

Iso-Analytical Limited

Report of Analysis

Laboratory Standard IA-R054

IA-R054: ^2H & ^{18}O Water standard (Zero Natural Water)

This laboratory standard is intended to provide a sample of known isotope composition with $^2\text{H}/^1\text{H}$ and $^{18}\text{O}/^{16}\text{O}$ isotope ratios stated in parts per thousand difference (‰) from the V-SMOW2 (Vienna Standard Mean Ocean Water 2) isotope ratio standard. This laboratory standard is not certified, but is provided to allow routine checking of the overall quality of measurements performed by continuous-flow isotope ratio mass spectrometry, and may be used as part of a quality control program. It is not intended for use as a substitute for calibration materials or inter-comparison materials distributed by NIST or IAEA.

Analysis

The $^2\text{H}/^1\text{H}$ and $^{18}\text{O}/^{16}\text{O}$ isotope ratios of the laboratory standard were measured by continuous-flow isotope ratio mass spectrometry using V-SMOW2 and SLAP2 (Standard Light Antarctic Precipitation) calibration materials and GISP (Greenland Ice Sheet Precipitation) as an inter-comparison material. The laboratory standard and V-SMOW2, SLAP2 and GISP were prepared for $^2\text{H}/^1\text{H}$ and $^{18}\text{O}/^{16}\text{O}$ isotope ratio analysis by equilibration with hydrogen (1) for $^2\text{H}/^1\text{H}$ and carbon dioxide (2) for $^{18}\text{O}/^{16}\text{O}$. Measurement of $^2\text{H}/^1\text{H}$ and $^{18}\text{O}/^{16}\text{O}$ isotope ratios in the laboratory standard was undertaken five times on four separate occasions.

- (1) Iso-Analytical SOP No. 0303 - Preparation of liquids for H_2 Equilibration-CF-IRMS.
- (2) Iso-Analytical SOP No. 0304 - Preparation of liquids for CO_2 Equilibration-CF-IRMS.

Isotope Abundance

V-SMOW2 is the isotope standard to which laboratory standard IA-R054 is compared. The $^2\text{H}/^1\text{H}$ and $^{18}\text{O}/^{16}\text{O}$ isotope ratio scales are defined in terms of V-SMOW2 and SLAP2, such that the $^2\text{H}/^1\text{H}$ and $^{18}\text{O}/^{16}\text{O}$ isotope composition of SLAP2 relative to V-SMOW2 is -427.5 ‰ for ^2H and -55.5 ‰ for ^{18}O . The isotope composition of the laboratory standard in ‰ notation (relative to V-SMOW2) can be found on the following page.

Iso-Analytical Laboratory Standard IA-R054

Laboratory Standard	$\delta^{2}\text{H}_{\text{V-SMOW}} (\text{‰})$ $\delta_{\text{m}} \pm \sigma_1$	$\delta^{18}\text{O}_{\text{V-SMOW}} (\text{‰})$ $\delta_{\text{m}} \pm \sigma_1$
IA-R054 (Zero Natural Water)	4.93 ± 0.85	0.56 ± 0.23

Note: $\delta_{\text{m}} = \sum_{i=1}^n \delta_i/n$; $\sigma_1 = \sqrt{\sum_{i=1}^n (\delta_{\text{m}} - \delta_i)^2/(n - 1)}$; $n = 20$

Storage

It is recommended that the laboratory standard is stored upside down in a cool dark place in the bottle provided to prevent evaporation. It is suggested that the laboratory standard is shaken before use, to ensure the contents are well mixed. As a laboratory standard is used you may wish to transfer the water to a smaller, dry, glass bottle with a gas-tight sealing top to reduce the volume of air in contact with the water.

Calibrated on July 12th 2007

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