

LETTER

Davisite, CaScAlSiO₆, a new pyroxene from the Allende meteorite

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ABSTRACT

Davisite, ideally CaScAlSiO₆, is a new member of the Ca clinopyroxene group, where Sc³⁺ is dominant in the M1 site. It occurs as micro-sized crystals along with perovskite and spinel in an ultra-refractory inclusion from the Allende meteorite. The mean chemical composition determined by electron microprobe analysis is (wt%) SiO₂ 26.24, CaO 23.55, Al₂O₃ 21.05, Sc₂O₃ 14.70, TiO₂ (total) 8.66, MgO 2.82, ZrO₂ 2.00, Y₂O₃ 0.56, V₂O₃ 0.55, FeO 0.30, Dy₂O₃ 0.27, Gd₂O₃ 0.13, Er₂O₃ 0.08, sum 100.91. Its empirical formula calculated on the basis of 6 O atoms is Ca_{0.99}(Sc_{0.50}Ti_{0.16}Mg_{0.16}Ti_{0.10}Zr_{0.04}V_{0.02}Fe_{0.01}Y_{0.01})_{Σ1.00}(Si_{1.03}Al_{0.97})_{Σ2.00}O₆. Davisite is monoclinic, C2/c; *a* = 9.884 Å, *b* = 8.988 Å, *c* = 5.446 Å, β = 105.86°, *V* = 465.39 Å³, and *Z* = 4. Its electron back-scattered diffraction pattern is an excellent match to that of synthetic CaScAlSiO₆ with the C2/c structure. The strongest calculated X-ray powder diffraction lines are [*d* spacing in Å (*I*) (*hkl*): 3.039 (100) (221), 2.989 (31) (310), 2.943 (18) (311), 2.619 (40) (002), 2.600 (26) (131), 2.564 (47) (221), 2.159 (18) (331), 2.137 (15) (421), 1.676 (20) (223), and 1.444 (18) (531)]. The name is for Andrew M. Davis, a cosmochemist at the University of Chicago, Illinois.

Keywords: Davisite, CaScAlSiO₆, new mineral, Sc-rich pyroxene, refractory phase, ultra-refractory inclusion, Allende meteorite