

# Certificate of Analysis (Elemental Composition)

Protein (Casein) Standard OAS  
Cat no. B2155 – Certificate no.354737

## General

This Organic Analytical Standard (OAS) consists of a homogenous batch of protein (Casein) standard for use as a routine working microanalytical standard for the determination of Carbon, Nitrogen and Sulfur.

## Certified Values and Uncertainty

The uncertainty in the certified value is expressed as expanded uncertainty, U, at 95% confidence and is calculated in accordance with ISO/IEC17025 according to GUM (Guidelines to Uncertainty in Measurement). Confidence limits include those due to sampling variation, weighing, calibration and measurement errors. The certified values are based upon the results of 24 to 29 determinations.

The certified values for Carbon and Nitrogen were determined by elemental analyser calibrated to Cystine 143d from National Institute of Standards and Technology (NIST).

The certified values for Sulfur were determined by elemental analyser calibrated to Rice Flour 1568a from National Institute of Standards and Technology (NIST).

<i>Element</i>	<i>Certified value (% w/w)</i>	<i>Uncertainty (+/- %)</i>
<b>Carbon</b>	<b>46.5</b>	<b>0.78</b>
<b>Nitrogen</b>	<b>13.32</b>	<b>0.40</b>
<b>Sulfur</b>	<b>0.75</b>	<b>0.083</b>

## Expiration of Certification

The certification of this OAS is valid until 15 June 2025 within the measurement uncertainties specified.

## Storage and use

This OAS should be stored between 20°C to 25°C and should be kept tightly sealed away from light and moisture. It is non-hygroscopic under normal conditions and can be used without preliminary drying.

## Certification Information

The technical aspects involved in the preparation, certification and issuance of this (In)Organic Analytical Standard (IAS/OAS) were carried out at Elemental Microanalysis Ltd, Okehampton, Devon EX20 1UB UK, Tel +44 1837 54446  
Email [enquiries@microanalysis.co.uk](mailto:enquiries@microanalysis.co.uk)

For and on behalf of  
Elemental Microanalysis Ltd

Jon Davies  
Technical Director

# Certificate of Analysis (Isotopic Composition)

Protein (Casein) Standard OAS  
Cat no. B2155 – Certificate no.354737

## General

This Organic Analytical Standard (OAS) consists of a homogenous batch of protein (Casein) standard for use as a routine working microanalytical standard for the determination of the Carbon, Nitrogen and Sulfur isotopes  $^{13}\text{C}$ ,  $^{15}\text{N}$ , and  $^{34}\text{S}$ .

## Certified Values and Uncertainty

The uncertainty in the values is expressed as  $\sigma$  (1 standard deviation). Confidence limits include those due to sampling variation, weighing, calibration and measurement errors. The values are based upon the results of 15 determinations.

The certified value for Carbon was determined by EA-IRMS calibrated to IAEA-CH-6 (IAEA, Vienna)

The certified value for Nitrogen was determined by EA-IRMS calibrated to IAEA-N-1 (IAEA, Vienna)

<i>Isotope</i>	<i>Certified value ( ‰ )</i>	<i>SD (<math>\sigma</math>)</i>
$\delta^{13}\text{C}_{\text{V-PDB}}$	<b>-26.98</b>	<b>0.13</b>
$\delta^{15}\text{N}_{\text{AIR}}$	<b>+5.83</b>	<b>0.08</b>
$\delta^{34}\text{S}_{\text{V-CDT}^*}$	<b>+6.18</b>	<b>0.80</b>

\* Note: The value for  $\delta^{34}\text{S}$  is given for information purposes only.

## Expiration of Certification

The certification of this OAS is valid until 15 June 2025 within the measurement uncertainties specified.

## Storage and use

This OAS should be stored between 20°C to 25°C and should be kept tightly sealed away from light and moisture. It is non-hygroscopic under normal conditions and can be used without preliminary drying.

## Certification Information

The technical aspects involved in the preparation and issuance of this (In)Organic Analytical Standard (IAS/OAS) were carried out at Elemental Microanalysis Ltd, Okehampton, Devon EX20 1UB UK, Tel +44 1837 54446, Fax +44 1837 54544, Email [enquiries@microanalysis.co.uk](mailto:enquiries@microanalysis.co.uk)

For and on behalf of  
Elemental Microanalysis Ltd

Jon Davies  
Technical Director