

Report for ISEI's Collaboration Program

Research title: Groundwater pollution and pollutants transfer in Sichuan Basin, China

Researcher: Li Xiaodong (Graduate School of Science, Osaka City University, D2)

Host: Prof. M. KUSAKABE

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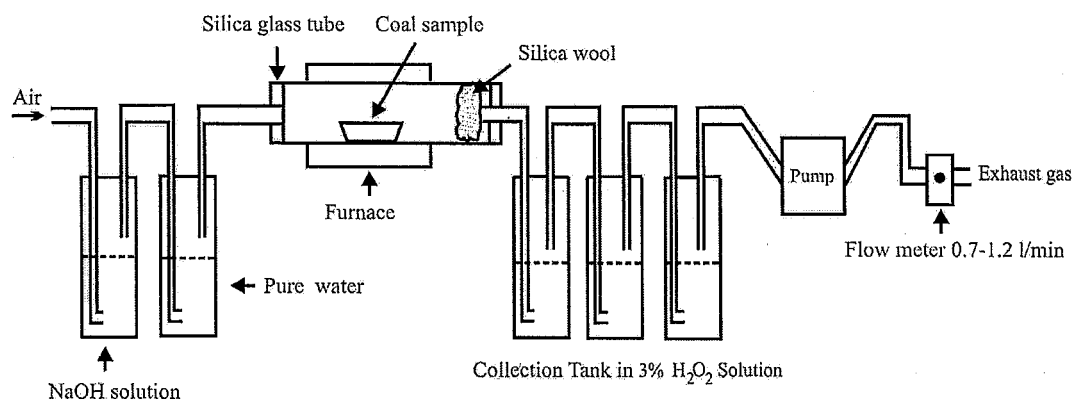
1. Purpose

In order to discuss the groundwater circulation and pollutants transfer in the Sichuan Basin, hydrogen and oxygen isotope are analyzed. Sulfur isotopic values of coals are used to confirm the source of air pollution (acid rain and acid deposition), to interpret the source of sulfate in groundwater, and to estimate the influence of the anthropogenic pollutants to the groundwater quality.

2. Isotope analysis

(A) The oxygen isotopic ratios were measured with stable isotopic ratio mass spectrometers (VG-PRISM) by using the automated $\text{CO}_2/\text{H}_2\text{O}$ equilibration method.

(B) Coal samples were combusted using the apparatus shown in the following figure.



Two grams of coal was combusted at 900°C for one hour and half. The resulting gases were oxidized in 3% H_2O_2 solutions to form sulfate ions. After the oxidation, one milliliter of 1:1 hydrochloric acid was added and the solution was boiled to remove the surplus H_2O_2 . Then, 10 mL of 10% (wt %) barium chloride solution were added, while stirring constantly. The barium sulfate precipitate was digested for one hour at 100°C , collected on a membrane filter by filtration, and recovered. Sulfur content was determined by gravimetry. At the same time, the sulfate in the residue was also recovered to obtain the total sulfur content in coal.

(C) The sulfate precipitate was converted to SO_2 gas by using the Yanangisawa preparation line. The sulfur isotopic ratios were measured with a stable isotopic ratio mass spectrometers (VG-SIRA10).