

## **Solvent mediated Calcite-Aragonite transformation in the presence of Se(VI)**

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When calcium carbonate precipitates from aqueous solutions, the presence of some foreign ions can affect the nucleation and crystal growth processes. The influence of some tetrahedral anions, such as  $\text{SO}_4^{2-}$  and  $\text{CrO}_4^{2-}$ , in the  $\text{CaCO}_3$  polymorphism have been discussed in previous work (Fernández-Díaz et al., 2010 and Sánchez-Pastor, 2011). In general, it has been observed that the presence of these tetrahedral anions in the aqueous solution from which  $\text{CaCO}_3$  precipitates influences the precipitation of the different polymorphs and the subsequent polymorphic transformations. In this experimental work we explore the effect of the interaction between  $\text{SeO}_4^{2-}$  aqueous solutions and the main crystal faces of calcite.

Rhombohedral cleavage fragments of calcite (Iceland Spar) were placed in a glass beaker and embedded in silica hydrogel. Aqueous Se(VI) was left to diffuse through the gel to the calcite surfaces. After a certain time of interaction, calcite fragments were extracted from the gel and observed by electronic microscopy and their surfaces were characterized by X-ray diffraction. The experiments were carried out at ambient pressure and temperature.

After interaction, calcite crystals have partially dissolved and numerous prismatic crystals of aragonite have grown on their {10-14} faces. The crystals of this newly-formed phase show parallel orientation. The observed topotactic relationship between the calcite parent phase and the newly formed aragonite has been characterized.

Changes in the solubility of calcite due to the lattice substitution of the tetrahedral anion  $\text{SeO}_4^{2-}$  for carbonate groups in its crystalline structure can explain this unexpected polymorphic transformation.

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