ISOTOPE TRACER TECHNOLOGIES INC

^{34}S & ^{18}O SULFATE (SO_4) ANALYSIS IN AQUEOUS SAMPLES

Sample preparation:

Required sample volumes are dependent on sulfate concentrations, and can range from 20 to 500 mL. Samples are acidified using hydrochloric acid (10%) to a pH of 1-2, and sulfate is precipitated as barium sulfate through the addition of 1 to 2 scoops of barium chloride. The precipitate is collected and rinsed, using distilled water, until neutrality is reached. Samples possessing turbidity or other possible contaminants are filtered prior to barium chloride addition.

Sample Analysis:

Dried samples are weighed into tin cups for separate ^{18}O and ^{34}S analysis with a replicate every 3 samples. Approximately 0.1 mg of sample is used for ^{18}O analysis. ^{18}O samples are combusted at 1430^{o}C, and purified by gas chromatography before continuous flow isotope ratio mass spectrometry. Analysis is carried out on a Finnigan Mat, DeltaPlus XL IRMS coupled with a Thermo Scientific TC/EA. Data is corrected and normalized using four international standards: USGS 32, NBS 127, IAEA SO5, and IAEA SO6, that bracket the samples. Standards are analyzed at the beginning and end of every run.

The analytical precision for analysis is ± 0.5‰.

Approximately 0.3 mg of sample is used for ^{34}S analysis, with 3 mg of niobium pentoxide added to each sample to ensure complete sample combustion, with a replicate every 3 samples. Samples are loaded into a Fisons Instruments elemental analyzer to be flash combusted at 1100^{o}C. Released gases are carried by ultrapure helium through the analyzer, then separated by gas chromatography. Clean SO_2 gas is carried into the Mat 253, Thermo Scientific, IRMS for analysis. Data is corrected and normalized using three international standards, IAEA SO6, IAEA SO5, NBS 127, and two calibrated internal standards that bracket the samples. Standards are analyzed at the beginning and end of every run.

The analytical precision for analysis is ± 0.5‰.

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