
Structures, Compositions, and X-ray Diffraction Identification of Dioctahedral Chlorites

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Abstract: Al-rich di, trioctahedral chlorite exists as the species cookeite and sudoite. Di, dioctahedral chlorite exists as the species donbassite. Cookeite has essential Li in its structure, sudoite has essential Mg, and donbassite has only small amounts of either element. To date, sudoite has been reported to have only *I**b*** structural units and donbassite to have only *I**a*** structural units. Cookeite is based primarily on *I**a*** structural units, but *I**b*** units are present in specimens from two localities. Most Al-rich chlorite species have regular-stacking “r” or “s” 2-layer stacking sequences, but 1-layer *I**a***-2 and *I**a***-6 polytypes also are known. The structural units (*I**a*** or *I**b***) and the specific stacking sequences can be explained by a combination of local charge balance and minimization of cation-cation repulsion involving the interlayer and tetrahedral cations. X-ray powder diffraction data are adequate to differentiate Al-rich chlorite from trioctahedral chlorite and to identify the type of structural unit present, but single crystal study is necessary to identify the 2-layer and 1-layer sequences with certainty.

Key Words: Chemical composition • Chlorite • Cookeite • Crystal structure • Donbassite • Sudoite • X-ray powder diffraction

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