Isotope ratio Mass Spectrometer for Hydrogen and Oxygen

Purpose: Isotope ratio of hydrogen and oxygen of water can provide important information on movement of water. Movement of groundwater can be supposed using profile of isotope ratio of hydrogen and oxygen. Furthermore, high concentrated HDO can be a tracer of water even for the water in rock-pore or layer structure of clay minerals. Thus, measurement of isotope ratio of hydrogen and oxygen of water is required.

Main Specifications:

1) Autosampler

An autosampler is fitted with mass spectrometer, and that provides up to 110 sample capacity. Samples are introduced to pre-treatment system automatically.

2) Sample preparation system

A continuous flow sample preparation system is also fitted with mass spectrometer delivering the best speciation for measurement of isotope ratio (CO for oxygen and H_2 for hydrogen).

3) Mass spectrometer

Using magnetic field and electro static filter, (H_2 and HD) or ($C^{16}O$ and $C^{18}O$) are separated and isotope ratio can be estimated. Uncertainty of measurement is within 0.1‰ in each measurement.

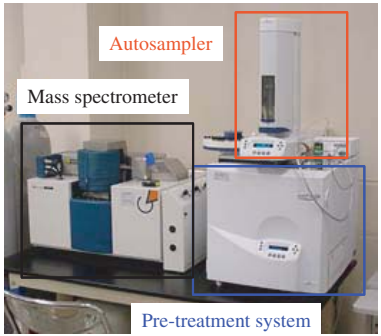
Location and Data of Installation

Abiko Campus, November 2004

An Example of Measurement Result of Hydrogen Isotope Ratio

Hydrogen isotope ratio in 2 samples was measured 10 times. Uncertainty of 10 times pretreatment and measurement are found to be within 0.4 % indicating high accuracy of treatment and measurement system.

δ D (‰)	Sample 1	Sample 2
1	47.14	16.85
2	48.14	17.02
3	47.18	17.72
4	47.26	17.82
5	47.69	17.12
6	48.03	16.95
7	47.13	17.23
8	47.53	17.53
9	47.68	17.68
10	47.26	17.23
Std dev (‰)	0.37	0.35



Overview of Isotope Ratio Mass Spectrometer