

Ferhodsite**(Fe, Rh, Ir, Ni, Cu, Co, Pt)_{9-x}S₈**

Crystal Data: Tetragonal. *Point Group:* 4/m or 4/m 2/m 2/m. As isometric or platy, triangular, and corroded grains to 100 μm , adjacent to isoferroplatinum grains.

Physical Properties: *Cleavage:* Well-developed on {111}. *Tenacity:* n.d. *Fracture:* n.d. Hardness = n.d. VHN = 516(15) (20 g load). D(meas.) = n.d. D(calc.) = 7.186

Optical Properties: Opaque. *Color:* Light brownish gray in reflected light. *Streak:* Black. *Luster:* Metallic.

Optical Class: n.d. *Birefractance:* Very weak. *Anisotropism:* Weak to moderate, creamy grays. R₁-R₂: (470) 35.6-33.0, (546) 36.0-33.8, (589) 36.2-34.0, (650) 37.1-34.8

Cell Data: *Space Group:* P4₂/n or P4/nmm. *a* = 10.009(5) *c* = 9.840(8) *Z* = 4

X-ray Powder Pattern: Russia. (similar to pentlandite)

2.23 (100), 3.01 (70), 1.933 (60), 5.72 (50), 1.772 (40), 1.167 (40), 2.81 (30)

Chemistry:	(1)	(2)		(1)	(2)
Pt	4.23	2.06	Fe	13.77	9.12
Pd	0.16	0.24	Cu	5.68	6.34
Rh	13.26	17.86	Ni	15.01	16.14
Ru	0.15	0.02	<u>S</u>	<u>28.53</u>	<u>28.40</u>
Os	0.23	0.13	Total	100.33	97.63
Ir	19.31	17.31			

(1) and (2) Seyba placer deposit, eastern Sayans, Khabarovskiy kray, Russia; electron microprobe analyses; correspond respectively to (Pt_{0.21}Pd_{0.01}Rh_{1.26}Os_{0.01}Ir_{0.98}Fe_{2.41}Cu_{0.87}Ni_{2.50}) $\Sigma=8.25$ S_{8.71} and (Pt_{0.11}Pd_{0.02}Rh_{1.73}Os_{0.01}Ir_{0.90}Fe_{1.63}Cu_{1.00}Ni_{2.75}) $\Sigma=8.15$ S_{8.85}.

Occurrence: In mineral separates from dunite (Nizhniy Tagil ultramafic massif) and Au-PGE-bearing alluvial placer deposits (Konder and along the River Seyba). In grains of Os-Ir-Ru alloy formed from fractionated Fe-Ni-Cu-melt enriched in the PGE. Likely the product of metasomatic replacement of magmatic minerals during serpentinization of ultramafic rocks.

Association: Cooperite, cuproiridsite, bowieite, kashinite, laurite, erlichmanite; commonly mantled and corroded by chengdeite.

Distribution: From the Nizhniy Tagil, Svetlyi Bor and Veresovyi Bor massifs, Ural Mountains and the Konder placer deposit, Ayano-Mayaskiy region, and along the Seyba River, south-central Siberia, near Krasnoyarsk, Khabarovskiy kray, Russia.

Name: From the first letters of three of its main chemical elements, *Fe* (iron), *Rhodium*, and *Sulfur*.

Type Material: A.E. Fersman Mineralogical Museum, Russian Academy of Sciences, Moscow.

References: (1) Begizov, V.D. and E.N. Zavjalov (2016) Ferhodsite (Fe,Rh,Ir,Ni,Cu,Co,Pt)_{9-x}S₈ - new mineral from Nizhny Tagil ultramafic complex. *Novye Dannye o Mineralakh* (New Data on Minerals), 51, 8-11 (in Russian with English abstract). (2) (2018) *Amer. Mineral.*, 103, 831-832 (abs. ref. 1 and comment). (3) Barkov, A.Y., G.I. Shvedov, A.A. Nikiforov, and R.F. Martin (2019) Platinum-group minerals from Seyba, Eastern Sayans, Russia, and substitutions in the PGE-rich pentlandite and ferhodsite series. *Mineral. Mag.*, 83, 531-538.