
Reassessment of the Volkonskoite-Chromian Smectite Nomenclature Problem

Eugene E. Foord, Harry C. Starkey, Joseph E. Taggart Jr. and Daniel R. Shawe

U.S. Geological Survey, Federal Center, Denver, Colorado 80225

Abstract: The name volkonskoite was first used in 1830 to describe a bright blue-green, chromium-bearing clay material from the Okhansk region, west of the Ural Mountains, U.S.S.R. Since that time, the name has been applied to numerous members of the smectite group of clay minerals, although the reported chromium content has ranged from 1% to about 30% Cr₂O₃. The name has also been applied to some chromian chlorites. Because volkonskoite has been used for materials that differ not only in their chromium content but also in their basic structure, the species status of the mineral has been unclear.

To resolve this uncertainty, two specimens of volkonskoite from (1) Mount Efimiatsk, the type locality in the Soviet Union (USNM 16308) and (2) the Okhansk region in the Perm Basin, U.S.S.R. (USNM R4820), were examined by several mineralogical techniques. Neotype sample 16308 has the following structural formula: (Ca 0.11 Mg 0.11 Fe 2+ K 0.02)(Cr 1.18 Mg 0.78 Fe 3+ Ca 0.02)(Si 3.50 Al 0.51) O 10 (OH) 2 · 3.64 H 2 O. Sample R4820 has the following structural formula: (Ca 0.25 Mg 0.05 Fe 2+ K 0.03 Mn 0.01)(Cr 1.07 Mg 0.75 Fe 3+ (Si 3.59 Al 0.43) O 10 (OH) 2 · 4.22 H 2 O. Mössbauer spectroscopy indicates that 91% and 98% of the iron is present as Fe³⁺ in samples 16308 and R4820, respectively. X-ray powder diffraction patterns of both samples have broad lines corresponding to minerals of the smectite group.

On the basis of these data, volkonskoite appears to be a dioctahedral member of the smectite group that contains chromium as the dominant cation in the octahedral layer. Smectites containing less than this amount of octahedral chromium should not be called volkonskoite, but should be named by chemical element adjectives, e.g., chromian montmorillonite, chromian nontronite.

Key Words: Chlorite • Chromium • Nomenclature • Octahedral cations • Smectite • Volkonskoite

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