Cookeite LiAl$_4$(Si$_3$Al)O$_{10}$(OH)$_8$

Crystal Data: Triclinic. Point Group: T. Pseudo-hexagonal platy crystals; curved, radial scales, spherulites, barrel-shaped, fibrous. Twinning: Around [310], composition plane {001}.

Physical Properties: Cleavage: {001}, perfect. Tenacity: Flexible but inelastic. Hardness = 2.5–3.5 D(meas.) = 2.58–2.69 D(calc.) = 2.968

Optical Properties: Transparent to translucent. Color: White, yellowish green, pink, brown; in thin section, colorless to pale green or pink. Luster: Pearly or silky. Optical Class: Biaxial (+); rarely with biaxial sectors around a uniaxial core. Pleochroism: X$=$Y$=$Z$=$ pale green to pink; X$=$Y$>$Z. Orientation: Y$=$b; X$^=$a$= 0^\circ \pm 3^\circ$; Z$^=$a$= 90^\circ \pm 87^\circ$. Dispersion: $r < v$. Absorption: $X = Y > Z$. $\alpha = 1.572–1.578 \ \beta = 1.579–1.584 \ \gamma = 1.589–1.595$ 2V(meas.) = 0°–80°

Cell Data: Space Group: C1. a = 5.14 \ b = 8.90 \ c = 14.15 \ \alpha = 90^\circ 33' \ \beta = 90^\circ 12' \ \gamma = 90^\circ \ Z = 2

X-ray Powder Pattern: Londonderry, Western Australia. 2.315 (10), 4.70 (9), 3.52 (9), 14.1 (8), 7.05 (7), 2.505 (7), 1.489 (7)

Chemistry: (1) (2) (1) (2)
\begin{align*}
\text{SiO}_2 & = 33.40 \quad 38.26 & \text{CaO} & = 0.45 \\
\text{Al}_2\text{O}_3 & = 47.47 \quad 44.28 & \text{Li}_2\text{O} & = 3.12 \quad 2.00 \\
\text{Fe}_2\text{O}_3 & = 0.00 \quad 1.31 & (\text{Na}, \text{K})_2\text{O} & = 0.09 \\
\text{FeO} & = 0.71 \quad 0.48 & \text{H}_2\text{O}^+ & = 14.98 \quad 13.00 \\
\text{MnO} & = \text{trace} & \text{H}_2\text{O}^- & = 0.23 \\
\text{MgO} & = 0.20 & \text{Total} & = 100.65 \quad 99.33
\end{align*}

(1) Kalbinsky Range, Ural Mountains, Russia; corresponds to (Li$_{1,11}$Na$_{0,02}$K$_{0,01}$)$_{\Sigma = 1.14}$ \ (Al$_{3,88}$Fe$_{0,03}$Ca$_{0,04}$Mg$_{0,03}$)$_{\Sigma = 4.01}$ \ (Si$_{2,95}$Al$_{1,05}$)$_{\Sigma = 4.00}$ \ (OH)$_8$. (2) Djalair deposit, “Middle Asia,” Russia; corresponds to Li$_{0,7}$ \ (Al$_{3,38}$Fe$_{0,09}$Fe$_{0,09}$)$_{\Sigma = 4.09}$ \ (Si$_{3,38}$Al$_{0,62}$)$_{\Sigma = 4.00}$ \ (OH)$_{10,35}$.

Mineral Group: Chlorite group.

Occurrence: A late-stage hydrothermal alteration product of lithium-bearing minerals in pegmatites; a primary hydrothermal vein mineral.

Association: Lepidolite, spodumene, tourmaline, petalite, quartz, albite, microcline.


Name: For Josiah B. Cooke, Jr. (1827–1894), American mineralogist and chemist, Harvard University, Cambridge, Massachusetts, USA.

Type Material: Yale University, New Haven, Connecticut, USA, 2.3728 (holotype material probably exhausted in analysis).

References: (1) Dana, E.S. (1892) Dana’s system of mineralogy, (6th edition), 625. (2) Deer, W.A., R.A. Howie, and J. Zussman (1963) Rock-forming minerals, v. 3, sheet 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.