

**Davidite-(La)****(La, Ce)(Y, U)(Ti, Fe<sup>3+</sup>)<sub>20</sub>(O, OH)<sub>38</sub>**

©2001-2005 Mineral Data Publishing, version 1

**Crystal Data:** Hexagonal; commonly metamict. *Point Group:* 3 or  $\bar{3}$ . As complex but rough crystals, to 30 cm, flattened {0001}, cuboidal, or pyramidal; as irregular masses and grains. *Twining:* Common about [11 $\bar{2}$ 0].

**Physical Properties:** *Fracture:* Subconchoidal to uneven. *Tenacity:* Brittle. Hardness =  $\sim$ 6 D(meas.) = 4.33–4.48 D(calc.) = 4.49 May be radioactive.

**Optical Properties:** Opaque, translucent in very thin fragments. *Color:* Black to grayish black, brownish black, dark brown, or reddish when altered; brown or reddish brown in transmitted light. *Streak:* Grayish black to dark brown. *Luster:* Vitreous to submetallic, shining.

*Optical Class:* Isotropic when metamict.  $n = \sim$ 2.3

R: (400) 19.4, (420) 19.0, (440) 18.6, (460) 18.1, (480) 17.8, (500) 17.5, (520) 17.3, (540) 17.2, (560) 17.0, (580) 17.0, (600) 16.9, (620) 16.8, (640) 16.8, (660) 16.8, (680) 16.7, (700) 16.6

**Cell Data:** *Space Group:*  $R\bar{3}$ .  $a = 10.32$ – $10.41$   $c = 20.85$ – $21.00$   $Z = 3$

**X-ray Powder Pattern:** Quijotoa Mountains, Arizona, USA; reconstituted by heating. 2.895 (100), 3.42 (70), 2.850 (60), 3.065 (50), 2.248 (50), 3.00 (40), 2.480 (40)

<b>Chemistry:</b>		(1)	(2)	(1)	(2)	(1)	(2)
Nb <sub>2</sub> O <sub>5</sub>			0.19	Sc <sub>2</sub> O <sub>3</sub>	0.18	MnO	0.04
Ta <sub>2</sub> O <sub>5</sub>			0.04	Y <sub>2</sub> O <sub>3</sub>	1.86	ZnO	0.04
V <sub>2</sub> O <sub>5</sub>	2.88	0.42		La <sub>2</sub> O <sub>3</sub>	3.35	PbO	0.69
TiO <sub>2</sub>	51.74	54.88		CeO <sub>2</sub>	3.06	MgO	0.10
ZrO <sub>2</sub>	0.07	0.37		Ce <sub>2</sub> O <sub>3</sub>		CaO	0.23
HfO <sub>2</sub>	0.51			Nd <sub>2</sub> O <sub>3</sub>	0.35	SrO	0.02
ThO <sub>2</sub>	0.05	0.73		RE <sub>2</sub> O <sub>3</sub>	[0.88]	K <sub>2</sub> O	0.03
UO <sub>2</sub>	6.42	4.94		Fe <sub>2</sub> O <sub>3</sub>	25.30		
Al <sub>2</sub> O <sub>3</sub>	0.22	0.41		Cr <sub>2</sub> O <sub>3</sub>	1.21		
					0.88	Total	[98.98] [100.51]

(1) Olary, South Australia; by electron microprobe, total Fe as Fe<sub>2</sub>O<sub>3</sub>, corresponds to (La, Ce, RE)<sub>0.90</sub>(U<sub>0.44</sub>Y<sub>0.31</sub>Ca<sub>0.08</sub>Pb<sub>0.06</sub>)<sub>Σ=0.89</sub>(Ti<sub>12.07</sub>Fe<sub>5.9</sub>V<sub>0.59</sub>Cr<sub>0.3</sub>Al<sub>0.08</sub>Mg<sub>0.05</sub>)<sub>Σ=18.99</sub>(O, OH)<sub>38</sub>. (2) Quijotoa Mountains, Arizona, USA; by electron microprobe, total Fe as Fe<sub>2</sub>O<sub>3</sub>, corresponds to (La, Ce, RE)<sub>0.91</sub>[U<sub>0.33</sub>Y<sub>0.25</sub>Ca<sub>0.20</sub>(Sr, Th, Pb)<sub>0.09</sub>]<sub>Σ=0.87</sub>[Ti<sub>12.53</sub>Fe<sub>5.97</sub>Mg<sub>0.24</sub>Cr<sub>0.21</sub>Al<sub>0.14</sub>(Mn, V, Zr, Nb, Sc)<sub>0.23</sub>]<sub>Σ=19.32</sub>(O, OH)<sub>38</sub>.

**Mineral Group:** Crichtonite group.

**Occurrence:** A primary mineral in high-temperature hydrothermal veins; in norite and anorthosite; in alkalic rocks and also granite pegmatites and carbonatites.

**Association:** Rutile, titanite, magnetite, ilmenite, apatite, tourmaline, epidote, albite, calcite.

**Distribution:** In Australia, in the Olary district, at Radium Hill, Crocker's Well, and Billeroo Station, South Australia, and from Thackeranga, Broken Hill, New South Wales. In the Vishnev Mountains, Southern Ural Mountains, Russia. At Bek-tau Alta, Kazakhstan, From Iveland, Norway. At Björko, Västervik district, Sweden. At Villanueva del Fresno, Spain. In Mozambique, very large crystals from Mavusi, Tete district; at Matema and Campangula. In the Kirumba massif, Kivu Province, Congo (Zaire). In the USA, from the Quijotoa Mountains, Pima Co., Arizona. At the Faraday mine, Bancroft, Ontario, and elsewhere in Canada. A few other localities are known.

**Name:** For Professor Tannatt William Edgeworth David (1858–1934), Australian geologist, University of Sydney, Sydney, Australia.

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.

**References:** (1) Palache, C., H. Berman, and C. Frondel (1944) Dana's system of mineralogy, (7th edition), v. I, 542. (2) Frondel, C. (1958) Systematic mineralogy of uranium and thorium. U.S. Geol. Sur. Bull. 1064, 337–341. (3) Pabst, A. (1961) X-ray crystallography of davidite. Amer. Mineral., 46, 700–718. (4) Gatehouse, B.M., I.E. Grey, I.H. Campbell, and P.R. Kelly (1978) The crystal structure of lovingite—a new member of the crichtonite group. Amer. Mineral., 63, 28–36. (5) Gatehouse, B.M., I.E. Grey, and P.R. Kelly (1979) The crystal structure of davidite. Amer. Mineral., 64, 1010–1017.