

**Crystal Data:** Hexagonal. *Point Group:*  $\bar{3} 2/m$ . As rhombohedra to 1 mm.

**Physical Properties:** *Cleavage:* Good {10 $\bar{1}$  1}. *Fracture:* n.d. *Tenacity:* n.d.  
Hardness = 3-3.5 D(meas.) = 3.75-3.95 D(calc.) = 3.75

**Optical Properties:** Transparent. *Color:* Dark green to blue-green. *Streak:* n.d.  
*Luster:* Vitreous.  
*Optical Class:* Uniaxial (-).  $\epsilon = 1.817(2)$   $\omega = 1.825(2)$   
*Pleochroism:* Green to greenish blue, weak. *Absorption:*  $O > E$ .

**Cell Data:** *Space Group:*  $R \bar{3} m$ .  $a = 6.834(1)$   $c = 14.075(2)$   $Z = 3$

**X-ray Powder Pattern:** Mina Los Tres Presidentes, Chile.  
2.764 (100), 5.466 (55), 2.266 (36), 1.709 (18), 4.702 (14), 2.730 (13), 1.820 (13)

<b>Chemistry:</b>	(1)
CuO	56.1
ZnO	18.2
Cl	17.2
H <sub>2</sub> O	12.5
<u>-O = Cl<sub>2</sub></u>	<u>3.9</u>
Total	100.1

(1) Mina LosTres Presidentes, Chile; average of 5 electron microprobe analyses, H<sub>2</sub>O by TGA; corresponding to Cu<sub>3.02</sub>Zn<sub>0.96</sub>(OH)<sub>5.91</sub>H<sub>0.03</sub>Cl<sub>2.08</sub>.

**Polymorphism & Series:** Forms a solid-solution series with Zn-stabilized paratacamite.

**Occurrence:** A secondary mineral in the oxidation zone of polymetallic mineral deposits.

**Association:** Gypsum, opal, diopside (Chile); wulfenite, hemimorphite, chrysocolla, rosasite, iranite, diabolite (Iran).

**Distribution:** Mina Los Tres Presidentes, Sierra Gorda, Chile; at the Kali Kafi and Chah Khouni mines, Anarak, Iran.

**Name:** Honors G.F. Herbert Smith (1872-1953), British Museum (Natural History), who discovered paratacamite.

**Type Material:** Natural History Museum, London, England; BM 2003.33.

**References:** (1) Braithwaite, R.S.W., K. Mereiter, W.H. Paar, and A.M. Clark (2004) Herbertsmithite, Cu<sub>3</sub>Zn(OH)<sub>6</sub>Cl<sub>2</sub>, a new species, and the definition of paratacamite. *Mineral. Mag.*, 68, 527-539. (2) (2005) *Amer. Mineral.*, 90, 519 (abs. ref. 1).