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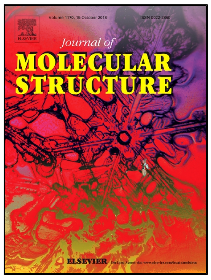

New mineralogical data for khademite (orthorhombic $AlSO_4F{\cdot}5H_2O$) and the story of rostite (orthorhombic $AlSO_4OH{\cdot}5H_2O$) from Libušín near Kladno, the Czech Republic

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New mineralogical data for khademite (orthorhombic $AlSO_4F\cdot 5H_2O$) and the story of rostite (orthorhombic $AlSO_4OH\cdot 5H_2O$) from Libušín near Kladno, the Czech Republic

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Abstract:

Khademite and rostite are orthorhombic minerals $Al(SO)_4F\cdot 5H_2O$ and $Al(SO)_4OH\cdot 5H_2O$, respectively. Libušín is a type locality of rostite but recent studies have only confirmed the presence of khademite. New electron microprobe analyses of this mineral from Libušín revealed a fluorine concentration of 8.12–8.18 wt.%, which is the highest ever found for khademite. The empirical formula is: $Al_{1,01–1.03}(SO_4)_{0.98–0.99}(F_{0.90–1.00}OH_{0.00–0.10})\cdot 5H_2O$, and lattice parameters for *Pcab* symmetry are a = 11.182(3), b =13.051(4), c =10.889(5) Å , V = 1589.0(7) Å^3. The intense Raman lines are 990 cm^{-1} (ν_1); 1081 and 1131 cm^{-1} (ν_3); 420 and 504 cm^{-1} (ν_2); 589 and 632 cm^{-1} (ν_4). Therefore, rostite has not been proven in Libušín and its existence at other localities is not credibly documented. The presented data of fluorine khademite are of high importance for geochemical studies and precise discrimination of structurally very similar sulfates. This information can be also used for better understanding of planetary surface and subsurface processes.

1. Introduction

Aluminum-containing sulfates are common secondary minerals that are generally formed through decomposition of aluminosilicates in the environment rich in sulfate anions. The group includes a number of chemically and structurally diverse minerals, namely aluminite [$Al_2(SO_4)(OH)_4\cdot 7H_2O$], meta-aluminite [$Al_2(SO_4)(OH)_4\cdot 5(H_2O)$] , basaluminite [$Al_4(SO_4)(OH)_{10}\cdot 5(H_2O)$], jurbanite [$Al(SO_4)(OH)\cdot 5H_2O$], khademite [$Al(SO_4)(F,OH)\cdot 5(H_2O)$], rostite [$Al(SO_4)(OH,F)\cdot 5(H_2O)$], alunogen [$Al_2(SO_4)_3\cdot 17H_2O$], and meta-alunogen [$Al_2(SO_4)_3\cdot 13.8H_2O$]. Anhydrous aluminum sulfate, millosevichite [$(Al,Fe)_2(SO_4)_3$], can also be found in natural systems, however, it is very rare. Mixed divalent–trivalent salts (pickeringite-halotrichite series), various alum salts, aluminocopiapite,