An experimental approach on rock-water interaction at Horonobe sedimentary sequences

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In the course of understanding of chemistry and rock-water interactions in the sedimentary sequences at the Horonobe area, a laboratory experimental approach has been made. Here we report preliminary results of the effect of grain size, rock/water ratio and redox environment on the chemistry and rock-water interactions in the meteoric water system.

In this experiment,rock sample were sealed in the polypropylene bottle with distilled water at room temperature and pressure. The samples used in the present study were diatomaceous rocks from the Koetoi and the Wakkanai Formations.The experiment with changing grain size(100 micrometer,1mm and rock blocks)was carried out with rock/water=1/1000 for 14 days.

The specific surface area decreases at the first 1 or 2 days and turns to be constant after these days,suggesting that the change of the specific surface area is due to the reaction of the micrograins.

Whereas the chemical compositions of the solution are nearly constant with changing of the grain size for the Koetoi samples, in the Wakkanai runs the concentrations of each ions increase with decreasing the size. In the Koetoi samples many pores contribute, but the pores decrease with diagenesis in the Wakkanai samples. This suggests that the effect of grain size on the chemistry of the solution would be deferent in the samples, being related to the mode of occurrence of pores.The experiment with changing rock/water ratio(2-2000 mg rocks/200 g water)was carried out for 42 days. The concentrations of each ions increase and the pH decreases with increasing the rock/water ratio, suggesting that the amount of pyrite which is subject to be oxidized is important for the pH condition which would lead to dissolve other minerals. The increases of iron contents in runs with the highest rock/water ratio indicate that the environment turns to be weakly reducing as the ferrous ion was stable.In the experiment with changing redox conditions, addition of various reducing agents such as metals of Al, Fe and Mg, and gases of H_2 were made with the handling under N_2 and Ar conditions. In many cases, the pH in the solution decreases, being due to the oxidation of pyrite. The useful techniques responsible for the experiment under reducing conditions analogous to natural environment, and the leaching under reducing conditions will be discussed.