

Minor Element Geochemistry of Chlorite and Pyrite in the Okuaizu Geothermal Area, Fukushima Prefecture, Japan

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The Okuaizu geothermal area is characterized by pervasive occurrence of hydrothermal alteration minerals. The representative minerals formed in hydrothermal alteration consist of quartz, sericite, chlorite, plagioclase, K-feldspar, calcite, anhydrite, pyrite and sphalerite. Pyrite and chlorite usually contain a trace amount of Ni, Co and As. The contents in ppm are that Ni = 30 - 2000, Co = 50 - 10000 and As = less than 8000 for pyrite, and Ni = less than 2500, No = 300 - 1300 and As = less than 3500 for chlorite. The contents of As in pyrite increase with the increasing temperatures up to 260°C and decrease with increasing temperatures more than 260°C. The As contents in chlorite also decrease with increasing temperatures more than 280°C. The distribution relationship of a pyrite-chlorite mineral pair indicates that Ni tends to be concentrated in chlorite at higher temperatures, while in pyrite at lower temperatures. The distribution coefficients of chlorite to pyrite vary from 52 to 30 for the temperature range between 310 and 290°C, from 30 to 10 for the temperatures around 280°C, from 10 to 5 between 200 and 180°C and from 5 to 0.7 between 200 and 180°C. Based on the distribution coefficients - temperature relationship, it is suggested that the diagram relating Fe/(Fe+Mg) to Al in tetrahedral site in chlorite is available for geothermometer.