Eur. J. Mineral.
1997, **9**, 83-87

On the transformation of synthetic diopside into chrysotile

EUGENIO BARRESE[*], ELENA BELLUSO[**,1)]
and FRANCESCO ABBONA[*]

[*] Dipartimento di Scienze della Terra, Università della Calabria,
I-87036 Arcavacata di Rende CS, Italy

[**] Dipartimento di Scienze Mineralogiche e Petrologiche, Università di Torino,
via Valperga Caluso 35, I-10125 Torino, Italy

Abstract: The transformation of synthetic diopside into chrysotile was achieved by hydrothermal reactions in the presence of MgO and $MgCl_2 \cdot 6H_2O$ at $p(H_2O)$ = 1 kbar in the temperature range 250°-390°C. The reaction progress was controlled by hydrothermal runs performed at 300°C and with reaction times ranging from 1 to 12 days. The habit of most chrysotile fibers is cylindrical, but other habits were also noticed. The fiber length and quality depend on temperature and reaction time. The accompanying phases, among which is lizardite, are also described.

Key-words: synthetic diopside, chrysotile, hydrothermal transformation.

Introduction

Chrysotile, usually occurring in serpentinized ultrabasic rocks, was obtained by a number of hydrothermal reactions in the $MgO\text{-}SiO_2\text{-}H_2O$ system during the latest years (Hodgson, 1986; Chernosky *et al.*, 1988). Besides, it was found to occur in association with several fibrous silicates and also with microfibers of diopside (Compagnoni *et al.*, 1985; Belluso *et al.*, 1993). From the spatial relationships among certain fibers of the two minerals, it was inferred that the growth of chrysotile could have been constrained by the structure of diopside *via* an epitaxial mechanism (Belluso *et al.*, 1993). In point of fact, pseudomorphs of chrysotile on natural diopside (identified by the crystal habit and IR spectra) were experimentally obtained in $MgCl_2$ aqueous solutions at 1 kbar and 400°C (Velde, 1988). The present study was undertaken in order to establish the experimental conditions of diopside-to-chrysotile transformation in the presence of various reactants in a large range of temperatures and reaction times and also to verify the hypothesis quoted above.

In this paper the preliminary results of our work are presented.

Experimental

All reactions were carried out on synthetic diopside, $CaMg[Si_2O_6]$, crystallized from the melt as follows: a stoichiometric mixture of pure oxides was heated to 1400°C, slowly cooled to 1360°C and then quenched. XR powder diffraction revealed the presence of diopside alone, whereas the TEM and EDS/TEM analyses revealed the presence of very few grains of the unreacted oxides and also of $CaSiO_3$ (wollastonite). Samples of the diopside so obtained were

[1)]e-mail: belluso@dsmp.unito.it

DOI:10.1127/ejm/9/1/0083

0935-1221/97/0009-0083 $ 1.25