

Calculation for paleo-redox condition in deep underground based on metal elements in the calcite

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Carbonate minerals are useful tools to estimate the history of paleo-hydrochemistry because they will preserve the chemical condition of fluid when they are precipitated. Then, it is possible to obtain more detail information by taking account of heterogeneity of each calcite grain. In this report, heterogeneity of chemical composition in calcite grains was confirmed in cathodoluminescence (CL) using luminoscope. And Eh values were calculated based on the concentration of U and Fe in calcite grains. In the result, all grains show the heterogeneous in CL images. Calculated Eh values indicated the range from -155mV to -419mV in the case of pH from 8 to 10. In the single grain, varies of Eh value corresponds to the heterogeneous in CL image. The maximum difference of Eh value in single grain is approx. 100mV. Eh value of present groundwater was about from -270 to -400mV, and the calcite that showed precipitation under an oxidative condition was not observed. This result indicated the possibility that redox condition will be preserved in the reduction state for a long period since calcite was precipitated.