

ALVEOLIZATION

Sample

Roman Wall of Tarragona. Spain. Portal de Sant Antoni.

Pathology Causes

Limestone of the Miocene age from Tarragona quarries. This partially dolomitized calcisiltite rock presents an idiotypic zoned fabric, with anomalous intracrystalline distribution, deficient in magnesium by geological processes. These crystals undergo a differential dissolution of their nuclei, which produces abundant intracrystalline moldic porosity and subsequent disaggregation favoring the formation of sand.

This predisposition to alteration of diagenetic origin, is speeded by existing gypsum and other sulphates efflorescences, external to the rock.

Visual Image



Author: J.L.Prada

Description: Altered ashlars from the Portal. The disaggregation processes and the formation of sand have

been produced by differential dissolution the anomalous dolomite crystalline.

Image detail / macro



Author: Africa Pitarch

Magnification: x100. MOP -thin section- crossed polar (XPL).

Description: These processes are very difficult to observe with stereomicroscope, because the dolomite crystals are smaller than a millimeter (micrometer scale)

Microscope Image



Author: Figure 1.Africa Pitarch. Figure 2. J.L.Prada

Magnification: Figure1. x120. Figure 2. x1570

Description: Figure 1. MOP -thin section- crossed polar (XPL). Dolomitic limestone with distinctly zoned crystal. The nuclei of euhedral rhomb-shaped crystal is unstained because it is not dedolomitized. The external zone is red stained because it is dedolomitized. These anomalous minerals undergo a differential dissolution and produce the subsequent disaggregation of material.

Figure 2. SEM-BSEI electron image. Differential dissolution of the nuclei produces abundant intracrystalline moldic porosity.

Associated Pathologies

Flaking,
Sanding.
Soluble salts.

Other Tests

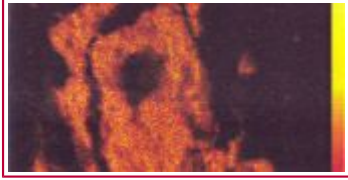


Figure1. X Ray image. Mg - EPMB CamecaX50-1500X

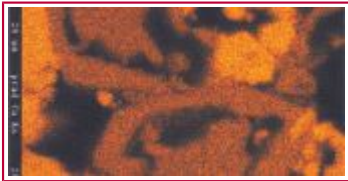


Figure 2. X Ray image. Ca - EPMB CamecaX50-1570X

Observations

Figure 1. Anomalous intracrystalline magnesium distribution. The anomalous dolomite due to a deficiency in magnesium is frequently found in the nuclei of the dolomite crystal.

Figure 2. Differential dissolution of the nuclei of dolomite crystal.

These mechanisms may be determined using the new techniques of electron microscopy -Electron Probe Micro Analyzer (EPMA)- that allow crystallochemical studies. The figures show the anomalous intracrystalline distribution of calcium and magnesium. In conclusion, this mineral is non-stoichiometric and deficient in magnesium. This composition is a favourable factor of stone decay process.

Bibliography

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Published Articles

PRADA, J.L.; VALENCIANO, A.; NAVARRO, A. 1995. Procesos de alteración de materiales pétreos en edificios de interés histórico. *Acta Geológica Hispánica*, vol 30, nº 13. Universidad de Barcelona. pp. 97-110.

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