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THE CRYSTAL STRUCTURE OF CATTIITE,  $\text{Mg}_3(\text{PO}_4)_2(\text{H}_2\text{O})_{22}$

The crystal structure of cattiite,  $\text{Mg}_3(\text{PO}_4)_2(\text{H}_2\text{O})_{22}$  (triclinic,  $P\bar{1}$ ,  $a = 6.9025(3)$ ,  $b = 6.9186(3)$ ,  $c = 16.0920(7)$  Å,  $\alpha = 89.808(1)$ ,  $\beta = 98.353(1)$ ,  $\gamma = 119.423(1)^\circ$ ,  $V = 660.20(5)$  Å<sup>3</sup>,  $Z = 2$ ) refined to  $R_1 = 0.040$  on the basis of 6337 independent observed reflections. In the crystal structure of cattiite, there are two symmetrically independent Mg sites, tetrahedrally coordinated by six water molecules to form octahedral complexes  $[\text{Mg}(\text{H}_2\text{O})_6]^{2+}$ . From 22  $\text{H}_2\text{O}$  molecules present in the structure for a single formula unit, four are not bonded to the  $\text{Mg}^{2+}$  cations and are located between the  $[\text{Mg}(\text{H}_2\text{O})_6]$  octahedral complexes. In the whole, the structure consists of layers of two types. The **A** layer consists of  $[\text{Mg}(\text{H}_2\text{O})_6]^{2+}$  groups and molecules  $\text{H}_2\text{O}_{13}$ . The **B** layer contains  $[\text{Mg}_2(\text{H}_2\text{O})_6]^{2+}$  octahedra,  $(\text{PO}_4)^{3-}$  tetrahedra and molecules  $\text{H}_2\text{O}_6$ . Alternation of these layers in the structure may be represented as the sequence **ABB'ABB'A...** or **[ABB']**, where **B'** is a layer equivalent but symmetrical to **B**. Natural cattiite is an analogue of synthetic  $\text{Mg}_3(\text{PO}_4)_2(\text{H}_2\text{O})_{22-141}$ . The difference between them is in the mutual location of octahedrons in different layers relatively one to another.

*Key words:* cattiite, crystal structure, polytypism, Kovdor alkaline massif, Kola peninsula, phosphates.