

Insight from metal and nonmetal isotopes for barite formation

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Barite (BaSO₄) is a highly stable and widely-distributed mineral found in magmatic, metamorphic, and sedimentary rocks of all ages, as well as in soils, aerosol dust, and extraterrestrial material. Barite can form in a variety of settings in the oceans (hydrothermal deposits, cold seeps, water column, or within sediments) and on the continents (soils, sulfidic springs and in the subsurface). Hydrologic and biologic processes can play key roles in the formation of barite (e.g., mixing fluids together, oxidizing sulfur or creating microenvironments where barite forms) and affect its geochemical composition.

Insight from measuring metal (stable and radiogenic Sr, stable Ca) and nonmetal (stable S and O) isotopes in barite from various modern settings is given as analogs for ancient systems to identify mode of formation. We present previous and new work summarized in [1] from pelagic marine, hydrothermal, cold seep and continental settings and add results from Ca isotopes – the first Ca isotopes measured in barite are from the U.S. Geologic Survey Menlo Park in Tom Bullen's lab. Tom was an encouraging and model scientist to a young graduate student and assistant professor. Tom emphasized rigor, respect and curiosity for all aspects of the scientific process and is sorely missed.

[1] Griffith et al. (2018) *Chemical Geology* **500**, 148-158.