Chabazite-offretite epitaxial overgrowths in cornubianite from Passo Forcel Rosso, Adamello, Italy

ELIO PASSAGLIA and ALESSANDRA TAGLIAVINI

Dipartimento di Scienze della Terra, Università di Modena, Via S. Eufemia, 19 - 41100 Modena, Italy

Abstract: The first occurrence of the zeolite offretite in Italy is described in a cornubianite rock from Passo Forcel Rosso, Adamello. The mineral occurs as milky-white fibrous overgrowths in structural epitaxy on the (0001) crystal faces of hyaline platy chabazite ("herschelite habit"), associated with large chabazite rhombohedra and yellowish spherules of saponite. Crystal chemical characterization of the zeolitic phases indicates anomalously high Mg contents in the offretite as well as the chabazite overgrowths. The chemistry of the offretites is reviewed, showing that the Si/Al ratio and K content are relatively constant, whereas the Ca/Mg ratio varies considerably, there being very few Mg-rich samples. The paragenesis of the newly-formed minerals is interpreted in the light of the host-rock chemistry.

Key-words: zeolites, offretite, Mg-rich chabazite, epitaxy, crystal chemistry.

Introduction

Offretite is a hexagonal zeolite found in a restricted number of localities, most of which have been reviewed by Weiner & Hochleitner (1982) and by Gottardi & Galli (1985). In all these descriptions, the mineral occurs as fine microscopic crystals clustered in the veins and fractures of basaltic rocks, associated with many other zeolites (erionite, levyne, chabazite, phillipsite, mazzite, faujasite, stilbite, etc.). According to Gottardi (1989), such a mode of occurrence suggests that the mineral is of hydrothermal origin; moreover, it is unknown as a diagenetic product in volcanoclastic rocks, where the structurally-related erionite is fairly common.

The detailed crystal chemical characteristics of offretite suggest the following schematic picture: The free-standing barrel-shaped habit observed at the type locality of Mont Semiol, France, (Gonnard, 1890; Galli et al., 1974) has subsequently only been described from Sasbach, Germany, (Rinaldi, 1976) and also Phillip Island, Australia, (Leach, 1989); otherwise, the mineral consists of hexagonal needles associated in both parallel and radiating aggregates. In the former case, the aggregates appear as silky-white coatings on or between clear levyne lamellae with the fibres oriented perpendicular to the (0001) of levyne (structural epitaxy). Examples have been reported in the following localities: Žežice, Czecho-slovakia, (Řídkošil & Daněk, 1983); Vogelsberg, Germany, (Hentschel & Vollrath, 1977); Westwold, Canada; Milwaukie, Oregon; Queen Creek, Arizona, (Wise & Tschernich, 1976), Beech Creek, Oregon, (Sheppard et al., 1974); Merriwa District, Flinders, Jindivick and Phillip Island in Australia (England & Ostwald, 1979; Birch, 1980, 1987; Leach, 1989). Given the strong correlation between their respective structures (Bennet & Gard, 1967; Gard & Tait, 1972), the structural epitaxy of offretite and eri-