Parascorodite, FeAsO₄·2H₂O—a new mineral from Kaňk near Kutná Hora, Czech Republic

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ABSTRACT

Parascorodite, a new mineral from Kaňk near Kutná Hora, Central Bohemia, Czech Republic, forms earthy white to white-yellow aggregates associated with scorodite, pitticite, bukovsky´ite, kaňkite, zýkaite, gypsum, and jarosite, wet chemical analysis gave (in wt%): As₂O₅ 44.45, P₂O₅ 0.84, SO₃ 1.53, Fe₂O₃ 34.55, Al₂O₃ 0.17, H₂O 17.81, totaling 99.95. The simplified chemical formula is FeAsO₄·2H₂O. Selected area electron diffraction suggests hexagonal or trigonal symmetry. The extinction symbol is \( P-c_- \). Powder X-ray diffraction yielded unit-cell parameters \( a = 8.9327(5) \text{ Å}, c = 9.9391(8) \text{ Å}, V = 686.83 (8) \text{ Å}^3, Z = 6. \) Densities (measured and calculated, respectively) are \( D_m = 3.213(3) \text{ g/cm}^3 \) and \( D_x = 3.212 \text{ g/cm}^3 \). SEM and TEM images showed that basal sections of parascorodite are hexagonal in shape; thicker prismatic crystals were also observed. Crystal size varies between 0.1 to 0.5 µm. The strongest lines in the X-ray powder diffraction pattern are \( d[hkl] (I) \): 4.184(44)(012), 4.076(100)(111), 3.053(67)(202), 2.806(68)(211), 2.661(59)(113), 2.520(54)(212), 2.289(44)(032). Refractive indexes could not have been measured due to extremely small crystallite size, \( n (\text{calc}) = 1.797 \). The TG curve shows two weight losses: at 20–150 °C (2.1 wt%, absorbed water) and at 150–620 °C (15.5 wt%, molecular water), respectively. They correspond to the endothermic peaks on the DTA curve at 120 and 260 °C. Strong exothermic reaction observed at 585 °C reflects formation of the phase FeAsO₄. Infrared absorption spectra of parascorodite are close to those of scorodite.

INTRODUCTION

Parascorodite was first identified in 1967 by X-ray powder diffraction methods as an unknown admixture in massive pale-green-gray scorodite associated with bukovsky´ite on medieval dumps of the Kaňk mine near Kutná Hora. In 1974, this phase was found as earthy aggregates in porous masses of kaňkite. Only new finds of parascorodite and recent development of sophisticated experimental methods has allowed formal description of this mineral.

The holotype material is deposited in the mineralogical collection of the National Museum, Prague, Czech Republic (the acquisition number P1p 25/98). The new mineral and its name were approved by the Commission on New Mineral and Mineral Names of IMA.

OCCURRENCE AND PARAGENESIS

Parascorodite is one of the rarest secondary minerals found at Kaňk in the Kutná Hora ore district (Central Bohemia, Czech Republic) from heavily weathered ore dumps (Kuntery mine) that date from the period when the ore district was a major source of silver and polymetallic ores. The dumps probably represent arsenic rich ore which, in medieval times, were considered mine waste. There are distinct relics of arsenopyrite in vein quartz-pyrite-arsenopyrite material of the dumps, and we assume that majority of secondary iron arsenates and arseno-sulfates did not originate after disposal of the material on dumps, but formed much earlier as products of natural weathering in the supergene zone of the deposit. Parascorodite represents one of the youngest iron arsenates at Kaňk, being most frequently associated with earthy scorodite and pitticite. Other associated minerals are bukovsky´ite, kaňkite, zýkaite, gypsum, jarosite and amorphous ferric hydroxides (Trdlička and Hoffman 1965, Novák et al. 1967, Čech et al. 1976, 1978).

Ondruš et al. (1997a, 1997b, 1997c) identified parascorodite in the Geschieber vein of the Svornost mine in the Jáchymov (Joachimsthal ore district), where it is associated with scorodite in quartz gangue, with pyrite, proustite and small spherical aggregates of kaňkite. The aggregates occur in small cavities of quartz gangue. Parascorodite is associated there with vajdakite (Mo⁶⁺O₂)As³⁺O₅·3H₂O and native arsenic (Ondruš et al. 1997a, 1997c).

Parascorodite is apparently a product of arsenopyrite dissolution, followed by later re-crystallization of iron-arsenic-bearing solutions in conditions of subrecent-to-recent near-surface weathering. Parascorodite is dimorphous with...