Ghiaraite: A new mineral from Vesuvius volcano, Naples (Italy)

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ABSTRACT

In this work we report the first finding of CaCl₂·4H₂O, long known as a synthetic phase. The mineral, called ghiaraite, was discovered in 2011 in a sample belonging to the Real Museo Mineralogico di Napoli (Italy), that had been collected in 1872 at Vesuvius volcano and stored in a glass sealed vial. It is associated with chlorocalcite (KCaCl₃), hematite, sylvite, and halite. The mineral was found inside an ejecta of 5 m in size transported by a lava flow to the locality of Massa di Somma. Here with the ejecta still hot the sample was collected and rapidly stored in a sealed glass vial to preserve it from the atmospheric conditions. Ghiaraite is triclinic, space group P(T), with unit-cell parameters: \(a = 6.3660(5)\), \(b = 6.5914(5)\), \(c = 8.5568(6)\) Å, \(\alpha = 93.504(6)\), \(\beta = 97.778(7)\), \(\gamma = 110.557(6)\), \(V = 330.802(9)\) Å³, \(Z = 2\). The calculated density is 1.838 g/cm³ using the ideal formula and the powder X-ray diffraction data. It occurs as euhedral isometric grains up to 5–6 μm long intimately intermixed with chlorocalcite. The eight strongest reflections in the X-ray powder diffraction pattern [listed as \(d(\AA)\,(hkl)\)] are: 2.628(100)(020); 2.717(88)(100); 4.600(88)(111); 2.939(77)(200); 2.204(75)(121), 5.874(73)(100), 6.124(47)(010); 3.569(46)(110). Ghiaraite was approved by the Commission on New Minerals, Nomenclature and Classification with IMA number 2012-072. The mineral was named in honor of Maria Rosaria Ghiara (b. 1948), Head of Real Museo Mineralogico of Napoli and Centro Musei delle Scienze Naturali e Fisiche dell’Università degli Studi di Napoli Federico II for her important work in promoting the scientific research focused on the mineralogy of Vesuvius volcano.

Keywords: Ghiaraite, new mineral, X-ray diffraction, EDS, Vesuvius volcano, calcium tetrahydrate chloride

INTRODUCTION

The new mineral described in this work, named ghiaraite, appears to be extremely rare and was found by one of the authors (M.R.) in association with chlorocalcite (KCaCl₂), hematite, sylvite, and halite in the mineral collection “Vesuviana” of the Real Museo Mineralogico di Napoli in 2011. Ghiaraite occurs in voids in the ejecta surface that were exposed to volcanic vapors. The sample was collected at the Vesuvius volcano, stored in a sealed glass vial and deposited at the Real Museo di Napoli in 1872 by Arcangelo Scacchi (1810–1894), a member of the “Reale Accademia delle Scienze Fisiche e Matematiche,” see Figure 1. More in detail, it was found inside an ejecta of 5 m in size transported by a lava flow to the locality of Massa di Somma (coordinates: 40.5° N, 14.22 E). Here, with the ejecta still hot (Scacchi 1874), the sample was collected and within a few minutes stored in a sealed glass vial to preserve it from the atmospheric conditions. Arcangelo Scacchi reported the description of the ejecta finding on a note published on October 1872 right after the Vesuvius eruption of April 26, 1872 (Scacchi 1872). The note was published by the “Società Reale di Napoli” in the “Rendiconto dell’Accademia delle Scienze Fisiche e Matematiche” (year XII). In the note of 1872 Scacchi described chlorocalcite with the wrong chemical formula CaCl₂; however, he reported a chemical analysis in which the CaCl₂ compound represented the 58.76% with the remaining 32.24% constituted by potassium chloride, sodium chlorides, and manganese chloride.

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FIGURE 1. Original sealed glass vial deposited by Scacchi in 1872 at Real Museo di Napoli. The vial is about 5 cm long.