

Selective incorporation of arsenate into calcite

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Coprecipitation experiments of arsenic with calcite coupled with determination of arsenic oxidation state both in calcite and water phases were used to investigate the influence of the oxidation state on the coprecipitation of arsenic into calcite. The oxidation states of arsenic in calcite and water were determined by As K-edge XANES and HPLC-ICP-MS analysis, respectively.

It was found that arsenate is preferentially incorporated into calcite in a wide range of pH. Incorporation of arsenite into calcite did not take place at circumneutral pH. This difference between arsenite and arsenate is attributed to the fact that their dissolved species are negatively charged and neutral species, respectively at circumneutral pH (arsenite as H_3AsO_3 ; arsenate as H_2AsO_4^- or HAsO_4^{2-}). The ratio of distribution coefficients of arsenite and arsenate at pH ~ 7 was larger than 1.4×10^2 , showing that arsenate selectively coprecipitates with calcite compared with arsenite.

According to both HPLC-ICP-MS and cyclic voltammetry measurements, the oxidation of arsenite to arsenate and stabilization of arsenate were found in the presence of calcium. It was suggested that these phenomena resulted from the formation of complexes between calcium and arsenate. Since the formation of the complexes was an important process on coprecipitation of arsenate into calcite, arsenic was incorporated into calcite as arsenate even if only arsenite existed in calcite-supersaturated water at circumneutral pH.

The results of this study suggested that the sequestration of arsenic by coprecipitation with calcite cannot be an important chemical process under reducing conditions such as in groundwater in Bangladesh and other arsenic-contaminated areas where arsenite is the dominant dissolved species of arsenic [1].

[1] Yokoyama *et al.* (2009) *Chem. Lett.* **38**, 910–911.

Geochronology and geochemistry of the I-type granitic pluton from the South Qilian Belt, NW China

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The Qilian Orogenic Belt, northwest China, had undergone very complicated evolutionary history and played an important role in the tectonic evolution of the northern margin of the Tibetan Plateau. A lot of granitic plutons of different age are widely outcropped, but few Mesozoic granites have been reported.

The Heimahé Pluton in the South Qilian Belt, intruded into the late Triassic strata, is a granodiorite of medium grain size. LA-ICP MS zircon U-Pb data indicate that the emplaced ages of the pluton was Triassic (248.3 ± 1.0 Ma). The pluton is metaluminous, belonging to High-K calc-alkaline series and showing characteristics of high Fe, Mg, Ca, Ti and $w(\text{CaO})/w(\text{Na}_2\text{O})$ ratio, and low K, Na, and P. The rock is enriched in Ba, Sr, Th, LREE and depleted in Rb, U, Hf, Zr, Nb and Ta, with Eu positive anomaly. The $(\text{Sr}^{87}/\text{Sr}^{86})_i$ is 0.7066, and $\epsilon_{\text{Nd}}(t)$ is -3.7.

Based on these geochemical characteristics, we conclude that the pluton belongs to metaluminous I-type granite, which was derived from partial melting of metabasalts that have strong relationships with subduction process. Together with previous data, our results indicate that the Triassic granitic rock in South Qilian Belt was generated at a same tectonic setting as widely outcropped granitic plutons in the southern part of the South Qilian Belt, which are similar to granitic plutons in East Kunlun. All these Triassic granitic plutons were formed in an island arc setting or active margin, indicating an early Paleozoic-Late Mesozoic subduction in East Kunlun, which represent an important subductive-orogenic episode in the northern margin of Tibetan Plateau.

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