

Czochralskiite

$\text{Na}_4\text{Ca}_3\text{Mg}(\text{PO}_4)_4$

Crystal Data: Orthorhombic. *Point Group:* $2/m$ $2/m$ $2/m$. As oval and amoeboid aggregates, with individual grains to 0.15 mm.

Physical Properties: *Tenacity:* Brittle. *Fracture:* Irregular, conchoidal. Hardness = 4-5 VHN = 403(18) (50 g load). D(meas.) = n.d. D(calc.) = 3.132

Optical Properties: Transparent. *Color:* Colorless, gray with light internal reflections in reflected light. *Streak:* White. *Luster:* Vitreous.

Optical Class: Biaxial (+). $\alpha = 1.608(2)$ $\beta = 1.611(2)$ $\gamma = 1.616(2)$ $2V(\text{meas.}) = 70(10)^\circ$ $2V(\text{calc.}) = 76^\circ$ *Dispersion:* Very weak. *Orientation:* $X = a$, $Y = b$, $Z = c$.

Cell Data: *Space Group:* $Pnma$. $a = 17.9230(2)$ $b = 10.7280(2)$ $c = 6.7794(1)$ $Z = 4$

X-ray Powder Pattern: Calculated pattern.

2.726 (100), 2.602 (83), 2.679 (63), 3.802 (48), 1.901 (44), 3.728 (31), 2.240 (16)

Chemistry:	(1)
P_2O_5	46.28
FeO	0.32
MnO	0.16
CaO	27.59
MgO	6.21
K ₂ O	0.09
Na_2O	20.04
Total	100.69

(1) Morasko IAB-MG iron meteorite; average of 12 electron microprobe analyses supplemented by Raman spectroscopy; corresponding to $\text{Na}_{3.97}\text{Ca}_{3.02}\text{Mg}_{0.95}\text{Mn}^{2+}_{0.01}\text{K}_{0.01}\text{Fe}^{2+}_{0.03}(\text{PO}_4)_{4.00}$.

Occurrence: A primary phase in graphite-bearing nodules, in an iron meteorite.

Association: Graphite, triolite, schreibersite, cohenite, merrillite, brianite, fluorapatite, kamacite, taenite, tetrataenite.

Distribution: From the Morasko IAB-MG iron meteorite.

Name: Honors Jan Czochralski (1885-1953), a Polish chemist, crystallographer and metallurgist, the inventor of the method of production of synthetic silicon crystals known as Czochralski's method.

Type Material: Mineralogical Museum, University of Wrocław, Poland (MM UWf IV7870).

References: (1) Karwowski, Ł., R. Kryza, A. Muszyński, J. Kusz, K. Helios, P. Drożdżewski, and E.V. Galuskin (2016) Czochralskiite, $\text{Na}_4\text{Ca}_3\text{Mg}(\text{PO}_4)_4$, a second new mineral from the Morasko IAB-MG iron meteorite (Poland). *Eur. J. Mineral.*, 28(6), 969-977. (2) (2017) Amer. Mineral., 102, 1566 (abs. ref. 1).