

Cation ordering and crystallinity of dolomites in the geological record

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Despite the fact that dolomite is an ubiquitous rock-forming carbonate in the geological record, the mechanism (or mechanisms) of its formation in nature remain elusive. The solution of such a mineralogical problem does not only require further experimental work but also a more detailed crystallochemical characterization of dolomites formed in different environments during the Earth's history.

We present here new data of cation ordering and crystallinity of dolomites formed from Late Precambrian to Holocene. These dolomites were collected in the Iberian Peninsula and can be considered as representatives of dolomites originated in most sedimentary environments on Earth. Dolomite samples were studied by X-ray powder diffraction. Cation ordering of dolomites was determined by calculating intensity ratios of the characteristic structure and superstructure Bragg reflections: $I_{01.5}/I_{11.0}$ ([1] and references therein). Crystallinity of dolomites was quantified by measuring the full width half maximum of 10.4 diffraction peaks ($\text{FWHM}_{10.4}$). Our data show that the lowest values of cation ordering and crystallinity (i.e. highest $\text{FWHM}_{10.4}$ values) correspond to dolomites formed in about the last 30 Myr. For older dolomites, maximum values of cation order and crystallinity are more frequently reached. This indicates that the formation of highly ordered dolomites can occur over large geological periods. Finally, the increase in cation order seems to be related to an increase in the crystallinity of dolomites, suggesting that Mg-Ca ordering in sedimentary dolomites takes place by a dissolution-recrystallization ageing process.

[1] Pimentel & Pina (2014) *Geochimica et Cosmochimica Acta* 142, 217–233.