

Technical Information Bulletin

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.

Available from your local Dealer:

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. Interlaboratory comparison Certified

An International study involving more than 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:

Material	Form	Pack	Part No	$\sigma^{13}\text{C}$	$\sigma^{15}\text{N}$	$\sigma^{34}\text{S}$	$\sigma^{18}\text{O}$	$\sigma^2\text{H}$
<i>Interlaboratory comparison Certified Isotopic reference materials:</i>								
EMA-P1 polymer	Solid	3g	B2203	-27.8		-3	21	-25.3
EMA-P2 polymer	Solid	3g	B2205	-28.2	-1.57		26.9	-87.8
Silver Phosphate	Solid	1g	B2207				21.7	
<i>Certified Isotopic reference materials:</i>								
Sediment	Solid	5g	B2151	-26.1	4.4	+4.2*		
Soil	Solid	5g	B2153	-26.7	7.3			
Protein (Casein)	Solid	5g	B2155	-27	5.9	+6.3*		
Wheat flour	Solid	5g	B2157	-27.2	2.8	-1.4*		
Sorghum flour	Solid	5g	B2159	-13.7	1.6	+10.1*		
High enriched water	Liquid	25ml	B2190				266.8	1701.8
Medium enriched water	Liquid	25ml	B2191				108.6	843.4
Zero natural water	Liquid	25ml	B2192				-0.4	11.3
Medium natural water	Liquid	25ml	B2193				-12.3	-98.3
Low natural water	Liquid	25ml	B2194				-33.6	-269.1
<i>Uncertified 'working standards':</i>								
Olive oil	Liquid	5g	B2172	-28.5				
Urea	Solid	5g	B2174	-48.6	-0.3			
Spruce (wood) flour	Solid	3g	B2213	-25.3	-3		23.9	

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