Origin and chemical composition of sudoites in Permian red beds from the eastern Iberian Range, Spain: relation to very low grade metamorphic conditions

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Sudoite has lately been reported to be a characteristic mineral replacing dickite in Triassic metamorphic rocks from Betic Cordilleras, Spain (Ruiz-Cruz and Sanz de Galdeano, 2005; Ruiz-Cruz et al., 2005). Sudoite is also a common mineral in Permian coarse-grained, very low-grade metamorphic rocks from the eastern Iberian Range, where typically forms the illite±sudoite±pyrophyllite assemblage (Martín-Martín, 2004; Martín-Martín et al., 2006). XRD, SEM-EDS and microprobe analysis have been used to study the origin and chemical composition of sudoites from this assemblage.

Textural observations indicate that sudoite replaces kaolin minerals stacks as well as expanded and kaolinitized mica grains. Although only small amounts of dickite, presumably dickite, persist in the studied rocks, it appears to be the precursor phase for sudoite as suggested by Daniels and Altaner, 1990 and Ruiz-Cruz et al., 2005. Pyrophyllite is also observed replacing dickite although its paragenetic relation with sudoite is not well constrained here.

Microprobe analyses of sudoite reveal homogeneous chemical composition in a sample scale, with Mg and Fe contents ranging between 9.82-11.46 %.wt. and 4-4.91 %.wt. respectively. The structural formulae calculated on the basis of $O_{10}(OH)_8$ and all Fe considered to be ferrous, results in Si^{IV} contents between 3.08 and 3.22 apfu, Al^{VI} contents between 2.96 and 3.11 apfu and Fe/(Fe+Mg) ratios ranging between 0.17 and 0.25. Thus, the main chemical variation is defined by the $Fe^{2+}Mg_{-1}$ vector, as in most trioctahedral chlorites.

Although sudoite from the Iberian Range shows a more restricted chemical composition than that described by Ruiz-Cruz et al. (2005) in the Betic Range, our results suggest a common origin, from a dickite precursor, at conditions ranging from late diagenesis to very low-grade metamorphism.

References

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