Suredaite, PbSnS₃, a new mineral species, from the Pirquitas Ag-Sn deposit, NW-Argentina: mineralogy and crystal structure

WERNER H. PAAR,¹ RONALD MILETICH,²,6 DAN TOPA,³ ALAN J. CRIDDLE,⁴ MILKA K. DE BRODTKORB,⁵ GEORG AMTHAVER,¹ AND GEROLD TIPPELT¹

¹Institut für Mineralogie, Universität Salzburg, Hellbrunnerstrasse 34, A-5020 Salzburg, Austria
²Laboratory for Crystallography, ETH Zürich, Sonneggstrasse 5, CH-8092 Zürich, Switzerland
³Institute of Geology and Palaeontology, Universität Salzburg, Hellbrunnerstrasse 34, A-5020 Salzburg, Austria
⁴Department of Mineralogy, The Natural History Museum, London SW7 5BD, U.K.
⁵Consejo Nacional de Investigaciones Científicas y Técnicas—University of Buenos Aires, Paso 258-9A, 1640 Martinez, Argentina
⁶Bayerisches Geoinstitut, Universität Bayreuth, D-95445 Bayreuth, Germany

ABSTRACT

Suredaite, ideally PbSnS₃, is a new mineral species from the Pirquitas Ag-Sn deposit (Province Jujuy, NW-Argentina). It was observed in symmetrically banded veins in the Oploca district, and is associated with sphalerite, arsenopyrite, pyrite-marcasite, cassiterite, cylindrite, franckeite, hectarite, rhodostannite, and various Ag-Sb and Ag-Bi sulfosalts in minor amounts. Suredaite occurs in layers up to 1 cm in thickness as aggregates of radialy arranged tabular-prismatic (single) crystals, has a metallic lustre, and a dark grey streak. VHN₀₅ ranges between 18.2 and 20.6 (mean 19.6) GPa, the Mohs hardness is 2.5–3. It has perfect cleavages parallel to {001}, {101}, and {100}. The measured density varies between 5.54 and 5.88 g/cm³, Dₛ was determined to be 5.615 g/cm³. In reflected plane-polarised light, it is white and is not perceptibly bireflectant or pleochroic. It lacks internal reflections and is weakly anisotropic with metallic blue, mauve to brown rotation tints. Specular reflectance percentages in air and in oil are tabulated from 400 to 700 nm and compared graphically to the alternative formula [Sn,Fe]₃. The suredaite structure, which is the natural analogue of synthetic PbSnS₃, consists of columns of double-edge sharing octahedra running parallel to the b axis, which house the Sn atoms. These columns are linked by rods of eightfold-coordinated Pb atoms. On the basis of the structure determination, the empirically determined idealized formula follows Pb₁⁰(As,Sn)₁⁰(Sn,Fe)₃S₁₀. Crystalchemical arguments suggest Ag possibly to occupy interstitial sites according to the alternative formula Pb₁⁰(As,Sn)₁⁰(Sn,Fe)₃S₁₀. The name of this new mineral species is in honor of R.J. Sureda Leston, head of the Department of Mineralogy and Economic Geology, University of Salta, Argentina.

INTRODUCTION

Suredaite is a new tin-bearing species, which represents a valuable tin ore at Pirquitas, Argentina. It occurs in an unique mineral assemblage, which is composed of the arsenic-substituted derivates of franckeite and cylindrite. Both represent new mineral species currently under investigation. The new mineral is named for Ricardo Sureda Leston, Professor of Mineralogy and Economic Geology at the University of Salta, NW-Argentina, for his significant contributions to the mineralogy and metallogeny of NW-Argentina. Holotype material is deposited under catalog numbers 14389-14391 in the reference collection of the Institute of Mineralogy (University of Salzburg) and cotype (BM 1998, 39-40) in the collections of the Natural History Museum (London).

LOCATION AND GENERAL GEOLOGY

The Pirquitas mining district is located in the Puna 135 km west of Abra Pampa, Province of Jujuy, NW-Argentina (Coira and Brodtkorb 1995; Sureda et al. 1986; Turner 1982). The mineralization is genetically comparable to the Ag-Sn formation of Bolivia and is the southernmost representative of this economically very important mineral belt. The district of Pirquitas includes the primary Ag-Sn deposit and alluvial tin and gold accumulations that were exploited intermittently from 1936 to 1990. Recently performed exploration drilling lead to...