

Chromo-alumino-povondraite, $\text{NaCr}_3(\text{Al}_4\text{Mg}_2)(\text{Si}_6\text{O}_{18})(\text{BO}_3)_3(\text{OH})_3\text{O}$, a new mineral species of the tourmaline supergroup

LEONID REZNITSKII¹, CHRISTINE M. CLARK², FRANK C. HAWTHORNE^{2,*}, JOEL D. GRICE³,
HENRIK SKOGBY⁴, ULF HÅLENIUS⁴ AND FERDINANDO BOSI^{4,5,*}

¹Institute of the Earth's Crust, Siberian Branch, Russian Academy of Science, Lermontova str., 128, 664033 Irkutsk, Russia

²Department of Geological Sciences, University of Manitoba, Winnipeg, Manitoba R3T 2N2, Canada

³Research Division, Canadian Museum of Nature, P.O. Box 3443A, Station "D", Ottawa, Ontario K1P 6P4, Canada

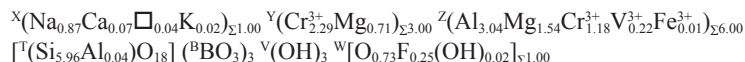
⁴Department of Geosciences, Swedish Museum of Natural History, Box 50007, SE-10405 Stockholm, Sweden

⁵Dipartimento di Scienze della Terra, Sapienza Università di Roma, Piazzale Aldo Moro, 5, I-00185 Rome, Italy

ABSTRACT

Chromo-alumino-povondraite, $\text{NaCr}_3(\text{Al}_4\text{Mg}_2)(\text{Si}_6\text{O}_{18})(\text{BO}_3)_3(\text{OH})_3\text{O}$, is a new mineral of the tourmaline supergroup. It is found in metaquartzites of the Pereval marble quarry (Sludyanka, Lake Baikal, Russia) in association with dravite, oxy-chromium-dravite, oxy-dravite, quartz, calcite, chromphyllite, eskolaite, chromite, uvarovite, chromian phlogopite, and pyroxenes of the diopside-kosmochlor series, Cr-bearing tremolite, Cr-bearing titanite, Cr-bearing rutile, and pyrite.

Crystals are green and transparent with a vitreous luster, and exhibit a pale-green streak and conchoidal fracture. Chromo-alumino-povondraite has a Mohs hardness of approximately 7½, and a calculated density of 3.227 g/cm³. In plane-polarized light, chromo-alumino-povondraite is pleochroic (*O* = emerald green and *E* = pale yellowish green) and uniaxial negative: $\omega = 1.745(5)$, $\epsilon = 1.685(5)$. Chromo-alumino-povondraite is rhombohedral, space group *R3m*, with the unit-cell parameters *a* = 16.0277(2), *c* = 7.3085(1) Å, *V* = 1625.93(5) Å³, *Z* = 3. Crystal-chemical analysis resulted in the empirical structural formula:



The crystal structure of chromo-alumino-povondraite was refined to an *R1* index of 1.68% using 1803 unique reflections collected with MoK α X-radiation. Ideally, chromo-alumino-povondraite is related to oxy-dravite and oxy-chromium-dravite by the homovalent substitution $\text{Cr}^{3+} \leftrightarrow \text{Al}^{3+}$. Tourmaline with chemical compositions classified as chromo-alumino-povondraite can be either Al-dominant or Cr-dominant as a result of the compositional boundaries along the solid solution between Al and Cr³⁺ that are determined at ^{Y+Z}(Cr_{1.5}Al_{1.5}), corresponding to Na^Y(Cr_{1.5}Al_{1.5})^Z(Al₄Mg₂)Si₆O₁₈(BO₃)₃(OH)₃O, and ^{Y+Z}(Cr₃Al₂), corresponding to Na^Y(Cr₃)^Z(Cr₂Al₂Mg₂)Si₆O₁₈(BO₃)₃(OH)₃O.

Keywords: Chromo-alumino-povondraite, tourmaline, new mineral species, electron microprobe, crystal-structure refinement, infrared spectroscopy, optical absorption spectroscopy, Sludyanka, Russia