

Iso-Analytical Limited

Report of Analysis

IA-R068 – $^{15}\text{N}/^{13}\text{C}/^{34}\text{S}$ Soy Protein Laboratory Standard

This laboratory standard is intended to provide a sample of known isotope composition with $^{15}\text{N}/^{14}\text{N}$, $^{13}\text{C}/^{12}\text{C}$ and $^{34}\text{S}/^{32}\text{S}$ isotope ratios stated in parts per thousand difference (‰) from Air, V-PDB (Pee Dee Belemnite) and V-CDT (Canyon Diablo Troilite) isotope ratio standards, respectively. 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 $^{15}\text{N}/^{14}\text{N}$ isotope ratio of the laboratory standard was measured by elemental analyser continuous-flow isotope ratio mass spectrometry using IAEA-N-1 (Ammonium Sulphate, $\delta^{15}\text{N} = 0.40$ ‰ vs. Air) as the calibration material. The $^{15}\text{N}/^{14}\text{N}$ isotope ratio in the laboratory standard was measured six times on three separate occasions.

The $^{13}\text{C}/^{12}\text{C}$ isotope ratio of the laboratory standard was measured by elemental analyser continuous-flow isotope ratio mass spectrometry using IAEA-CH-6 (ANU Sucrose, $\delta^{13}\text{C} = -10.45$ ‰ vs. V-PDB) and IAEA-CH-7 (Polyethylene foil, $\delta^{13}\text{C} = -32.15$ ‰ vs. V-PDB) as the calibration material. The $^{13}\text{C}/^{12}\text{C}$ isotope ratio in the laboratory standard was measured six times on three separate occasions.

The $^{34}\text{S}/^{32}\text{S}$ isotope ratio of the laboratory standard was measured by elemental analyser continuous-flow isotope ratio mass spectrometry using NBS-127 (Barium Sulphate, $\delta^{34}\text{S} = 20.3$ ‰ vs. CDT) and IAEA-SO-5 (Barium Sulphate, $\delta^{34}\text{S} = 0.5$ ‰ vs. V-CDT) as the calibration materials. The $^{34}\text{S}/^{32}\text{S}$ isotope ratio in the laboratory standard was measured six times on three separate occasions.

Isotope Abundance

The laboratory standard IA-R068 is compared to Air for the $^{15}\text{N}/^{14}\text{N}$ isotope ratio, to V-PDB for the $^{13}\text{C}/^{12}\text{C}$ isotope ratio and to V-CDT for the $^{34}\text{S}/^{32}\text{S}$ isotope ratio. The isotope composition of the laboratory standard in ‰ relative to Air, V-PDB and V-CDT is:

Laboratory Standard	$\delta^{15}\text{N}_{\text{Air}}$ (‰) $\delta_m \pm \sigma_1$	$\delta^{13}\text{C}_{\text{V-PDB}}$ (‰) $\delta_m \pm \sigma_1$	$\delta^{34}\text{S}_{\text{V-CDT}}$ (‰) $\delta_m \pm \sigma_1$
IA-R068	0.99 ± 0.07	-25.22 ± 0.02	5.25 ± 0.27

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

$n = 18$ for ^{13}C , $n = 18$ for ^{15}N and $n = 16$ for ^{34}S

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