American Mineralogist, Volume 84, pages 769–772, 1999

Simmonsite, Na_2LiAlF_6, a new mineral from the Zapot amazonite-topaz-zinnwaldite pegmatite, Hawthorne, Nevada, U.S.A.

EUGENE E. FOORD,[1,†] JOSEPH T. O'CONNOR,[2] JOHN M. HUGHES,[3,*] STEPHEN J. SUTLEY,[4] ALEXANDER U. FALSTER,[5] ARTHUR E. SOREGAROLI,[6] FREDERICK E. LICHTE,[4] AND DANIEL E. KILE[7]

[1]U.S. Geological Survey, Denver Federal Center, Denver, Colorado 80225, U.S.A.
[2]M.S. 939, U.S. Geological Survey, Denver Federal Center, Denver, Colorado 80225, U.S.A.
[3]Department of Geology, Miami University, Oxford, Ohio 45056, U.S.A.
[4]M.S. 973, U.S. Geological Survey, Denver Federal Center, Denver, Colorado 80225, U.S.A.
[5]Department of Geology and Geophysics, University of New Orleans, New Orleans, Louisiana 70148, U.S.A.
[6]1376 West 26 Avenue, Vancouver, British Columbia V6H 2B1, Canada
[7]M.S. 408, U.S. Geological Survey, Denver Federal Center, Denver, Colorado, 80225, U.S.A.

ABSTRACT

Simmonsite, Na_2LiA1F_6, a new mineral of pegmatitic-hydrothermal origin, occurs in a late-stage breccia pipe structure that cuts the Zapot amazonite-topaz-zinnwaldite pegmatite located in the Gillis Range, Mineral Co., Nevada, U.S.A. The mineral is intimately intergrown with cryolite, cryolithionite and trace elpasolite. A secondary assemblage of other alumino-fluoride minerals and a second generation of cryolithionite has formed from the primary assemblage. The mineral is monoclinic, $P2_1$ or $P2_1/m$, a = 7.5006(6) Å, b = 7.474(1) Å, c = 7.503(1) Å, β = 90.847(9)°, V = 420.6(1) Å^3, Z = 4. The four strongest diffraction maxima [d (Å), hkl, I/I_{100}] are (4.33, 111 and 11$\bar{1}$, 100); (1.877, 400 and 004, 90); (2.25, 13$\bar{1}$, 113, 131 and 311, 70); and (2.65, 220, 202, 022, 60). Simmonsite is pale buff cream with white streak, somewhat greasy, translucent to transparent, Mohs hardness of 2.5–3, no distinct cleavage, subconchoidal fracture, no parting, not extremely brittle, D_m is 3.05(2) g/cm^3, and D_c is 3.06(1) g/cm^3. The mineral is biaxial, very nearly isotropic, N is 1.359(1) for λ = 589 nm, and birefringence is 0.0009. Electron microprobe analyses gave (wt%) Na = 23.4, Al = 13.9, F = 58.6, Li = 3.56 (calculated), with a total of 99.46. The empirical formula (based on 6 F atoms) is $Na_{1.98}Li_{1.00}Al_{1.00}F_6$. The crystal structure was not solved, presumably because of unit-cell scale twinning, but similarities to the perovskite-type structure exist.

The mineral is named for William B. Simmons, Professor of Mineralogy and Petrology, University of New Orleans, New Orleans.