wt.%  $ZnO$ , 10.43 wt.%  $MnO$ , 3.19 wt.%  $Na_2O$ , and 8.06 wt.%  $K_2O$  found by chemical analysis.

References: [1] Nadezhina T.N., Sokolova E.V., Belakovskii D.I. (1990), Dokl. Akad. Nauk SSSR 313, 865-868.