INTRODUCTION

Okayamalite, Ca$_2$SiB$_2$O$_7$, was first found at the Fuka Mine, Japan, in a vein-like skarn consisting mainly of vesuvianite, calcite, and wollastonite, closely associated with datolite and other undetermined borates (Matsubara et al. 1998). The chemical composition and powder X-ray diffraction (XRD) pattern of okayamalite closely resemble those of both the synthetic compound Ca$_2$SiB$_2$O$_7$ (Bauer 1962) and B-melilite obtained by heating datolite CaBSiO$_4$(OH) (Tarney et al. 1973; Kimata 1978). The structure of datolite consists of sheets of corner-linked SiO$_4$ and BO$_3$OH tetrahedra separated by sheets of Ca cations coordinated by 8 anions (Foit et al. 1973). On the whole, the structure resembles the atomic arrangement found in minerals of the melilite group (Smith 1953). It is not surprising, therefore, that the transformation of datolite to okayamalite shows a high degree of topotaxy (Tarney et al. 1973). For this reason, we investigated a number of datolite-bearing samples by means of optical and roentgenographic methods. This paper deals with the chemical and microtextural characterization of okayamalite found in a sample from Arendal, Norway.

OCCURRENCE AND SPECIMEN DESCRIPTION

Okayamalite was obtained from a skarn sample from the Arendal district, Sørlandet, Norway, associated with datolite, calcite, apophyllite, and chlorite. The chemical composition was determined by analyzing both heavy (Ca and Si) and light (B and O) elements using an electron microprobe: the empirical formula based on seven O atoms is Ca$_{1.96}$Si$_{0.97}$B$_{2.07}$O$_{7.00}$. TEM investigation revealed that okayamalite is intergrown on a fine scale with amorphous silica, giving rise to a complex interpenetrating structure at the scale of few hundreds angstroms. Okayamalite probably was formed by a desilication-dehydroxylation process of the associated datolite.

CHEMICAL COMPOSITION

A fragment of okayamalite was analyzed by wavelength-dispersive methods (WDS) using a Jeol JXA-8600 electron microprobe. No elements with Z > 9, other than Si and Ca, were detected by a preliminary 300 s energy-dispersive scan. Boron and O contents of okayamalite were also determined with the electron microprobe. Particular care was given to problems concerning the acquisition of light-element data. Due to the almost perfect overlap of the first-order Cl$K\alpha$ and Cl$L\alpha$ lines with the BK$\alpha$ line, the absence of chlorine, already assumed...