Technical Information Bulletin

Elemental Microanalysis
The centre of excellence in elemental analysis

The Use of IRMS reference standards

All IRMS data should be traceable to Primary reference standards. These primary references are materials that have been selected and assigned definitive delta (δ) values for the light elements H, C, O, N and S and are isotope ratio scale defining.

These standards may be considered as analogous to the CHNOS elemental primary standards certified and issued by NIST e.g. NIST SRM 141d Acetanilide.

At this time the only primary IRMS standards available are those issued by IAEA Vienna (International Atomic Energy Authority).

Typical references from IAEA Vienna include:

Element	IAEA reference (example)	Material	Delta value (‰) wrt zero points	Scale zero point
Nitrogen	IAEA-N-1	Ammonium sulphate	0.4	Air
Hydrogen	IAEA-CH-7	Polyethylene	-100.3	V-SMOW
Oxygen	NBS-18	Calcite	-23.3	V-SMOW
Carbon	IAEA-CH-3	Cellulose	-24.72	V-PDB
Sulphur	IAEA-SO-5	Barium sulphate	0.5	V-CDT

Two methodologies developed regarding the use of these primary standards:

1. The use of these to generate individual in-house secondary reference materials to be used as calibration materials.

2. The continued use of the (expensive) IAEA primaries as calibration standards with (and sometimes without) the use of secondary (check) references which also would have been generated in-house.

The problems with the above are:

- The consumption of the expensive IAEA materials, both within individual laboratories, and in general. The demand of these has been such that the more popular ones are now out of stock with replacements taking often years to become available. In addition to this, to conserve stocks, purchases are restricted to one unit per laboratory per three years.
- The reliance on the accuracy of intra-laboratory generated references without any inter-laboratory checks.
- The increased recognition that quality control references should be of a similar matrix to those samples being analysed.

Elemental Microanalysis

Elemental Microanalysis Ltd
1 Hameldown Road Okehampton
Devon EX20 1UB UK
t. +44 (0) 1837 54446
f. +44 (0) 1837 54544
info@microanalysis.co.uk
www.elementalmicroanalysis.com

Available from your local Dealer:

The Use of IRMS reference standards (continued)

Technical Information Bulletin

Elemental Microanalysis
The centre of excellence in elemental analysis

In most analytical techniques, secondary reference materials traceable to a primary reference (NIST, IAEA) are commonplace.

Elemental Microanalysis have a range of IRMS standards which are made available to customers to allow cross-checking, reduce the reliance on in-house generated references and satisfy the above.

Three different levels of reference materials are offered:

1. **Inter-laboratory comparison Certified.**
   An international study involving 6 to 25 laboratories.
2. **Certified reference materials.**
   Derived from data from two or more instruments in a single testing organisation on two or more runs on different days.
3. **Uncertified working standards.**
   Using data from a single instrument and intended as "in-run" reference only.

B2207. Silver Phosphate

IRMS reference materials available from Elemental Microanalysis:

Part No	Material	Pack	δ ^{13}C ‰	δ ^{2}H ‰	δ ^{15}N ‰	δ ^{18}O ‰	δ ^{34}S ‰	% C	% H	% N	% O	% S
Inter-laboratory comparison Certified Isotopic reference materials												
B2203	IRMS EMA P1	3g	-28	-25		21	-3	61.5	3.5		20.9	13.9
B2205	IRMS EMA P2	3g	-28	-88	-2	27		68.4	2.9	7.5	19.9	
B2207	Silver Phosphate	1g				22						
B2214	Carrara marble	0.5g	2.1			-2.01						
Certified Isotopic reference materials												
B2151	High Organic Sediment	5g	-26		5			9.2		0.6		0.7
B2153	Low Organic Soil	5g	-27		7			1.6		0.1		0.0
B2155	Protein (Casein)	5g	-27		6		6*	46.5		13.3		0.8
B2157	Wheat Flour	5g	-27		3		1*	39.4		1.4		0.1
B2159	Sorghum Flour	5g	-14		2		10*	41.3		1.5		0.1
Uncertified working standards												
B2190	High enriched water	25ml		1702		267						
B2191	Medium enriched water	25ml		843		109						
B2192	Zero natural water	25ml		11		0						
B2193	Medium natural water	25ml		-98		-12						
B2194	Low natural water	25ml		-269		-34						
B2172	Olive Oil	5g	-29									
B2174	Urea	5g	-43		-1							
B2213	Spruce (Wood) powder	3g	-25		-3	24		50.0	6.3	0.1	40.0	

Values are approximate, at time of printing, - refer to Certificate of Analysis for current values.

* Not certified value – for reference only.

Elemental Microanalysis
Elemental Microanalysis Ltd
1 Hameldown Road Okehampton
Devon EX20 1UB UK
t. +44 (0) 1837 54446
f. +44 (0) 1837 54544
info@microanalysis.co.uk
www.elementalmicroanalysis.com

Available from your local Dealer: