

Assessment of Groundwater Quality in some parts of Southwestern Nigeria

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One hundred and twenty samples from groundwater were collected at Ago Iwoye, Oru and Ijebu Igbo, Southwestern Nigeria. The purpose was to establish preliminary baselines for these constituents in the ground water of the study area and also to determine the quality. The analysis of trace elements and cations in water were carried out using inductively coupled plasma optical emission spectrometry (ICP-OES at Acme, Ontario Canada. Concentrations of 34 elements which include trace and major elements such as Al, As, B, Ba, Be, Ca, Cd, Ce, Co, Cr, Cu, Fe, K, Li, Mg, Mn, Mo, Na, Ni, P, Sb, Se, Si, Te, Ti, Tl, U, V, W and Zn were determined. Trace elements like Si, Bi and Ti were below detection level of 0.05ppb, 0.05ppb and 10ppb respectively for all the samples. As, Be, Cd, Cr, Cu, Mn, Se and Zn were below Maximum Contamination Level (MCL) of EPA 2012 for all the samples. Al, Br, Fe, Mn, Ni, Pb, Sb were above the standard and generally pose health or environmental hazard for most of the samples with the following ranges <1-2686ppb, 5.48-2199.35ppb, <10-22450ppb, <0.05-52.8ppb and 0.09-11.64ppb respectively. The pollution index among all sites varied from 0.075 to 6.26 and exceeded the acute and chronic effect levels proposed by the United States Environmental Protection Agency in 2007.

Production of S-MIF Signatures during Photochemistry of Biogenic Volatile Sulfur Compounds: A Potential Marker for Marine Stratospheric Sulfur Aerosol Layer

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Sulfur mass-independent fractionation (S-MIF) has been reported for UV-photochemistry SO₂ and CS₂ but not for OCS and H₂S. These experimental observations have been linked to S-MIF signatures observed in sedimentary sulfides and sulfates of Archean and Early Palaeoproterozoic age, and have been used as evidence for a low-pO₂ atmosphere on the Early Earth. Although biogenic methylated sulfur compounds is important in atmospheric sulfur cycles today, multiple-S isotope effects of photochemistry of dimethylsulfide (DMS), dimethyldisulfide (DMDS), dimethyltrisulfide (DMTS), and episulfides (e.g., ethylene sulfide (ES)) have not been reported. Characterizing multiple sulfur isotope effects during photochemistry of these organic sulfur compounds may be used to study the fate for marine biogenic sulfur, particularly DMS photochemistry, which is the most abundant biogenic sulfur gas in our present atmosphere.

We will report that broadband UV-photolysis of DMS, DMTS, and ES using a Xenon-Arc lamp produced S-MIF signals with magnitudes of $\Delta^{33}\text{S}$ up to +2.9‰ and $\Delta^{36}\text{S}$ up to +0.9‰ for the solid aerosol sulfur products with significant changes in $\delta^{34}\text{S}$ fractionations up to +7.1‰. UV-photolysis experiments with water vapor produced relatively small to no S-MIF signals in some of their oxidation products (e.g., sulfate and sulfonic), which may likely result from HO_x oxidation reactions via direct or indirect photodissociation reactions of: O₂ → O + O, and H₂O + O → 2HO. These biogenic gases undergo a rapid oxidation when emitted to the present day atmosphere, and its oxidation products can be transferred above the tropopause and contribute to stratospheric cloud-condensation nuclei (CCN). Our results suggest that the production of S-MIF could be potentially possible even in today's atmosphere containing biogenic sulfur gases. We hypothesize that these S-MIF signals can be used as a marker to identify the source of sulfur aerosols where biogenic sulfur constituents affect radiative forces.