Kashinite $(Ir, Rh)_2S_3$

Crystal Data: Orthorhombic. *Point Group:* $2/m\ 2/m\ 2/m$. As subhedral granular crystals, to 0.2 mm; on the rims of platinum or iridosmine grains.

Physical Properties: *Fracture:* Flinty. *Tenacity:* Brittle, weakly elastic. Hardness = n.d. VHN = 1529(477) (50 g load). D(meas.) = n.d. D(calc.) = 9.10

Optical Properties: Opaque. *Color:* Grayish black; light gray in reflected light. *Luster:* Metallic. *Pleochroism:* Weak. *Anisotropism:* Moderate to strong, with reddish violet tints.
R_1–R_2: (400) — , (420) — , (440) 43.7–45.9, (460) 45.1–45.5, (480) 46.1–45.5, (500) 46.8–45.6, (520) 47.2–45.7, (540) 47.5–45.8, (560) 47.6–46.0, (580) 47.6–46.2, (600) 47.4–46.3, (620) 47.1–46.5, (640) 46.8–46.6, (660) 46.6–46.8, (680) 46.3–46.9, (700) 46.0–47.0

Cell Data: *Space Group: Pbcn.* $a = 8.464$ $b = 6.001$ $c = 6.146$ Z = 4

X-ray Powder Pattern: Nizhni Tagil, Russia.
2.99 (10), 1.736 (6b), 2.14 (4), 1.758 (4), 1.136 (4b), 1.028 (4), 0.982 (4)

Chemistry:

	(1)	(2)	(3)
Ir	53.6	52.4 – 75.8	57.9
Rh	21.5	1.7 – 22.9	15.7
Pt	0.8		0.2
Ru	0.5		
Fe	0.1		0.1
Cu	0.7	0.0 – 0.8	0.7
S	24.0	21.6 – 24.8	23.0
Total	97.6		97.6

(1) Russia; by electron microprobe, average of five analyses; corresponds to $(Ir_{1.12}Rh_{0.84}Ru_{0.02}Pt_{0.02})_{\Sigma=2.00}S_{3.00}$. (2) Nizhni Tagil, Russia; by electron microprobe, range of 18 analyses. (3) China; by electron microprobe, average of analyses on four grains; corresponds to $(Ir_{1.26}Rh_{0.64}Cu_{0.05}Fe_{0.01})_{\Sigma=1.96}S_{3.00}$.

Occurrence: In placer deposits derived from ultramafic rocks.

Association: Iridosmine, platinum, osmiridium, laurite, erlichmanite, cuproiridisite, cherepanovite, rhodian pentlandite, irarsite, Fe–Pt alloy, sulfides of Fe, Cu, Ir, Rh, chromite.

Distribution: In Russia, from the Aleksandrov Log platinum deposit, Mt. Solov'eva, Nizhni Tagil massif, Ural Mountains [TL]; at the Ray-Iz ophiolite complex, Polar Ural Mountains; in the Vaimka River placers, Aluchinskii massif, and the Baimka placers, Aluchin horst, Chukota region, Far Eastern Region. At an unspecified placer in China. From Chromwerk, Kraubath ultramafic massif, Styria, Austria. At Goodnews Bay, Alaska, USA.

Name: To honor Stepan Aleksandrovich Kashin (1900–1981), Central Institute of Geological Exploration for Base and Precious Metals, Moscow, Russia, a Russian investigator of ore deposits in the Ural Mountains.

Type Material: Institute of Mineralogy and Geochemistry of Rare Elements, Moscow; A.E. Fersman Mineralogical Museum, Academy of Sciences, Moscow, Russia.

References: (1) Begizov, V.D., E.N. Zabyalov, N.S. Rudashevskii, and L.N. Vyal'sov (1985) Kashinite $(Ir, Rh)_2S_3$ – a new sulfide of iridium and rhodium. Zap. Vses. Mineral. Obshch., 114, 617–622 (in Russian). (2) (1987) Amer. Mineral., 72, 223 (abs. ref. 1). (3) Anon. (1985) A study of kashinite $(Ir, Rh)_2S_3$. Acta Mineralogica Sinica, 5, 6–9 (in Chinese with English abs.). (4) (1986) Mineral. Abs., 37, 236 (abs. ref. 3). (5) Criddle, A.J. and C.J. Stanley, Eds. (1993) Quantitative data file for ore minerals, 3rd ed. Chapman & Hall, London, 277. (6) Pekov, I.V. (1998) Minerals first discovered on the territory of the former Soviet Union. Ocean Pictures, Moscow, 111.