The IMA-CNMNC Dominant-Constituent Rule Revisited and Extended

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The criteria for the definition of a new mineral species currently used by the IMA-CNMNC involve what should now be called the rule of the dominant constituent: a mineral is a distinct species if the set of dominant constituents at the sites in the crystal structure is distinct from that of any other mineral with the same structural arrangement. The term 'constituent' may designate atoms (cations or anions), molecular groups, or vacancies.

The current dominant-constituent rule is applied in most approved new-mineral proposals. On the one hand, this rule has sometimes been applied rigorously, thus leading to some proliferation of new mineral species. On the other hand, new nomenclature systems for minerals of the arrojadite and epidote groups have recently been approved by the CNMNC which do not follow the current definition of the dominant-constituent rule.

The aim of this study is to clarify, revise and extend the dominant-constituent rule, taking into account the recent problems encumbering or prohibiting a strict application of the rule. The nomenclature of members in complete solid-solution series remains in principle determined by the application of the dominant-constituent rule, but the rule has been extended with the dominant-valency rule by considering a group of atoms with the same valency state as a single constituent. The old dominant-constituent rule (with only atoms, molecular groups or vacancies as constituents) can merely be applied without problems or errors to solid-solution series involving only homovalent substitutions or singular coupled heterovalent substitutions. The extension with the dominant-valency rule is imposed by all cases of coupled heterovalent/homovalent substitutions. The application of the old dominant-constituent rule in such systems is a possible source of problems or errors, as illustrated by examples given in this study. The extension with the dominant-valency rule is necessary to establish charge-balanced end-member formulae for solid-solution series with complex substitution mechanisms.

The existence of end-members with valency-imposed double-site occupancy, produced by heterovalent substitution mechanisms, is now allowed by the new guidelines, as well as the grouping of sites with the same crystal-chemical behavior.

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