

Ponomarevite, $K_4Cu_4OCl_{10}$, a Naturally occurring Mineral with a $[Cu_4O]$ Core –Ancestor of Many Synthetic Cluster Compounds
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The crystal structure of the title compound was determined by de Boer et al.[1]. Later the mineral Ponomarevite has been identified in fumarole deposits in Kamchatka, Russia, its crystal structure being essentially identical with that of the synthetic compound [2]. The Russian authors, however, appear to have not known the earlier work.

Ponomarevite is composed of Cu_4OCl_{10} clusters with a Cu_4 tetrahedron centered by oxygen. The two-valent copper has fivefold distorted trigonal-bipyramidal coordination by one terminal and three bridging chlorine atoms and the centering oxygen.

Many other related compounds with clusters of the type $[Cu_4OCl_6X_4]$, with X being always terminal and mainly organic or halogen, have been reported without making reference to Ponomarevite. All these cluster compounds are in principle very interesting from a magnetic point of view.

In this paper the crystal structure of the new compound $[Me_4N]_4[Cu_4O(OCN)_{10}]$ is reported ($a=16.632$, $b=12.632$, $c=20.557\text{Å}$, $\beta=101.34$, SG. $P2_1/a$, $Z=4$). In this compound the cluster differs from all the ones known by having only two cyanato ligands with oxygens bridging opposite edges of the $[Cu_4O]$ tetrahedron, while the other eight cyanato groups are terminal. The copper has thus a quadratic coordination by four oxygens.

[1] De Boer J.J. et al., *Acta Cryst.*, 1972, **B28**, 3436. [2] Semenova T. F. et al., *Doklady Akademii Nauk SSSR* 1989, **304**, 427.

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