



Chemical gardens, an example of pattern formation in geophysics

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Chemical gardens are biomimetic plantlike growths formed by a mixture of salts which precipitate by a combination of the fluid dynamics of convection forced by osmosis, free convection and chemical reactions. Chemical gardens may be implicated in other phenomena which involve precipitation across a colloidal gel membrane that separates two different aqueous solutions, for example, in the context of geophysical pattern formation in geothermal vents, as well as in cement technology and metal corrosion processes. However, the variation in chemical composition, morphology and mechanical properties of the different surfaces of these formations is not well known. Several salts in different concentrations and conditions have been explored under terrestrial gravity and microgravity. The chemical garden structures have been characterized by morphology analysis, scanning electron microscopy, chemical analysis and X-ray diffraction, correlating these data with the biomimetic growth and the physical-chemical nanoprocesses involved in it. Chemical gardens are a very interesting example of pattern formation in geophysics, combining fluid dynamics and chemical reactions to produce a variety of structures.