

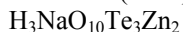
*hP*68

(176)  $P6_3/m - i^3h^4fe$

$\text{Na}_x\text{H}_{2-x}(\text{Zn,Fe})_2(\text{TeO}_3)_3 \cdot n\text{H}_2\text{O}$  [1], zemannite family

Structural features: Units of two face-linked  $\text{ZnO}_6$  octahedra share vertices with  $\text{TeO}_3$   $\psi$ -tetrahedra to form a 3D-framework;  $(\text{Na},\text{OH}_3)$  in channels parallel to  $[001]$  (high degree of disorder).

Matzat E. (1967) [1]



$a = 0.941$ ,  $c = 0.764$  nm,  $c/a = 0.812$ ,  $V = 0.5859$  nm<sup>3</sup>,  $Z = 2$

site	Wyck.	sym.	<i>x</i>	<i>y</i>	<i>z</i>	occ.	atomic environment
M1	12 <i>i</i>	1	0.065	0.195	0.16	0.056	
M2	12 <i>i</i>	1	0.2	0.12	0.019	0.056	
O3	12 <i>i</i>	1	0.4908	0.1441	0.0678		non-coplanar triangle TeZnNa
M4	6 <i>h</i>	<i>m</i> ..	0.135	0.285	$\frac{1}{4}$	0.111	
O5	6 <i>h</i>	<i>m</i> ..	0.1636	0.5019	$\frac{1}{4}$		non-colinear NaTe
M6	6 <i>h</i>	<i>m</i> ..	0.288	0.061	$\frac{1}{4}$	0.111	
Te7	6 <i>h</i>	<i>m</i> ..	0.5429	0.0407	$\frac{1}{4}$		non-coplanar triangle O <sub>3</sub>
Zn8	4 <i>f</i>	3..	$\frac{1}{3}$	$\frac{2}{3}$	0.0593		octahedron O <sub>6</sub>
M9	4 <i>e</i>	3..	0	0	0.169	0.333	

M1 = 0.5Na + 0.5OH<sub>3</sub>; M2 = 0.5Na + 0.5OH<sub>3</sub>; M4 = 0.5Na + 0.5OH<sub>3</sub>; M6 = 0.5Na + 0.5OH<sub>3</sub>; M9 = 0.5Na + 0.5OH<sub>3</sub>

Experimental: single crystal, precession photographs, X-rays, R = 0.071

Remarks: Natural specimen from Moctezuma, Mexico. 5 wt.% Fe, ~1 wt.% (each) Na, Mg, and Mn found by electron microprobe analysis. We assigned an arbitrary value to the Na/OH<sub>3</sub> ratio of sites M in agreement with the general formula  $\text{Na}_x\text{H}_{2-x}(\text{Zn,Fe})_2(\text{TeO}_3)_3 \cdot y\text{H}_2\text{O}$  given in [1]; the general formula of the mineral zemannite is  $\text{Mg}_{0.5}(\text{Zn,Mn})\text{Fe}(\text{TeO}_3)_3 \cdot 4.5\text{H}_2\text{O}$ . Short interatomic distances for partly occupied site(s). Hydrogen atoms are not taken into consideration for Pearson symbol, Wyckoff sequence and atomic environments.

References: [1] Matzat E. (1967), *Tschermaks Mineral. Petrogr. Mitt.* 12, 108-117.