Variability of the element content in clays of the Poznan series

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Introduction

Miocene-Pliocene sediments of the Poznań series, occurring in central and northern Poland, were formed in a vast inland alluvial-lacustrine basin. In these series three lithostratigraphic horizons are distinguished: green clays, gray clay, and flamy clays.

Methods

129 samples were collected from 18 deposits of clays in order to characterize the variability of elements in clays of the Poznan series. In the samples after the full acid digesting, the contents of As, Ba, Cd, Co, Cr, Cu, Mn, Mo, Ni, Pb, Sn, Sr, Ti, V, Zn, Al, Ca, Fe, K, Mg, Na, P and S were determined using ICP-OES method, the Hg was determined by AAS.

Results

Differences were found in the element contents in Poznan clays depending on their lithotype. Green clays have higher average contents of Cr, Ni, Sr, Zn, Ca, Mg, Na, K, gray clays - higher content of Hg, Ba, Ti, and lower contents of Fe, Ca, Mg, Cr and V, and a flamy clay is marked by higher contents of As, Cu, Fe, Mn, P. Higher levels of the some elements in green clays are associated with the marine environment - Sr, Mg, Na and K. It was noted the variability of elements in clays depending on the region of their occurrence. Clays occurring in the northern part of the basin have higher contents of Na and Sr. In the western part of the basin clays contain less V, Cu, Fe and Mn than clays occurring in other parts of the reservoir. It was observed decline the content of Ba, Hg, K and P in clays in an easterly direction, while increasing Ca content. Clays occurring in northern coastal zone reservoir, fed from the East European Craton area, contain more Na, Sr and Ca as compared to clays located in the southern part, fed from an old Sudeten massif, characterized by a higher content of Ti and low contents of Fe and Ca. The clays formed in the reservoir, for which feeding area were mostly young Western Carpathian orogenic areas, contain more Cu, Zn, V and Mg.

Conclusions

It has been found differences in the contents of elements in the clays of Poznan series depending on their lithological variety and the region of deposition.

Rhodochrosite gemstones: Contrasting origin and evolution of related fluids

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The Wutong (Guanxi Province, China) and Sweet Home (Colorado, USA) are Pb-Zn-Ag deposits of similar mineralogy, originally exploited for Ag, and both are prolific producers of gem-quality rhodochrosite. The Sweet Home Mine is in the Colorado Mineral Belt (which includes several giant porphyry-Mo deposits), and the genesis of the Sweet Home deposit has been linked to the Mo deposits. Converesely, potential genetic relations of the Wutong Mine are unknown. The comparison between their fluid source and evolution provides a frame to understand which factors are critical in the formation of rhodochrosite gemstones.

At Wutong, narrow ranges in Sr and Pb isotopic compositions indicate that these elements were predominantly contributed by the same fluid source. Low variability in C and O isotopic compositions in rhodochrosite is additional evidence of a fairly simple fluid evolution, unaffected by strong mixing or partitioning events. Sweet Home Mine shows contrasting results: the wide Sr range suggests that several fluid sources contributed to the bulk Sr, and the distribution of C and O isotopic compositions may point to contributions from magmatic and meteoric derived fluids [1]. The Pb isotopic compositions in both deposits reflect as well the contrasting geologic history of the Pb source rocks.

Wutong fluid inclusions (FI) indicate that temperature and salinity decrease with time during the paragenesis, consistent with a magmatic fluid trend. The only observed exception to this trend is found in primary FI in fluorite where the temperature decreases but fluid salinities are higher than in previous or later generations. Pre-fluorite FI contain CO_2 while FI post-fluorite lack CO_2. The syn-fluorite peak in salinity and the disappearance of CO_2 in FI can be explained by several processes in the system including changes in pressure, boiling or mineral precipitation.

Magmatic fluids are responsible for the formation of Wutong. Despite the more complex history of Sweet Home, additional fluid sources do not seem to be a requirement for the formation of gem-quality rhodochrosite.

[1] Lüders *et al*. (2009) *Miner Deposita* **44**, 415–434.