Proposition of electronic waste as a reference material - Part 2: homogeneity, stability, characterization, and uncertainties

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Supplementary Information

Table S1 ANOVA for the homogeneity test of the candidate PCB sample for reference material.

Element	**Source of variance**	**SS**	**DF**	**MS**	**F_{cal}**	***p*-Value**	**F_{tab}**
Ag	Between-bottle	0.00046	9	0.000051	2.08	0.082	2.39
	Within-bottle	0.00049	20	0.000024			
	Total	0.00095	29				
Al	Between-bottle	6.70	9	0.74	3.16	0.01	2.39
	Within-bottle	4.71	20	0.23			
	Total	11.40	29				
As	Between-bottle	335.60	9	37.29	3.60	0.0082	2.39
	Within-bottle	207.35	20	10.37			
	Total	542.95	29				
Au	Between-bottle	13111.39	9	1456.82	0.48	0.87	2.39
	Within-bottle	60843.69	20	3042.18			
	Total	73955.07	29				
Ba	Between-bottle	0.048	9	0.0053	2.72	0.030	2.39
	Within-bottle	0.039	20	0.0020			
	Total	0.087	29				
Cr	Between-bottle	1.16	9	0.13	1.06	0.43	2.39
	Within-bottle	2.41	20	0.12			
	Total	3.57	29				
Cu	Between-bottle	329.00	9	36.56	3.09	0.017	2.39
	Within-bottle	236.49	20	11.82			
	Total	565.49	29				

Table S1 Continuation

Element	**Source of variance**	**SS**	**DF**	**MS**	**F_{cal}**	***p*-Value**	**F_{tab}**
Fe	Between-bottle	37.00	9	4.11	1.66	0.16	2.39
	Within-bottle	49.39	20	2.47			
	Total	86.39	29				
Ni	Between-bottle	0.17	9	0.019	1.34	0.28	2.39
	Within-bottle	0.29	20	0.014			
	Total	0.47	29				
Pb	Between-bottle	0.59	9	0.066	6.27	0.00032	2.39
	Within-bottle	0.21	20	0.010			
	Total	0.80	29				
Sb	Between-bottle	0.10	9	0.012	3.55	0.0087	2.39
	Within-bottle	0.066	20	0.0033			
	Total	0.17	29				
Si	Between-bottle	2.80	9	0.31	1.88	0.11	2.39
	Within-bottle	3.30	20	0.16			
	Total	6.10	29				
Sn	Between-bottle	5.72	9	0.64	1.42	0.24	2.39
	Within-bottle	8.96	20	0.45			
	Total	14.69	29				
Zn	Between-bottle	5.22	9	0.58	3.13	0.016	2.39
	Within-bottle	3.71	20	0.18			
	Total	8.92	29				

Table S2 ANOVA for the short-term stability test of the reference material.

Element	**Source of variance**	**SS**	**DF**	**MS**	**F_{cal}**	***p*-Value**	**F_{tab}**
Ag	Between-bottle	0.0018	5	0.00036	2.73	0.071	3.10
	Within-bottle	0.0016	12	0.00013			
	Total	0.0034	17				
Al	Between-bottle	12.50	5	2.50	12.65	0.00019	3.10
	Within-bottle	2.37	12	0.20			
	Total	14.87	17				
As	Between-bottle	71.24	5	14.25	2.27	0.11	3.10
	Within-bottle	75.29	12	6.27			
	Total	146.53	17				
Au	Between-bottle	6112.73	5	1222.54	0.78	0.58	3.10
	Within-bottle	18779.13	12	1564.93			
	Total	24891.86	17				
Ba	Between-bottle	0.022	5	0.0045	1.44	0.28	3.10
	Within-bottle	0.037	12	0.0031			
	Total	0.059	17				
Cr	Between-bottle	0.11	5	0.022	2.14	0.13	3.10
	Within-bottle	0.12	12	0.010			
	Total	0.23	17				
Cu	Between-bottle	32.80	5	6.56	13.33	0.00015	3.10
	Within-bottle	5.91	12	0.49			
	Total	38.71	17				

Table S2 Continuation.

Element	**Source of variance**	**SS**	**DF**	**MS**	**F_{cal}**	***p*-Value**	**F_{tab}**
Fe	Between-bottle	11.02	5	2.20	2.16	0.13	3.10
	Within-bottle	12.24	12	1.02			
	Total	23.26	17				
Ni	Between-bottle	0.0081	5	0.0016	0.44	0.81	3.10
	Within-bottle	0.044	12	0.0037			
	Total	0.052	17				
Pb	Between-bottle	0.080	5	0.016	1.63	0.22	3.10
	Within-bottle	0.12	12	0.0098			
	Total	0.20	17				
Sb	Between-bottle	0.11	5	0.022	8.80	0.0010	3.10
	Within-bottle	0.030	12	0.0025			
	Total	0.14	17				
Si	Between-bottle	1.55	5	0.31	3.63	0.03	3.10
	Within-bottle	1.03	12	0.08			
	Total	2.58	17				
Sn	Between-bottle	2.18	5	0.43	2.89	0.061	3.10
	Within-bottle	1.81	12	0.15			
	Total	3.99	17				
Zn	Between-bottle	0.75	5	0.15	2.48	0.092	3.10
	Within-bottle	0.73	12	0.06			
	Total	1.48	17				

Table S3 ANOVA data for the long-term stability test of the reference material.

Element	**Source of variance**	**SS**	**DF**	**MS**	**F_{cal}**	***p*-Value**	**F_{tab}**
Ag	Between-bottle	0.0014	8	0.00017	0.30	0.96	2.21
	Within-bottle	0.020	36	0.00056			
	Total	0.021	44				
Al	Between-bottle	6.30	8	0.79	2.42	0.033	2.21
	Within-bottle	11.70	36	0.32			
	Total	18.00	44				
As	Between-bottle	125.41	8	15.68	0.66	0.72	2.21
	Within-bottle	855.59	36	23.77			
	Total	980.99	44				
Au	Between-bottle	14364.32	8	1795.54	0.88	0.54	2.21
	Within-bottle	73546.17	36	2042.95			
	Total	87910.49	44				
Ba	Between-bottle	0.079	8	0.0098	1.22	0.31	2.21
	Within-bottle	0.29	36	0.0080			
	Total	0.37	44				
Cr	Between-bottle	0.18	8	0.023	1.17	0.34	2.21
	Within-bottle	0.70	36	0.019			
	Total	0.88	44				
Cu	Between-bottle	405.92	8	50.74	2.54	0.026	2.21
	Within-bottle	719.42	36	19.98			
	Total	1125.35	44				

Table S3 Continuation.

Element	Source of variance	SS	DF	MS	F_{cal}	*p*-Value	F_{tab}
Fe	Between-bottle	26.88	8	3.36	1.78	0.11	2.21
	Within-bottle	68.10	36	1.89			
	Total	94.99	44				
Ni	Between-bottle	0.097	8	0.012	1.00	0.45	2.21
	Within-bottle	0.43	36	0.012			
	Total	0.53	44				
Pb	Between-bottle	0.081	8	0.010	0.61	0.77	2.21
	Within-bottle	0.60	36	0.017			
	Total	0.68	44				
Sb	Between-bottle	0.14	8	0.018	2.46	0.031	2.21
	Within-bottle	0.26	36	0.0073			
	Total	0.40	44				
Si	Between-bottle	1.73	8	0.22	1.02	0.44	2.21
	Within-bottle	7.67	36	0.21			
	Total	9.40	44				
Sn	Between-bottle	5.12	8	0.64	1.33	0.26	2.21
	Within-bottle	17.35	36	0.48			
	Total	22.46	44				
Zn	Between-bottle	6.78	8	0.85	1.48	0.20	2.21
	Within-bottle	20.66	36	0.57			
	Total	27.44	44				

Table S4 Participating laboratories at collaborative trial

Exata Laboratory, GO, Brazil
São Paulo State University (UNESP) – Campus Rio Claro, SP, Brazil
Federal University of Espírito Santo (UFES), ES, Brazil
São Paulo State University (UNESP) – Campus Araraquara, SP, Brazil
Center of Nuclear Energy in Agriculture (CENA), University of São Paulo, Piracicaba, SP, Brazil
Central laboratory division of Eletrobras Eletronorte (OTLPL), PA, Brazil
Federal University of Bahia (UFBA), BA, Brazil
Information Technology Center Renato Archer (CTI Renato Archer), SP, Brazil
Federal University of Paraná (UFPR), PR, Brazil
Federal University of Ceará (UFC), CE, Brazil
Sinergia Laboratory, MS, Brazil
Laboratory of Poços de Caldas (LAPOC), National Nuclear Energy Commission (CNEN), MG, Brazil

Caption for figures

Figure S1 Univariate linear models for long-term stability testing.