

Calibration strategies to correct for matrix effects in direct analysis of urine by ICP OES: internal standardization and multi-energy calibration

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Electronic supplementary information

Table S1 Best internal standard and chosen internal standard for Al, As, Ba, Be, Bi, Ca, Cd, Co, Cr, Cu, Hg, K, Li, Mg, Na, Pb, Sb and Zn determination in urine sample by ICP OES

Analyte - wavelength (nm)	Ionization energy (eV)	Best internal standards	Internal standard selected - wavelength (nm)	Ionization energy (eV)
Al - 167.079 (II)	5.98	Ga, Ge, Pd, Sc and Y	Ge - 265.117 (I)	7.89
As - 189.042 (I)	9.79	Ga, Sc, Pd and Y	Pd - 340.457 (I)	8.34
Ba - 455.403 (II)	5.21	Ga, Ge, Pd, Sc and Y	Ge - 265.117 (I)	7.89
Be - 313.042 (II)	9.32	Ga, Ge, Pd, Sc and Y	Pd - 340.457 (I)	8.34
Bi - 223.061 (I)	7.28	Ga, Ge and Y	Ge - 265.117 (I)	7.89
Ca 317.933 (II)	6.11	Ga, Ge and Pd	Ga - 294.363 (I)	5.99
Cd - 226.520 (II)	8.99	Ga, Ge, Pd, Sc and Y	Ge - 265.117 (I)	7.89
Cd - 228.802 (I)		Ga, Ge, Pd, Sc and Y		7.89
Co - 228.615 (II)	7.88	Ga, Ge and Y	Ge - 265.117 (I)	7.89
Cr - 357.820 (I)	6.77	Ga, Ge and Y	Ge - 265.117 (I)	7.89
Cr - 283.152 (II)		Pd and Sc	Pd - 340.457 (I)	8.34
Cu - 224.700 (II)	7.73	Ga, Ge and Y	Ge - 265.117 (I)	7.89
Cu - 324.754 (I)		Ga, Ge, Pd, Sc and Y		7.89
Hg - 184.949 (I)	10.44	Pd and Sc	Pd - 340.457 (I)	8.34

Hg - 194.227 (II)		Pd and Sc		8.34
K – 766.489 (I)	4.34	Ga, Ge and Pd	Pd - 340.457 (I)	8.34
Li - 670.776 (I)	5.39	Pd and Sc	Pd - 340.457 (I)	8.34
Mg 280.270 (II)	7.64	Ga, Ge and Pd	Pd - 340.457 (I)	8.34
Na – 818.325 (I)	5.14		Ga - 294.363 (I)	5.99
Pb - 220.353 (II)	7.41	Ga, Ge and Y	Ge - 265.117 (I)	7.89
Sb - 206.833 (I)	8.60	Ga, Ge and Pd	Ge - 265.117 (I)	7.89
Sb - 217.581 (I)		Pd	Pd - 340.457 (I)	8.34
Zn - 202.548 (II)	9.39	Ga, Ge, Pd, Sc and Y		7.89
Zn - 213.856 (I)		Ga, Ge and Y	Ge - 265.117 (I)	7.89

Lines: I – atomic line; II ionic line.

Table S2 Wavelengths excluded for obtaining the calibration curve by MEC and their most common spectral interferences in ICP OES analysis

Element - wavelength (nm)	
Analyte	Interference
Al – 236.705	Co – 236.746
Al – 309.271	Na – 309.273
Ba – 413.065	Si – 413.089
Ba – 493.408	Ar – 493.321
Bi – 306.770	Fe – 306.724
Cr – 284.324	Fe – 298.348
Cr – 283.563	Fe – 283.571
Pb – 280.199	Co – 280.200
Sb – 252.852	V – 252.846 and Si – 252.851
Zn – 202.548	Cu – 202.549

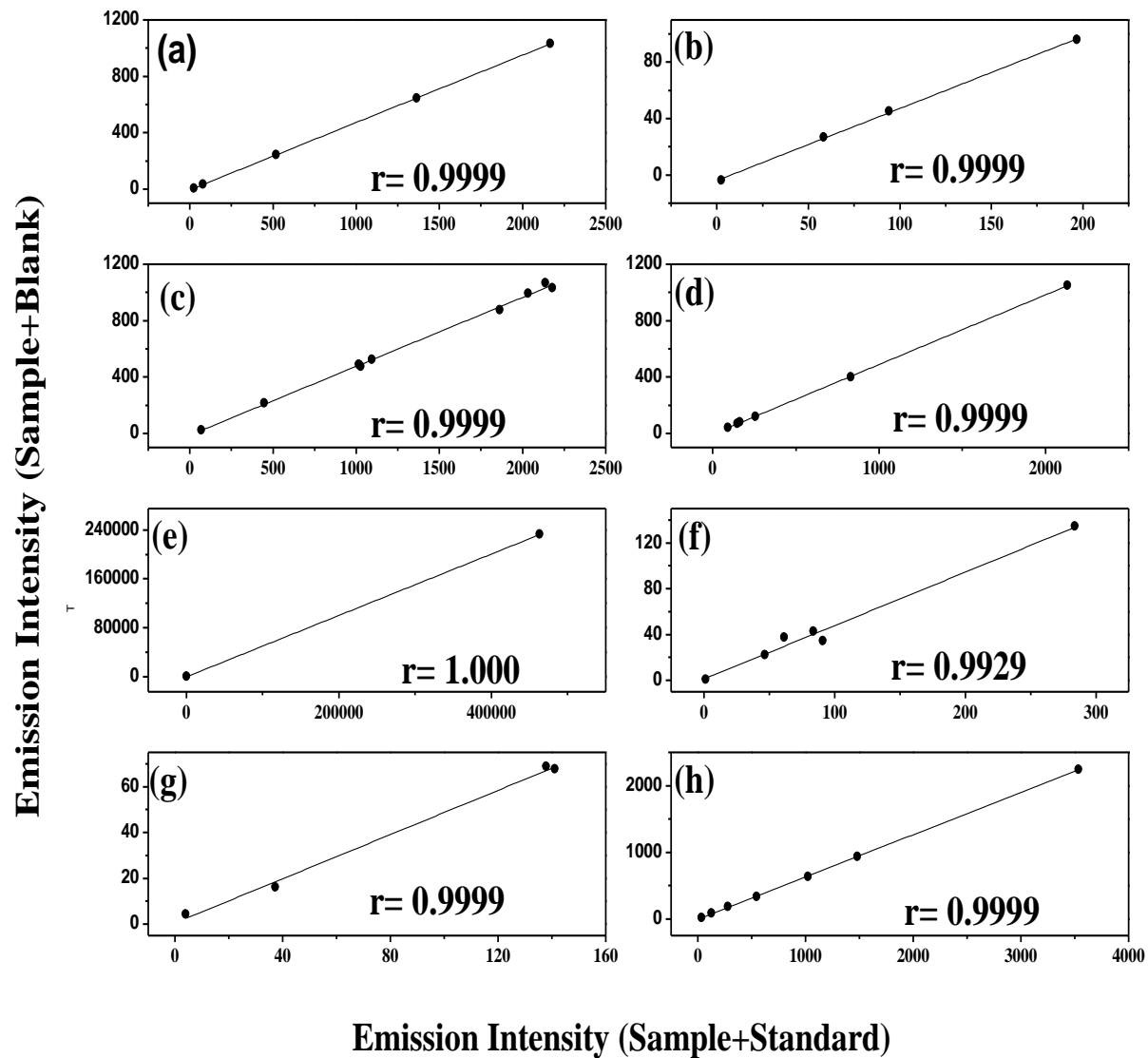


Fig. S1 Multi-energy calibration curves for (a) Ba, (b) Bi, (c) Cr, (d) Cu, (e) Li, (f) Pb, (g) Sb and (h) Zn, in non-diluted urine sample by ICP OES.

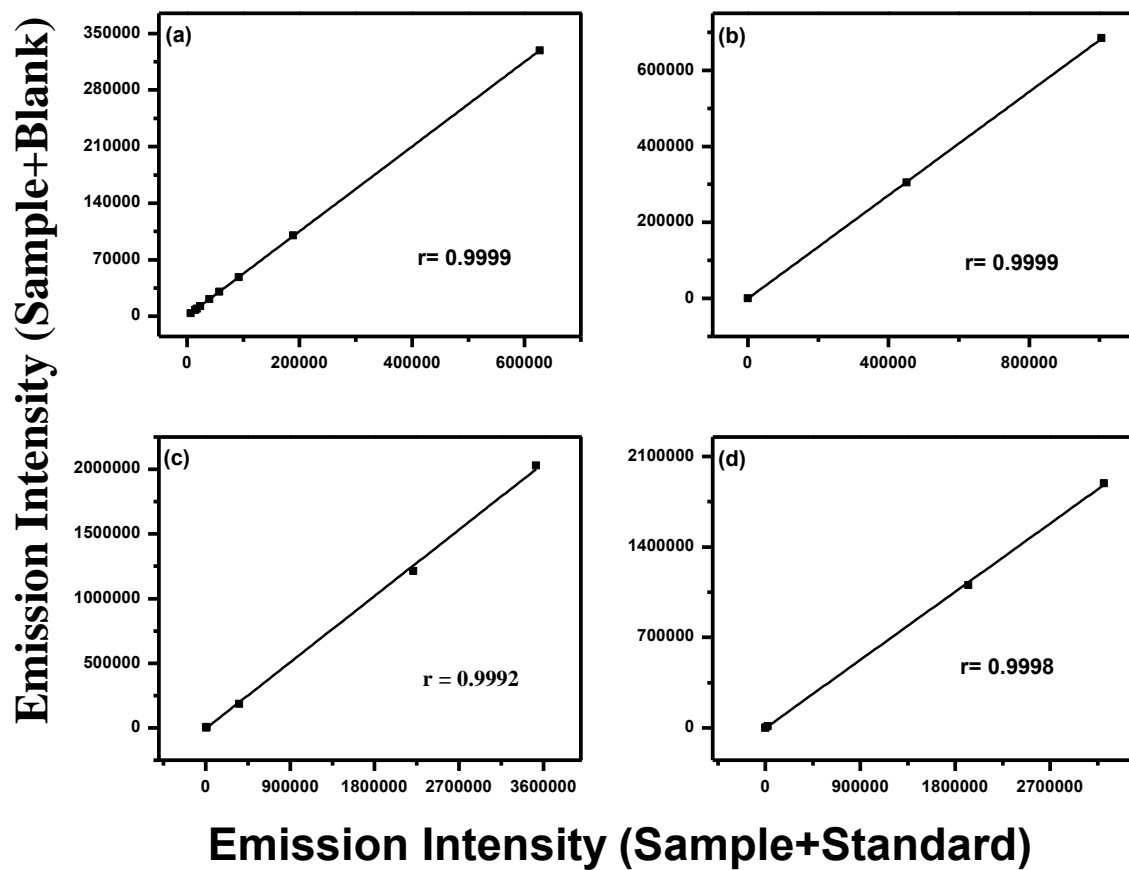


Fig. S2 Multi-energy calibration curves for (a) Ca, (b) K, (c) Mg and (d) Na in diluted urine sample by ICP OES.