

Arsenohauchecornite and tellurohauchecornite: new minerals in the hauchecornite group

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SUMMARY. Arsenohauchecornite, Ni_9BiAsS_8 , and tellurohauchecornite, Ni_9BiTeS_8 from the Sudbury area, Ontario, are now recognized as distinct mineral species in the Hauchecornite Group and not as varieties as described previously. Descriptions of these two minerals are given, summarized from Gait and Harris (1972).

GAIT AND HARRIS (1972) described arsenic- and tellurium-rich hauchecornite from the Sudbury area as arsenian and tellurian varieties of hauchecornite on the basis of their chemistry. Subsequently Kocman and Nuffield (1974) published structural data on hauchecornite from the type locality in Westphalia. This study indicated that the general structural formula should be expressed as $Ni_9A^{vi}B^{viii}S_8$, thus allowing species

status for the arsenian- and tellurian-rich members. Tučekite, ideally Ni_9SbSbS_8 , a new mineral in the hauchecornite group, was described by Just (1978) and his proposal to the International Mineralogical Association Commission on New Minerals and Mineral Names redefining the hauchecornite group had been favoured in 1975. The new names, arsenohauchecornite, ideally Ni_9BiAsS_8 , and tellurohauchecornite ideally Ni_9BiTeS_8 , have also been approved by the International Mineralogical Association Commission on New Minerals and Mineral Names.

Descriptive data

Arsenohauchecornite, Vermilion Mine, Lot 6, Con. IV, Denison Tp., Sudbury Dist., Ontario,

TABLE I. *Electron microprobe analyses*

		Arsenohauchecornite		Tellurohauchecornite	
		wt %	At. prop.*	wt %	At. prop.*
	Ni	44.9	8.9	44.1	8.8
	Fe	1.4	0.3	0.9	0.2
	Co	0.3	0.1	0.9	0.2
site ^{vi}	Bi	26.5	1.0	22.4	1.0
	Bi		0.5		0.2
site ^{viii}	As	4.4	0.7	—	—
	Sb	0.1	—	—	—
	Te	—	—	8.5	0.8
	S	22.0	8	21.9	8
	Total	99.6		98.7	

* Calculated on the basis of eight sulphur atoms.

TABLE II. *Crystallographic data*

Arsenohauchecornite			Tellurohauchecornite		
<i>P4/mmm</i>			<i>P4/mmm</i>		
<i>a</i> 14.517 Å			<i>a</i> 14.64 Å		
<i>c</i> 10.803 Å			<i>c</i> 10.87 Å		
<i>I</i> _{est}	<i>d</i> _{meas} Å	<i>hkl</i>	<i>I</i> _{est}	<i>d</i> _{meas} Å	<i>hkl</i>
70	4.33	022	40	4.35	022
70	3.63	040	40	3.66	040
70	3.24	240	40	3.28	240
100	2.771	242	100	2.80	242
90	2.381	224	50	2.405	224
80	2.284	{ 442 260	60	2.314	260
80	1.854	444	40	1.868	444
70	1.810	080			

TABLE III. *Reflectance, microhardness and specific gravity*

Wavelength (nm)	Arsenohauchecornite	Tellurohauchecornite
470	41.6–43.0	41.2–44.8
546	46.2–47.1	43.9–47.7
589	48.2–49.2	45.6–49.4
650	50.8–51.6	48.2–51.9
VHN _{50g} (kg/mm ²)	516–655	182–825
S.G. (Meas.)	6.35	—
S.G. (Calc.)	6.52	6.50

Canada; occurs as irregular masses up to 10 mm in diameter, occasionally as tabular crystals up to 2 × 20 mm embedded in chalcopyrite, and rarely as subhedral crystals exhibiting crystal faces several millimeters across. It has a metallic lustre, is bronze in colour, resembling pyrrhotine, though slightly darker. On fresh surfaces it is brilliant, metallic with a conchoidal fracture. Associated minerals are chalcopyrite, pyrrhotine, gersdorffite, pyrite, gold, nickeline, galena, copper, and sperrylite. The name alludes to its chemical relation to the hauchecornite group. Type material is deposited at the Royal Ontario Museum: ROM # M29206 (cotype), M29207 (holotype; specimen and polished section), and M29208 (cotype). Additional data are given in Tables I, II, and III.

Tellurohauchecornite, Strathcona Mine, Lot 4, Con. IV, Levack Tp., Sudbury Dist., Ontario, Canada; occurs as irregular grains up to 150 μm in diameter and is associated with chalcopyrite and millerite. Its optical properties, in polished section, are similar to pyrrhotine. The name alludes to its chemical relation to the hauchecornite group. Type material is deposited at the Royal Ontario

Museum: ROM # M30942 (holotype; specimen and polished section). Additional data are given in Tables I, II, and III.

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REFERENCES

- Gait (R. I.) and Harris (D. C.), 1972. Hauchecornite—antimonian, arsenian and tellurian varieties. *Can. Mineral.* **11**, 819–25.
 Just (J.) and Feather (C. E.), 1978. Tučekite, a new antimony analogue of hauchecornite. *Mineral. Mag.* **42**, 278, M21–22.
 Kocman (V.) and Nuffield (E. W.), 1974. The crystal structure of antimonian hauchecornite from Westphalia. *Can. Mineral.* **12**, 269–74.