

**Kesterite****Cu<sub>2</sub>(Zn, Fe)SnS<sub>4</sub>**

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**Crystal Data:** Tetragonal, pseudocubic. *Point Group:*  $\bar{4}$ . Massive.**Physical Properties:** Hardness = 4.5 VHN = 328–348 (100 g load). D(meas.) = 4.54–4.59 D(calc.) = 4.524**Optical Properties:** Opaque. *Color:* Greenish black. *Streak:* Black. *Luster:* Metallic.R<sub>1</sub>–R<sub>2</sub>: (400) 23.7–24.5, (420) 24.4–25.2, (440) 24.9–25.8, (460) 25.4–26.0, (480) 25.6–26.0, (500) 25.6–25.9, (520) 25.2–25.7, (540) 24.9–25.6, (560) 24.6–25.5, (580) 24.5–25.5, (600) 24.4–25.4, (620) 24.3–25.3, (640) 24.2–25.1, (660) 24.2–25.1, (680) 24.3–25.2, (700) 24.6–25.4**Cell Data:** *Space Group:*  $I\bar{4}$ . *a* = 5.427 *c* = 10.871 *Z* = 2**X-ray Powder Pattern:** Kester deposit, Russia.

3.15 (100), 1.929 (70), 1.645 (50), 1.113 (40), 2.73 (30), 1.248 (30), 0.860 (30)

**Chemistry:**

	(1)	(2)
Cu	30.56	29.40
Zn	11.16	10.18
Fe	1.68	3.12
Sn	25.25	28.07
S	28.40	29.19
rem.	0.98	
Total	98.03	99.96

(1) Kester deposit, Russia; remainder Mn 0.07%, Sb 0.90%, Se 0.01%; corresponding to Cu<sub>2.17</sub>(Zn<sub>0.77</sub>Fe<sub>0.14</sub>)<sub>Σ=0.91</sub>Sn<sub>0.96</sub>S<sub>4.00</sub>. (2) St. Michael's Mount, England; by electron microprobe corresponding to Cu<sub>2.03</sub>(Zn<sub>0.68</sub>Fe<sub>0.24</sub>)<sub>Σ=0.92</sub>Sn<sub>1.04</sub>S<sub>4.00</sub>.**Occurrence:** In quartz-sulfide hydrothermal veinlets in tin deposits.**Association:** Arsenopyrite, stannoidite, chalcopyrite, chalcocite, sphalerite, tennantite.**Distribution:** From the Kester deposit, Arga-Ynnakh-Khai granite massif, Yana-Adycha River region, Sakha, Russia [TL]. In the Kochbulak gold deposit, Chatkal-Kuramin Mountains, eastern Uzbekistan. From the Dachang district, Guangxi Autonomous Region, China. In the Ikuno mine, Hyogo Prefecture, and the Toyoha mine, Hokkaido, Japan. At Cínovec (Zinnwald), Czech Republic. From St. Michael's Mount, Marazion, and in the Cligga mine, Perranzabuloe, Cornwall, England. From Chizeuil, Saône-et-Loire, France. At Kirki, Thrace, Greece. In Canada, from the Snowflake mine, Revelstoke mining division, British Columbia; at the Brunswick tin mine, 55 km southwest of Fredericton, New Brunswick; and in the Kidd Creek mine, near Timmins, Ontario. In the USA, from the Hugo mine and in the Peerless pegmatite, near Keystone, Pennington Co., South Dakota; at the Cove mine, McCoy district, Lander Co., Nevada; in the Campbell mine, Bisbee, Cochise Co., Arizona. From the Pirquitas deposit, Riconada Department, Jujuy Province, Argentina. At Oruro, Bolivia. A few other minor occurrences are known.**Name:** For the locality in Russia at the Kester deposit.**Type Material:** Mineralogical Museum, St. Petersburg University, 16188, 16324–16326, 16351, 16352; Mining Institute, St. Petersburg, Russia, 163a/2.**References:** (1) Ivanov, V.V. and Y.A. Pyatenko (1958) On the so-called kēsterite [kesterite]. Zap. Vses. Mineral. Obshch., 88, 165–168 (in Russian). (2) (1959) Amer. Mineral., 44, 1329 (abs. ref. 1). (3) Hall, S.R., J.T. Szymański, and J.M. Stewart (1978) Kesterite, Cu<sub>2</sub>(Zn, Fe)SnS<sub>4</sub>, and stannite, Cu<sub>2</sub>(Fe, Zn)SnS<sub>4</sub>, structurally similar but distinct minerals. Can. Mineral., 16, 131–137. (4) Kissin, S.A. and D.R. Owens (1979) New data on stannite and related tin sulfide minerals. All rights reserved. No part of this publication may be reproduced, stored in a retrieval system or transmitted in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise without the prior written permission of Mineral Data Publishing.

Can. Mineral., 17, 125–135. (5) Moore, F. and R.A. Howie (1984) Tin-bearing sulphides from St Michael's Mount and Cligga Head, Cornwall. Mineral. Mag., 48, 389–396. (6) Bonazzi, P., L. Bindi, G.P. Bernardini, and S. Menchetti (2003) A model for the mechanism of incorporation of Cu, Fe and Zn in the stannite-k esterite series,  $\text{Cu}_2\text{FeSnS}_4$ – $\text{Cu}_2\text{ZnSnS}_4$ . Can. Mineral., 41, 639–649. (7) Criddle, A.J. and C.J. Stanley, Eds. (1993) Quantitative data file for ore minerals, 3rd ed. Chapman & Hall, London, 283. (8) Pekov, I.V. (1998) Minerals first discovered on the territory of the former Soviet Union. Ocean Pictures, Moscow, 113.