

Terranovaite from Antarctica: A new ‘pentasil’ zeolite

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ABSTRACT

A new high-silica zeolite, terranovaite, was recently found in cavities of Ferrar dolerites at Mt. Adamson (Northern Victoria Land, Antarctica). The mineral $[(\text{Na}_{4.2}\text{K}_{0.2}\text{Mg}_{0.2}\text{Ca}_{3.7})_{\Sigma 8.3}(\text{Al}_{12.3}\text{Si}_{67.7})_{\Sigma 80.0}\text{O}_{160}] \cdot > 29 \text{ H}_2\text{O}$ occurs as globular masses that flake off in transparent lamellae; it has a vitreous luster, white streak, {010} perfect cleavage, and {001} distinct parting. The observed density is $2.13 \pm 0.02 \text{ g/cm}^3$. Optically, it is biaxial positive, with $2V = 65^\circ$, $\alpha = 1.476$, $\beta = 1.478$, $\gamma = 1.483$ (all ± 0.002). The orientation is $X = c$, $Y = a$, and $Z = b$. Terranovaite is orthorhombic with $a = 9.747(1)$, $b = 23.880(2)$, $c = 20.068(2) \text{ \AA}$ and topological symmetry $Cmcm$. The strongest powder X-ray diffraction lines are (d (\AA), I , hkl): 11.94, 40, 020; 10.16, 65, 021, 002; 9.04, 33, 110; 3.79, 100, 025, 240; 3.61, 40, 153. Terranovaite topology, hitherto unknown in either natural or synthetic zeolites, is characterized by the presence of pentasil chains and of a two-dimensional ten-membered ring channel system. The mineral was named terranovaite after the Italian Antarctic Station at Terranova Bay, Antarctica.