

Mineral evolution and mineral niches of ammonium sulfates: The case of Pastora mine, Aliseda, Spain

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ABSTRACT

The uncommon association of ammonium sulfates identified in the Pastora abandoned mine is the result of a complex mineral evolution. By means of dissolution-(re)crystallization reactions operating during long periods of time, ammonium minerals “adapt” to local spatiotemporal changes in physico-chemical conditions. We found that during such an evolution, seasonal variations in temperature and humidity, the relative solubility of mineral species, and the presence of organic matter play an important role. In addition, our study shows the existence of “mineral niches” and “mineral seasonality,” which can be explained on the basis of the “mineral ecology” concept introduced by Hazen et al. (2015). Our investigation of the formation of hydrated sulfates, particularly of ammonium sulfates, might be of importance for identifying the existence of life in mineral formation environments.

Keywords: Ammoniojarosite, tschermigite, acid mine drainage, dissolution-precipitation, mineral evolution