

Hollingworthite

(Rh, Pt, Pd)AsS

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Crystal Data: Cubic. *Point Group:* $2/m\bar{3}$. Euhedral to anhedral grains, to 40 μm .

Physical Properties: Hardness = > 6, greater than that of sperrylite. VHN = ~650–700 (100 g load). D(meas.) = n.d. D(calc.) = [7.86]

Optical Properties: Opaque. *Color:* In polished section, medium gray, slightly bluish in oil. R: (400) —, (420) 50.0, (440) 51.3, (460) 51.9, (480) 51.9, (500) 51.6, (520) 51.3, (540) 50.8, (560) 50.2, (580) 49.7, (600) 49.2, (620) 48.5, (640) 47.8, (660) 47.2, (680) 46.4, (700) 45.6

Cell Data: *Space Group:* $Pa\bar{3}$. $a = 5.769\text{--}5.797$ $Z = 4$

X-ray Powder Pattern: Onverwacht mine, South Africa (ruthenian). 3.31 (10), 2.87 (10), 1.74 (1), 2.04 (9), 1.112 (9), 2.57 (8), 1.29 (8)

Chemistry:	(1)	(2)	(3)		(1)	(2)	(3)
Rh	30.8	25.0	47.62	Ru		4.0	
Pt	10.3	20.0		Fe			0.56
Pd	8.7			As	32.6	35.0	37.02
Ir	3.1	5.0		S	13.9	11.0	14.99
				Total	99.4	100.0	100.19

(1) Driekop mine, South Africa; by electron microprobe, corresponding to $(\text{Rh}_{0.68}\text{Pd}_{0.18}\text{Pt}_{0.12}\text{Ir}_{0.04})_{\Sigma=1.02}\text{As}_{0.99}\text{S}_{0.99}$. (2) Noril'sk, Russia; by electron microprobe, corresponding to $(\text{Rh}_{0.60}\text{Pt}_{0.25}\text{Ru}_{0.10}\text{Ir}_{0.06})_{\Sigma=0.98}\text{As}_{1.15}\text{S}_{0.84}$. (3) Shetland Islands; by electron microprobe, corresponding to $(\text{Rh}_{0.97}\text{Fe}_{0.02})_{\Sigma=0.99}\text{As}_{1.03}\text{S}_{0.98}$.

Polymorphism & Series: Forms a series with irarsite.

Mineral Group: Cobaltite group.

Occurrence: In platinum deposits in dunite pipes, layered ultramafic intrusives, and chromatites; in Cu–Ni sulfide ores.

Association: Sperrylite, geversite, erlichmanite, irarsite, Pt–Fe alloys (South Africa); chalcopyrite, cobaltite, gersdorffite, pyrrhotite (Canada); Au–Ag alloy, braggite, sperrylite, cobaltite, pyrrhotite, pentlandite, pyrite, chalcopyrite (Stillwater complex, Montana, USA).

Distribution: Increasingly recognized as an economically important platinum-group mineral. In South Africa, in the Merensky Reef, Bushveld complex, Transvaal, from the Driekop [TL], Onverwacht, and Tweefontein mines. In the Upper and Banded zones of the Stillwater complex, Montana; from the Yuba River, Nevada Co., California; and at Goodnews Bay, Alaska, USA. In Canada, at Sudbury and Werner Lake, Ontario. From the Noril'sk region, western Siberia, and around Nizhni Tagil, Ural Mountains, Russia. In Finland, from the Hitura Ni–Cu deposit, and in the Siikakämä intrusion. At the Maja e Sukës chromite deposit, Tropoja massif, Albania. From the Cliff and Harold's Grave quarries, Shetland Islands. Numerous other trace occurrences are now known.

Name: To honor Professor Sidney Ewart Hollingworth (1899–1966), eminent British geologist, University College, London, England.

Type Material: National School of Mines, Paris, France.

References: (1) Stumpfl, E.F. and A.M. Clark (1965) Hollingworthite, a new rhodium mineral, identified by electron probe microanalysis. *Amer. Mineral.*, 50, 1068–1074. (2) Cabri, L.J., Ed. (1981) Platinum group elements: mineralogy, geology, recovery. *Can. Inst. Min. & Met.*, 108–109, 154. (3) Tarkian, M. and H.M. Prichard (1987) Irarsite-hollingworthite solid-solution series and other associated Ru-, Os-, Ir-, and Rh-bearing PGM's from the Shetland ophiolite complex. *Mineralium Deposita*, 22, 178–184. (4) Genkin, A.D., N.N. Zhuravlev, N.V. Troneva, and I.V. Murav'eva (1966) Irarsite, a new sulfarsenide of iridium, rhodium, ruthenium, and platinum. *Zap. Vses. Mineral. Obshch.*, 95, 700–712 (in Russian).

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