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Tučekite, a new antimony analogue of hauchecornite

J. JUST

Australian Selection (Pty.) Ltd., Perth, Western Australia

AND

C. E. FEATHER

Anglo American Corporation of South Africa Ltd., Johannesburg, Republic of South Africa

TUČEKITE, $Ni_9Sb_2S_8$, was found as microscopic grains in a mineralized Archaean chlorite schist at Kanowna (35° 35′ S., 121° 36′ E.), Western Australia, and in the gold-bearing conglomerates of the Witwatersrand System (26° S., 27° E.), South Africa.

The nickel mineralization at Kanowna is located in metamorphosed basic and ultrabasic rocks of the Morelands Formation, which is part of the Kalgoorlie–Yilgarn succession of the West Australian Archaean shield. The tučekite-bearing mineralization occurs as an approximately 2 cm thick zone of disseminated sulphides in a chlorite schist near its contact with a serpentinized ultramafic intrusive rock. Tučekite is here associated with millerite, pyrite, chalcopyrite, gersdorffite, pentlandite, magnetite, and supergene polydymite. Tučekite occurs as rims and irregular grains partly replacing millerite, and was apparently formed during the later stages of the ore-forming process by reaction of Sb-bearing solutions with millerite.

In the Witwatersrand the mineral was found in a heavy mineral concentrate prepared from ore from the Vaal Reef, Vaal Reefs mine, Klerksdorp (Far West Witwatersrand), and in a mixed concentrate from the Carbon Leader Reef and the Ventersdorp Contact Reef, Western Deep Levels Ltd., Carltonville (West Wits Line). Although rare free grains of tučekite are found, the mineral is more commonly intergrown with gold, and in the Vaal Reef the mineral is also found intergrown with gersdorffite.

Empirical formula of the Kanowna mineral is $(Ni, Fe, Co)_{9\cdot05}(Sb, Bi, Te)_{1\cdot00}(Sb, As)_{1\cdot04}S_8$; that of the Witwatersrand mineral is $(Ni, Fe)_{9\cdot00}(Sb, Bi)_{1\cdot00}(Sb, As)_{1\cdot06}S_8$. The structural formula is assumed to be $Ni^{vi}Ni^{v}_{8}Sb^{vi}Sb^{viii}S^{v}_{4}S^{v}_{4}$; $Z = 1$. The mineral is opaque, has a metallic lustre, and is pale yellow. Under the microscope in reflected light it is pale brownish-yellow; bireflectance not discernible; anisotropy very strong with deep brown and greyish-blue polarization colours; reflectivity high. Indentation hardness 718 kg/mm^2 (20 g load); 417 kg/mm^2 (10 g load).

Strongest Debye-Scherrer powder-pattern lines of the Witwatersrand mineral are 2·76 (10) 211; 2·38 (8) 112; 2·28 (8b) 221, 310; 1·850 (8) 222; 4·33 (7) 101; 1·793 (7) 400, 302. By analogy with hauchecornite, the pattern can be indexed on a tetragonal unit cell with $a = 7{\cdot}174$ Å and $c = 5{\cdot}402$ Å; ρ (calc.) = 6·15 g/cm^3. Type material is preserved in the British Museum, London, and the National Museum, Prague (Czechoslovakia).

The full paper appears in the Miniprint section, pp. M21–22.