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Magnesiochloritoid, and the Fe-Mg series
in the chloritoid group

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Abstract: Magnesiochloritoid is the Mg-dominant member of the chloritoid group. With Mg/(Mg+Fe+Mn) up to 0.82, it occurs in high-pressure metamorphic rocks of the eastern and western Alps in association with talc, kyanite, garnet, chlorite, omphacite, phengite, quartz, etc. It is monoclinic, space group C2/c. Magnesiochloritoid from the Monte Rosa massif, Italy, has the formula (Mg0.65Fe0.35Al4O2(Si04)2(OH)4 (from structure refinement) and a = 9.452(3), b = 5.466(2), c = 18.158(6) Å, ß = 101.47(2)°, (powder data), Z = 4; Dmeas = 3.25(2) g/cm³; biaxial positive, nα = 1.687(2), nβ = 1.690(2), nγ = 1.702(2), 2V = 40-50°, very faint pleochroism (light blue, grey blue, yellowish). The synthetic Mg-end-member grown at 700°C, 33 kbar water pressure shows both the monoclinic and triclinic polytypes; the former has (powder data) a = 9.427(6), b = 5.442(3), c = 18.140(8) Å, ß = 101.12(6)°, the latter a = 9.429(5), b = 5.445(2), c = 9.126(4) Å, α = 96.36(3), ß = 101.12(4), γ = 90.07(4)°, space group C1. The infrared spectrum is given. Chemical and X-ray data for 23 samples of the Fe-Mg series show that the substitution of Mg for Fe results in a decrease of about 0.8 percent for the a and b parameters, 0.3 for c. The highest substitutions known for Al are 0.3 atom by Fe³⁺ and 0.6 atom by Cr³⁺ (pfu.).

Key-words: magnesiochloritoid, new data, chloritoid group, Fe-Mg substitution.

Introduction

The chloritoid group has the general formula (Fe²⁺,Mg,Mn²⁺)₂(Al,Fe³⁺,Cr³⁺,Ga)Al₃O₈[(Si,Ge) O₄]₂(OH)₄ with monoclinic and triclinic polytypes (e.g. van der Plas et al., 1958 ; Jefferson & Thomas, 1978 ; Deer et al., 1982 ; Johan et al., 1983 ; Kiéas & Messiga, 1987). Several names have been used in the literature for the silicate members of the group, as summarised by Simpson (1915) and Halferdahl (1961). Breithaupt (1835) first introduced the name chloritoid for the Fe-dominant member ; the name ottrelite seems now well established for the Mn-dominant member (Fransois, 1978). The name sismondine, originally proposed for a Fe-dominant member (Delesse, 1843), has been sometimes used for Mg-rich, yet Fe-dominant chloritoids (des Cloizeaux, 1884 ; Manasse, 1911 ; Simpson, 1915). Recently, Mg-dominant members have been reported from high-pressure metamorphic terranes, (i) in the ophiolitic zone of Zermatt - Saas Fee, western Alps, by Bearth (1963), who uses indifferently the names Mg-chloritoid, sismondine, magnesium-chloritoid, and by Chinner & Dixon (1973), who call it Mg-chloritoid, (ii)