

Crystal chemistry of Cr³⁺-V³⁺-rich clinopyroxenes

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ABSTRACT

Eleven clinopyroxenes from the Sludyanka Crystalline Complex in Russia belonging to the ternary join NaVSi₂O₆-NaCrSi₂O₆-CaMgSi₂O₆ (natalyite-kosmochlor-diopside) were studied by means of X-ray single crystal diffractometry and electron probe microanalysis.

The crystal chemical data show that the T site is almost completely occupied by Si, so that the Na (V³⁺,Cr³⁺) → Ca Mg substitution mechanism ensures charge balance. Changes in M1 site geometry are explained by the aggregate ionic radius, and are influenced by Mg occupancy and V³⁺/(V³⁺ + Cr³⁺) ratio. The M2 site geometry depends both on Na content and on the (V³⁺,Cr³⁺) → Mg substitution in M1 site. Changes in M2-O3c1 bond length are mainly related to Na content, whereas the longest M2-O3c2 bond lengths are significantly affected by the V³⁺/(V³⁺ + Cr³⁺) ratio of the M1 site. The T site geometry is affected by chemical and geometrical variations at the M1 and M2 sites, principally the M1 site occupancy.