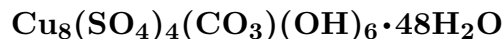


# Nakauriite



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**Crystal Data:** Orthorhombic. *Point Group:* n.d. Crystals are fibers, to 3 mm, in sprays and aggregates.

**Physical Properties:** Hardness = n.d.  $D(\text{meas.}) = 2.39(2)$   $D(\text{calc.}) = 2.35$

**Optical Properties:** Semitransparent. *Color:* Sky-blue.

*Optical Class:* Biaxial (-). *Pleochroism:*  $X$  = colorless;  $Y$  = pale greenish blue;

$Z$  = pale sky-blue to very pale blue. *Orientation:* Positive elongation, parallel extinction.

*Dispersion:*  $r < v$ .  $\alpha = 1.585\text{--}1.597$   $\beta = 1.604\text{--}1.612$   $\gamma = 1.612\text{--}1.618$   $2V(\text{meas.}) = 60^\circ\text{--}70^\circ$   
 $2V(\text{calc.}) = 65.3^\circ$

**Cell Data:** *Space Group:* n.d.  $a = 14.585$   $b = 11.47$   $c = 16.22$   $Z = 2$

**X-ray Powder Pattern:** Nakauri, Japan.

7.31 (100), 3.652 (20), 2.367 (16), 1.9148 (16), 4.840 (14), 3.936 (14), 2.397 (14)

## Chemistry:

|                                |          |
|--------------------------------|----------|
|                                | (1)      |
| SO <sub>3</sub>                | 16.23    |
| CO <sub>2</sub>                | 2.28     |
| Fe <sub>2</sub> O <sub>3</sub> | 0.06     |
| MnO                            | 0.09     |
| NiO                            | 0.88     |
| CuO                            | 32.12    |
| ZnO                            | 0.03     |
| H <sub>2</sub> O <sup>+</sup>  | 45.31    |
| H <sub>2</sub> O <sup>-</sup>  | 3.01     |
| Total                          | [100.01] |

(1) Nakauri, Japan; by AA, CO<sub>2</sub> by volumetric analysis; after deduction of estimated 67% chrysotile, corresponds to  $(\text{Cu}_{7.77}\text{Ni}_{0.23}\text{Mn}_{0.02})_{\Sigma=8.01}(\text{SO}_4)_{3.90}(\text{CO}_3)_{1.00}(\text{OH})_{6.23} \cdot 48.4\text{H}_2\text{O}$ .

(2) Material from Gabbs, Nevada and the Cedar Hill quarry, Pennsylvania, USA, and the Hagdale quarry, Scotland, contains only traces to no detectable SO<sub>4</sub>.

**Occurrence:** As fracture fillings in serpentinite (Nakauri, Japan); on chromatite from serpentinite (Hagdale quarry, Scotland).

**Association:** Chrysotile, magnetite, artinite, pyroaurite, brochantite, malachite (Nakauri, Japan); callaghanite, hydromagnesite (Gabbs, Nevada, USA); antigorite, magnesite, talc, quartz (Cedar Hill quarry, Pennsylvania, USA); chrysotile, theophrastite, pentlandite, heazlewoodite (Hagdale quarry, Scotland).

**Distribution:** From an abandoned mine at Nakauri, about 6 km southeast of Shinshiro, Aichi Prefecture, Japan. In the USA, good crystals at the Gabbs mine, Gabbs district, Nye Co., Nevada; from the Cedar Hill quarry, Lancaster Co., Pennsylvania. In the Hagdale quarry, Unst, Shetland Islands, Scotland.

**Name:** For the original material found at Nakauri, Japan.

**Type Material:** National Science Museum, Tokyo, Japan, M-24586; National Museum of Natural History, Washington, D.C., USA, 136584.

**References:** (1) Suzuki, J., M. Ito, and T. Sugiura (1976) A new copper sulfate-carbonate hydroxide hydrate mineral,  $(\text{Mn}, \text{Ni}, \text{Cu})_8(\text{SO}_4)_4(\text{CO}_3)(\text{OH})_6 \cdot 48\text{H}_2\text{O}$ , from Nakauri, Aichi Prefecture, Japan. *J. Japan. Assoc. Mineral. Petrol. Econ. Geol.*, 71(7), 183–192 (in English). (2) (1977) *Amer. Mineral.*, 62, 594 (abs. ref. 1). (3) Braithwaite, R.S.W. and P. Pritchard (1983) Nakauriite from Unst, Shetland. *Mineral. Mag.*, 47, 84–85. (4) Foord, E.E., R.B. Finkelman, A.H. Feinberg, I. O'Neill, A.V. Heyl, D.K. Smith, and B. Brookmyer (1985) Nakauriite from Cedar Hill quarry, Lancaster County: a new mineral for Pennsylvania. *Friends of Mineralogy, Pennsylvania Chapter, Newsletter* 13(4), 4–12.

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