

Significance of Fluid Chemistry for the Origin of Siderite Mineralization in the Greywacke Zone of the Eastern Alps

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The rock series of the Greywacke Zone range from the Ordovician to the Carboniferous and comprise carbonates, metapelites and metamorphosed quartz porphyries. The siderite mineralizations are bound to the tectonically highest segment of the Greywacke Zone and to the basis of the Northern Calcareous Alps. A set of siderite mineralizations from Ordovician to Permomesozoic age was investigated:

Siderite veins in Ordovician quartz porphyries: The structure of this type of mineralization is that of a typical vein type deposit with siderite-quartz veins crosscutting Ordovician quartz porphyries.

Metasomatic siderite bodies in Devonian limestones: The most prominent example of this type of siderite mineralizations is the Erzberg in the province of Styria. Metasomatic-epigenetic structures are dominant, and usually coarse grained siderite ore exhibits crosscutting contacts to the unmineralized limestones.

Vein type mineralizations in Permoskythian hostrocks: Different mineralizations of this type were investigated within the course of this work (Gollrad, Grillenberg, Sohlenalm). The usual structure is that of siderite veins crosscutting Permoskythian sandstones and conglomerates.

Because of the incompatible behaviour of Br changes in the molar ratios of Na/Br and Cl/Br are very sensitive for fluids being affected by evaporitic processes (and ultrafiltration processes) or for fluids acquiring their salinities by dissolution of halite during migration through the crust. In the first case Br is enriched with respect to Na and Cl with prograding evaporation or filtration of formation water being expelled during diagenesis. The molar compositions of the fluids plot along the „evaporation trend“ (fig.1). The inclusion fluids of the Erzberg siderite province fit well within this trend.

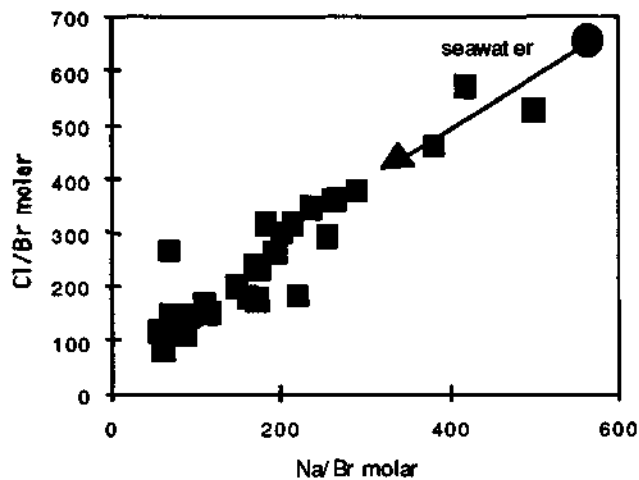


Fig. 1: Na/Br-Cl/Br molar ratios of the inclusion fluids of the Erzberg siderite province

In summary the siderite mineralizations from the Erzberg siderite province evidently exhibit epigenetic features. They were formed in an initial stage of the Alpine tectono-metamorphic event and can be correlated with extensional phases in the Permoskythian. The overall high Br-content may be indicative of this type of mineralizations. A fluid origin from Permo-mesozoic, halite- fractionated seawater is suggested.

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