

Supporting information

Evaluation of Internal Standards for the Mass-shift Analyses of As, Fe, S, and Zn in Biological Reference Materials Using ICP-Reaction Cell -MS

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Table S1. Calibration standards used to determine elemental concentrations of SRMs

Analyte	<i>m/z</i>	Stds	Composition
AsO	91	0.1, 0.8, 4, 8 µg/L	As
Fe(NH ₃) ₂	90	20, 100, 250, 500, 1000 µg/L	Fe, Zn
SO	48	1, 2.5, 5, 10 mg/L	S
ZnNH ₃	83	10, 50, 125, 250, 500 µg/L	Fe, Zn

Table S2. Sensitivity of each potential internal standard element calculated as the slope of a standard curve (cps/ $\mu\text{g/L}$)

Mode	^6Li	^{45}Sc	^{69}Ga	^{74}Ge	^{89}Y	^{115}In	^{159}Tb	^{165}Ho	^{187}Re	^{193}Ir	^{209}Bi
STD	65458	153643	103079	35599	234261	256900	261826	257858	117803	92384	117009
He KED	1696	6717	6854	3614	29297	37392	87368	85572	43311	39255	53720
He DRC	24378	172648	142953	50738	314519	253658	264787	258719	116363	94109	135560
NH ₃ DRC	2180	166	22417	135	506	99771	3455	202722	77810	164	183386
O ₂ DRC	1862	-97	56822	11692	128	147697	10	69	54650	103231	160464

Table S3. Relative change in sensitivity compared to STD mode. Relative change is calculated as $(\text{cps}_{\text{mode}} - \text{cps}_{\text{std}}) / \text{cps}_{\text{std}}$.

Mode	^6Li	^{45}Sc	^{69}Ga	^{74}Ge	^{89}Y	^{115}In	^{159}Tb	^{165}Ho	^{187}Re	^{193}Ir	^{209}Bi
He KED	-97.4%	-95.6%	-93.4%	-89.8%	-87.5%	-85.4%	-66.6%	-66.8%	-63.2%	-57.5%	-54.1%
He DRC	-62.8%	12.4%	38.7%	42.5%	34.3%	-1.3%	1.1%	0.3%	-1.2%	1.9%	15.9%
NH ₃ DRC	-96.7%	-99.9%	-78.3%	-99.6%	-99.8%	-61.2%	-98.7%	-21.4%	-33.9%	-99.8%	56.7%
O ₂ DRC	-97.2%	-100.1%	-44.9%	-67.2%	-99.9%	-42.5%	-100.0%	-100.0%	-53.6%	11.7%	37.1%

Table S4. LLOQs of elements for each internal standard in $\mu\text{g/kg}$. LLOQ=10 σ , n=10.

NH ₃ DRC Mode	GaNH ₃	Ho	YNH(NH ₃) ₄	TbNH(NH ₃) ₂	Bi	Ir(NH ₃) ₂	Re(NH) ₃
Fe	2	2	1	2	2	2	2
Zn	0.6	0.6	0.6	0.6	0.6	0.6	0.6
O ₂ DRC Mode	Ga	In	TbO	HoO	IrO	ReO ₃	
S	50	60	70	70	70	70	
As	0.006	0.004	0.005	0.004	0.004	0.005	

Figure S1. Relative sensitivity of the eleven internal standard elements plotted against A) Mass and B) 1st IE. Mass and 1st IE data available in Table 2.

