Tephroite from the Val Graveglia metacherts (Liguria, Italy): mineral data and reactions for Mn-silicates and Mn-Ca-carbonates

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Abstract: Tephroite coexists with rhodonite and manganan calcite in the Val Graveglia metacherts, replacing the braunite + quartz (± haematite) assemblages at decreasing oxygen fugacity, as a consequence of circulating CO₂-bearing, Ca-rich, hydrous fluids. Tephroite is almost pure phase (99.25 mol % Te) and rhodonite has 82.4 mol % MnSiO₃. Later fluid infiltration along fractures resulted in the replacement of the tephroite-rhodonite-bearing assemblage by bementite and carbonate, possibly in response to increasing XCO₂. In this study, tephroite is chemically analysed by electron microprobe and examined by X-ray diffraction, optical and DTA methods.

Key-words: tephroite, compositional and optical data, lattice parameters, reaction relations, Eastern Liguria (Italy).

Introduction

Although pure tephroite itself (Mn₂SiO₄) is rare, Mn-rich compositions of the tephroite-fayalite series have been investigated from various occurrences in iron-manganese ore deposits and metamorphosed manganese-rich sediments (Palache, 1937; Yoshimura, 1939; Smith et al., 1944; Lee, 1955; Henriques, 1956; Mason, 1959; Watanabe et al., 1960; Hewett et al., 1961; Segnit, 1962; Howie, 1965; Nambu et al., 1966; Trommsdorff et al., 1970; Peters et al., 1973, 1977; Mossman & Pawson, 1976; Keankeo et al., 1986). Recent data on the forsterite-tephroite series have been reported from a suite of metamorphic samples from Sweden and New Jersey (Francis, 1985). In zinc-iron-manganese ores from Franklin, New Jersey, tephroite containing 1.53 wt% of ZnO has been found (Palache, 1937). The purest tephroites analysed up to now are from Hijiokusu Mine, Japan (Keankeo et al., 1986) (97.30 mol % Te), and from the Hoskins mine, Australia (Ashley, 1989) (97.6-99.5 mol % Te).

In the Val Graveglia metacherts (Northern Apennine, Italy) the occurrence of tephroite has been already reported (Cortesogno et al., 1979). The aim of the present paper is to supplement the mineralogical and chemical data, and to examine the mineral equilibria of tephroite-bearing assemblages.

Occurrence

In the Val Graveglia metacherts, tephroite is known as a very rare phase occurring together with rhodonite, rhodochrosite and sometimes bementite or parsettensite, filling veins in braunite + quartz layers (Cortesogno et al., 1979). A recent find of tephroite in massive bands allows us to study the mineral assemblages and