

High-temperature ammonium white mica from the Betic Cordillera (Spain)

MARÍA DOLORES RUIZ CRUZ^{1,*} AND CARLOS SANZ DE GALDEANO²

¹Departamento de Química Inorgánica, Cristalografía y Mineralogía, Facultad de Ciencias, Universidad de Málaga, 29071 Málaga, Spain

²Instituto Andaluz de Ciencias de la Tierra, CSIC-Universidad de Granada, Facultad de Ciencias, 18071 Granada, Spain

ABSTRACT

High-temperature, ammonium-rich white mica has been identified for the first time in deep Paleozoic (and probably older) polymetamorphic schists from the Internal Zone of the Betic Cordillera (Spain). Ammonium-rich white mica has been characterized by optical microscopy, X-ray diffraction, infrared spectroscopy, elemental analysis, electron microprobe, and scanning and transmission electron microscopy. High-temperature, ammonium-rich white mica shows some significant chemical differences with tobelite formed in hydrothermal and low-temperature metamorphic rocks. Although the average formula, $\text{Ca}_{0.09}\text{Na}_{0.01}\text{K}_{0.15}(\text{NH}_4)_{0.75}(\text{Al}_{1.70}\text{Ti}_{0.01}\text{Fe}_{0.26}\text{Mg}_{0.13})(\text{Si}_{2.99}\text{Al}_{1.01})\text{O}_{10}(\text{OH})_2$, is typical of a dioctahedral mica, the chemical plots reveal a clear deviation toward the trioctahedral field. Thus, the increase in Fe + Mg contents is not accompanied by the parallel increase of Si contents, characteristic of the phengitic substitution, which is characteristic of low-pressure conditions of formation. Chemical differences are also accompanied by notable differences in the optical properties, both features suggesting that the term tobelite is not appropriate for this mica. Ammonium-rich white mica relics only persist in some graphite-rich microdomains, defining the first schistosity. Textural relations indicate that this mica formed during an older pre-Alpine metamorphic episode.

Keywords: Ammonium-rich white mica, Betic Cordillera, muscovite, SEM, TEM-AEM, tobelite