

## Lead-tellurium oxysalts from Otto Mountain near Baker, California: II. Housleyite, $\text{Pb}_6\text{CuTe}_4\text{O}_{18}(\text{OH})_2$ , a new mineral with Cu-Te octahedral sheets

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### ABSTRACT

Housleyite,  $\text{Pb}_6\text{CuTe}_4\text{O}_{18}(\text{OH})_2$ , is a new tellurate from Otto Mountain near Baker, California, named in honor of Robert M. Housley. The new mineral occurs on fracture surfaces and in small vugs in brecciated quartz veins. Housleyite is directly associated with acanthite, cerussite, gold, iodyargyrite, khinite-4O, wulfenite, and three other new tellurates: markcooperite, ottoite, and thorneite. A variety of other secondary minerals occur in the veins, including three other new secondary tellurium minerals, paratimroseite, telluroperite, and timroseite. Housleyite is monoclinic, space group  $P2_1/n$ ,  $a = 7.8552(5)$ ,  $b = 10.4836(7)$ ,  $c = 11.0426(8)$  Å,  $\beta = 95.547(2)^\circ$ , and  $Z = 2$ . Crystals are prismatic to bladed with elongation parallel to **b** and typically occur in bow tie-like aggregates, drusy balls, and irregular sprays. It is pale to medium greenish blue and transparent, with pale blue streak and adamantine luster. Mohs hardness is estimated at 3. The mineral is brittle, with an irregular fracture. Cleavage was not observed, but is likely on  $\{10\bar{1}\}$ . The calculated density is 7.845(1) g/cm<sup>3</sup>. Housleyite is biaxial (+), with  $2V = 50^\circ$  to  $60^\circ$  and strong inclined dispersion,  $r > v$ , but indices of refraction are too high to be measured. The optic orientation is  $Y = \mathbf{b}$ ,  $Z \wedge c \approx 40^\circ$  in obtuse  $\beta$  and pleochroism is  $Y$  (medium green-blue)  $> Z$  (light green-blue)  $> X$ . Energy dispersive spectroscopy provided PbO 62.53, CuO 3.77, TeO<sub>3</sub> 32.85, H<sub>2</sub>O 0.84 (structure), total 99.99 wt%; the empirical formula (based on O = 20) is  $\text{Pb}_{5.99}\text{Cu}_{1.01}\text{Te}_{4.00}\text{O}_{18}(\text{OH})_2$ . The strongest powder X-ray diffraction lines are [ $d_{\text{obs}}$  in Å ( $hkl$ )  $I$ ]: 3.336 ( $\bar{2}02$ , 031, 122) 69, 3.292 ( $\bar{1}13$ ) 50, 3.195 (130, 103) 100, 3.068 ( $\bar{2}21$ , 202) 47, 3.007 (023) 49, 2.942 (032, 212) 80, 2.723 (123,  $\bar{2}13$ , 132) 29, 2.580 (230,  $\bar{3}01$ ,  $\bar{2}31$ ) 38. The crystal structure ( $R_1 = 0.028$ ) consists of corner-sharing chains of TeO<sub>6</sub> octahedra along [101] linked into slabs parallel to  $\{10\bar{1}\}$  by sharing edges and corners with strongly Jahn-Teller (4+2) distorted and severely skewed CuO<sub>6</sub> octahedra. Lead (Pb) atoms in lopsided nine- and elevenfold coordinations form additional links within and between the octahedral sheets.

**Keywords:** Housleyite, new mineral, tellurate, crystal structure, Otto Mountain, California