Proposition of electronic waste as a reference material - Part 1: sample preparation, characterization and chemometric evaluation

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Supplementary Information

Table S1 Concentrations (mg kg^{-1}) determined from the factorial design experiments by ICP OES.

Experiment	Reagent	Ag	Al	As	Au	Ba	Cr	Cu	Fe	Ni	Pb	Sb	Si	Sn	Zn
1a	AR	738	59282	36	127	5433	3055	92036	47339	3903	8586	7103	15059	28950	18864
2a	AR	254	66512	33	169	5195	5811	168352	77722	5011	9627	5649	3436	35314	13900
3a	AR	734	66832	29	94	5374	5227	217458	90216	5286	9010	5934	25708	38853	28864
4a	AR	476	49653	39	188	4548	3253	135374	58136	4270	8711	5799	5598	26657	12837
5a	AR	668	51872	37	155	5167	5176	127048	65911	4619	9312	5999	7042	26776	18077
6a	AR	660	43641	32	185	4378	3527	158309	68688	4183	9863	5090	6444	26050	22145
7a	AR	704	56597	41	172	5151	3519	116793	53514	4002	9115	6966	7706	26247	16526
1b	ARI	44	39164	< LOQ	209	8472	2876	124061	78929	3457	8132	4495	3825	21478	20654
2b	ARI	7	36061	18	205	6679	3180	138942	61191	3681	8969	729	940	24027	22365
3b	ARI	52	36861	12	200	6260	5483	169798	65557	4738	8383	4308	3416	25720	38359
4b	ARI	20	39418	16	205	6371	5089	154572	84271	4463	8247	3649	1445	25292	26021
5b	ARI	19	40114	14	161	8212	3564	153238	63777	4054	10189	4071	2167	25566	32983
6b	ARI	27	39384	13	186	6951	4310	117882	59824	3882	8974	4571	1938	24257	18871
7b	ARI	30	35967	9	140	6078	3622	156381	85594	4108	9358	4149	1946	25572	27354
1c	AR 50%	656	60860	30	372	5012	22785	218056	136438	12175	12366	6475	30173	30038	23141
2c	AR 50%	168	66386	34	193	4771	5022	229192	84572	4889	14476	5616	4617	40561	39367
3c	AR 50%	843	70007	32	241	5318	4446	155806	78802	5066	13994	6999	36141	35164	18593
4c	AR 50%	419	64590	36	203	4891	6238	234169	92908	5250	13623	5763	7441	38781	34400
5c	AR 50%	436	51991	32	227	3816	2757	96916	43300	3614	9333	5792	7948	23538	14270
6c	AR 50%	422	49773	31	190	4191	4955	189693	69458	4441	11702	5439	9274	30586	25288
7c	AR 50%	459	58874	35	197	4547	3593	169081	64160	3872	13228	5866	9041	34360	27223

Table S1 Continuation.

Experiment	Reagent	Ag	Al	As	Au	Ba	Cr	Cu	Fe	Ni	Pb	Sb	Si	Sn	Zn
1d	HNO_3 50%	< LOQ	29040	< LOQ	196	4807	3446	137876	71169	3485	7123	< LOQ	13339	1295	28570
2d	HNO_3 50%	< LOQ	27532	< LOQ	131	4155	1402	127370	28530	2021	6630	< LOQ	2674	511	31647
3d	HNO_3 50%	< LOQ	48951	< LOQ	210	6611	5	122662	65188	3688	9845	203	23065	2355	19904
4d	HNO_3 50%	< LOQ	18039	< LOQ	205	5588	3552	173633	57731	3485	8632	270	4888	2321	28608
5d	HNO_3 50%	< LOQ	36088	< LOQ	223	5394	2958	179490	45913	3968	8643	32	7253	1426	31305
6d	HNO_3 50%	< LOQ	39037	< LOQ	184	5355	3851	176475	77140	4764	8451	50	7799	1907	35884
7d	HNO_3 50%	< LOQ	36543	< LOQ	189	5544	4157	178966	68708	4070	8620	316	7954	3804	27294
1e	HNO_3	< LOQ	31988	< LOQ	204	6071	3870	148056	57901	3594	9701	< LOQ	2710	1766	27649
2e	HNO_3	< LOQ	33284	< LOQ	149	5900	5767	160031	81338	4422	9179	343	757	3867	24286
3e	HNO_3	< LOQ	37443	< LOQ	266	6934	4088	190760	61777	3984	9811	< LOQ	3243	1395	25435
4e	HNO_3	< LOQ	34572	< LOQ	196	< LOQ	4300	150820	70668	4270	8974	107	930	2124	28180
5e	HNO_3	< LOQ	32179	< LOQ	161	7523	4711	141655	58724	4509	9615	< LOQ	985	1692	22338
6e	HNO_3	< LOQ	35105	< LOQ	268	6363	4110	170363	63545	4598	9887	52	1223	1903	23190
7e	HNO_3	< LOQ	32996	< LOQ	121	6818	6048	137601	74419	6171	9144	64	1213	2333	22508

LOQ - Limit of quantification for HNO_3: 0.04 mg kg^{-1} Ag; 0.05 mg kg^{-1} As; 1.07 mg kg^{-1} Ba; 0.64 mg kg^{-1} Sb.

LOQ - Limit of quantification for ARI: 0.22 mg kg^{-1} As

Table S2 Codded values (d_i and D) for concentrations determined from the factorial design experiments by ICP OES.

Experiment	Reagent	Ag	Al	As	Au	Ba	Cr	Cu	Fe	Ni	Pb	Sb	Si	Sn	Zn	D
1a	AR	0.8758	0.7936	0.8795	0.1165	0.6413	0.1339	0.0000	0.1743	0.1854	0.2493	1.0000	0.4042	0.7101	0.2272	0.0000
2a	AR	0.3010	0.9328	0.8202	0.2673	0.6132	0.2549	0.5369	0.4559	0.2945	0.3820	0.7954	0.0757	0.8690	0.0401	0.3574
3a	AR	0.8711	0.9389	0.7043	0.0000	0.6343	0.2293	0.8824	0.5717	0.3216	0.3034	0.8355	0.7051	0.9573	0.6041	0.0000
4a	AR	0.5650	0.6083	0.9535	0.3379	0.5368	0.1426	0.3049	0.2744	0.2215	0.2652	0.8164	0.1368	0.6528	0.0000	0.0000
5a	AR	0.7919	0.6510	0.9063	0.2199	0.6099	0.2270	0.2463	0.3464	0.2559	0.3419	0.8447	0.1776	0.6558	0.1975	0.3926
6a	AR	0.7825	0.4926	0.7759	0.3258	0.5167	0.1546	0.4663	0.3722	0.2129	0.4121	0.7167	0.1607	0.6377	0.3508	0.4037
7a	AR	0.8356	0.7420	1.0000	0.2802	0.6080	0.1543	0.1742	0.2315	0.1952	0.3167	0.9808	0.1964	0.6426	0.1390	0.3633
1b	ARI	0.0517	0.4065	0.0000	0.4136	1.0000	0.1260	0.2253	0.4671	0.1415	0.1914	0.6329	0.0867	0.5235	0.2946	0.0000
2b	ARI	0.0080	0.3468	0.4344	0.3979	0.7884	0.1394	0.3300	0.3027	0.1635	0.2981	0.1026	0.0052	0.5872	0.3591	0.0000
3b	ARI	0.0620	0.3622	0.2972	0.3815	0.7388	0.2405	0.5471	0.3431	0.2676	0.2234	0.6066	0.0751	0.6294	0.9620	0.3374
4b	ARI	0.0237	0.4114	0.3937	0.3976	0.7519	0.2232	0.4400	0.5166	0.2405	0.2061	0.5137	0.0194	0.6188	0.4969	0.2683
5b	ARI	0.0228	0.4248	0.3526	0.2389	0.9693	0.1562	0.4306	0.3266	0.2003	0.4536	0.5732	0.0399	0.6256	0.7594	0.2805
6b	ARI	0.0320	0.4107	0.3193	0.3313	0.8204	0.1890	0.1818	0.2900	0.1833	0.2988	0.6435	0.0334	0.5929	0.2274	0.2270
7b	ARI	0.0356	0.3450	0.2308	0.1635	0.7174	0.1588	0.4527	0.5288	0.2056	0.3477	0.5841	0.0336	0.6257	0.5472	0.2591
1c	AR 50%	0.7787	0.8240	0.7495	1.0000	0.5916	1.0000	0.8866	1.0000	1.0000	0.7311	0.9117	0.8313	0.7373	0.3884	0.7946
2c	AR 50%	0.1992	0.9303	0.8430	0.3555	0.5631	0.2202	0.9650	0.5193	0.2825	1.0000	0.7908	0.1091	1.0000	1.0000	0.5116
3c	AR 50%	1.0000	1.0000	0.7764	0.5280	0.6277	0.1950	0.4487	0.4659	0.2999	0.9386	0.9855	1.0000	0.8652	0.2170	0.5847
4c	AR 50%	0.4973	0.8958	0.8921	0.3916	0.5773	0.2736	1.0000	0.5966	0.3180	0.8914	0.8113	0.1889	0.9556	0.8128	0.5806
5c	AR 50%	0.5169	0.6533	0.7974	0.4756	0.4504	0.1208	0.0343	0.1369	0.1569	0.3445	0.8155	0.2032	0.5750	0.0540	0.2665
6c	AR 50%	0.5004	0.6107	0.7586	0.3454	0.4947	0.2173	0.6871	0.3793	0.2384	0.6465	0.7658	0.2407	0.7509	0.4693	0.4655
7c	AR 50%	0.5447	0.7858	0.8525	0.3704	0.5367	0.1575	0.5421	0.3302	0.1823	0.8410	0.8259	0.2341	0.8452	0.5422	0.4727

Table S2 Continuation.

Experiment	Reagent	Ag	Al	As	Au	Ba	Cr	Cu	Fe	Ni	Pb	Sb	Si	Sn	Zn	D
1d	HNO_3 50%	0.0000	0.2117	0.0000	0.3659	0.5674	0.1511	0.3225	0.3951	0.1443	0.0629	0.0000	0.3556	0.0196	0.5930	0.0000
2d	HNO_3 50%	0.0000	0.1827	0.0000	0.1325	0.4905	0.0613	0.2486	0.0000	0.0000	0.0000	0.0000	0.0542	0.0000	0.7090	0.0000
3d	HNO_3 50%	0.0000	0.5948	0.0000	0.4179	0.7803	0.0000	0.2155	0.3397	0.1642	0.4098	0.0286	0.6305	0.0461	0.2664	0.0000
4d	HNO_3 50%	0.0000	0.0000	0.0000	0.3979	0.6595	0.1557	0.5741	0.2706	0.1442	0.2552	0.0380	0.1167	0.0452	0.5945	0.0000
5d	HNO_3 50%	0.0000	0.3473	0.0000	0.4635	0.6367	0.1296	0.6153	0.1611	0.1918	0.2566	0.0045	0.1836	0.0229	0.6961	0.0000
6d	HNO_3 50%	0.0000	0.4041	0.0000	0.3238	0.6321	0.1688	0.5941	0.4505	0.2701	0.2321	0.0071	0.1990	0.0348	0.8687	0.0000
7d	HNO_3 50%	0.0000	0.3561	0.0000	0.3390	0.6543	0.1823	0.6116	0.3723	0.2018	0.2537	0.0445	0.2034	0.0822	0.5449	0.0000
1e	HNO_3	0.0000	0.2684	0.0000	0.3962	0.7166	0.1697	0.3941	0.2722	0.1549	0.3915	0.0000	0.0552	0.0313	0.5583	0.0000
2e	HNO_3	0.0000	0.2933	0.0000	0.1959	0.6964	0.2530	0.4784	0.4894	0.2364	0.3248	0.0482	0.0000	0.0838	0.4315	0.0000
3e	HNO_3	0.0000	0.3734	0.0000	0.6177	0.8185	0.1792	0.6946	0.3081	0.1933	0.4054	0.0000	0.0703	0.0221	0.4748	0.0000
4e	HNO_3	0.0000	0.3181	0.0000	0.3671	0.0000	0.1885	0.4136	0.3905	0.2215	0.2988	0.0151	0.0049	0.0403	0.5783	0.0000
5e	HNO_3	0.0000	0.2721	0.0000	0.2398	0.8879	0.2066	0.3491	0.2798	0.2451	0.3805	0.0000	0.0064	0.0295	0.3581	0.0000
6e	HNO_3	0.0000	0.3284	0.0000	0.6238	0.7510	0.1802	0.5511	0.3245	0.2538	0.4151	0.0074	0.0131	0.0348	0.3902	0.0000
7e	HNO_3	0.0000	0.2878	0.0000	0.0963	0.8048	0.2653	0.3206	0.4253	0.4087	0.3204	0.0090	0.0129	0.0455	0.3645	0.0000

Figure S1 Surface plot for optimized condition using aqua regia (AR).

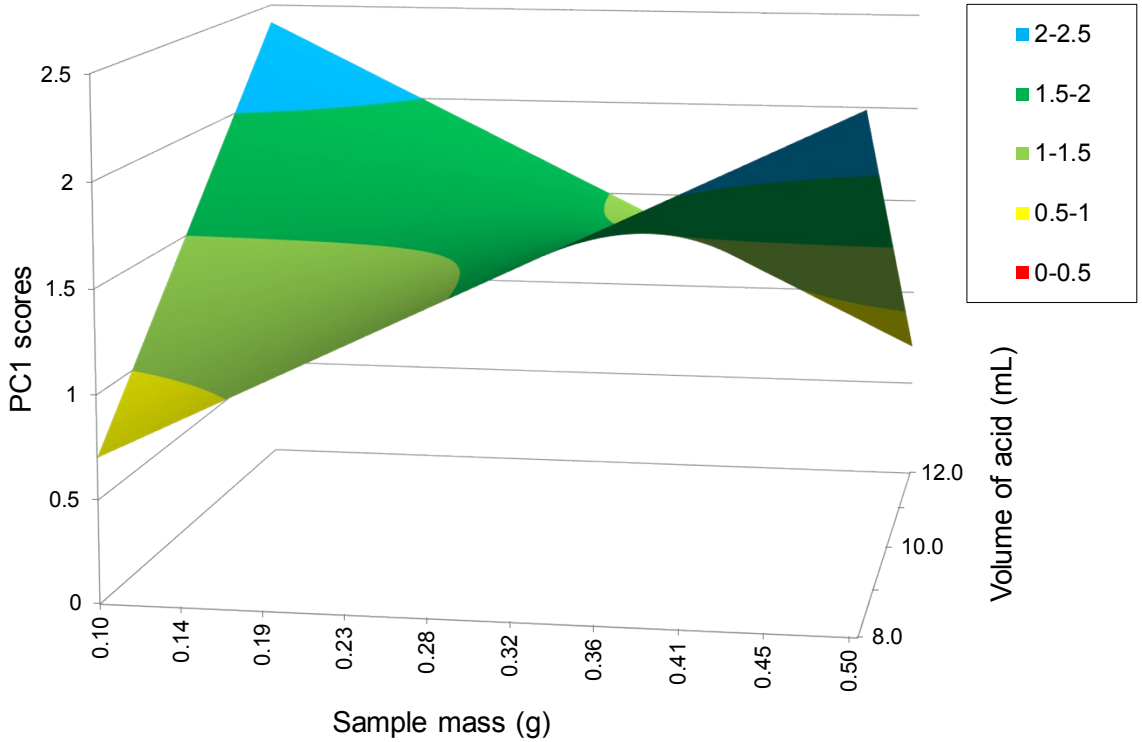

Figure S2 Surface plot for optimized condition using inverted aqua regia (ARI).

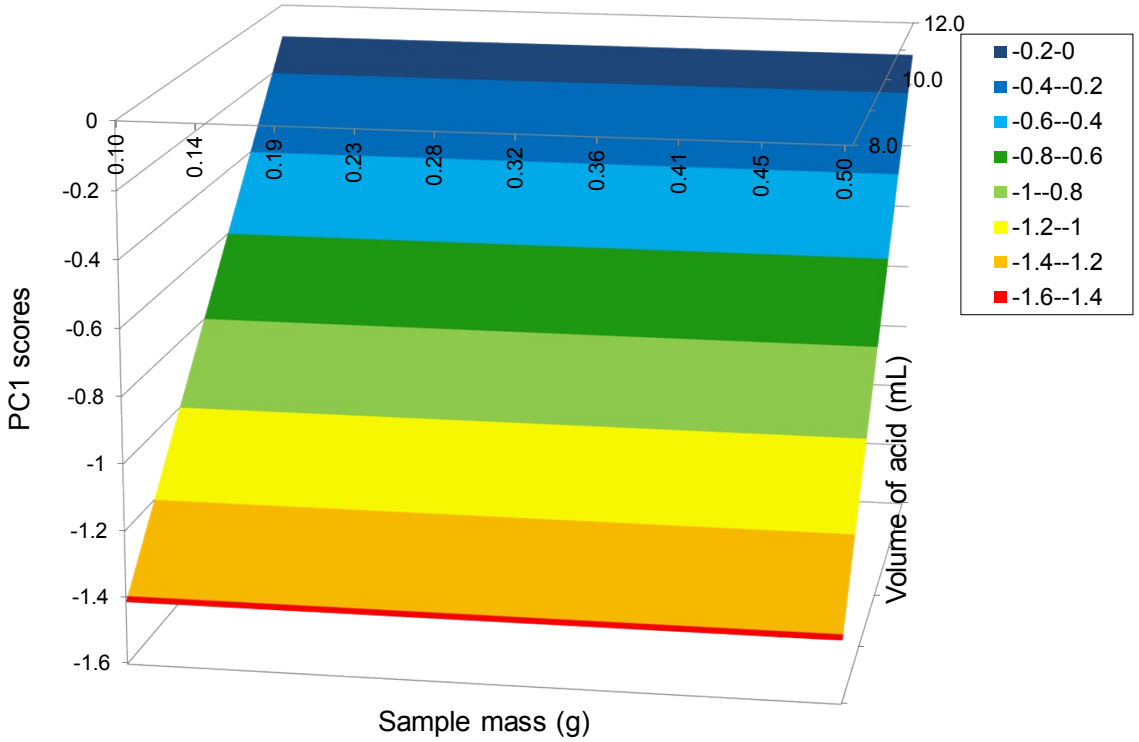

Figure S3 Surface plot for optimized condition using HNO_3.

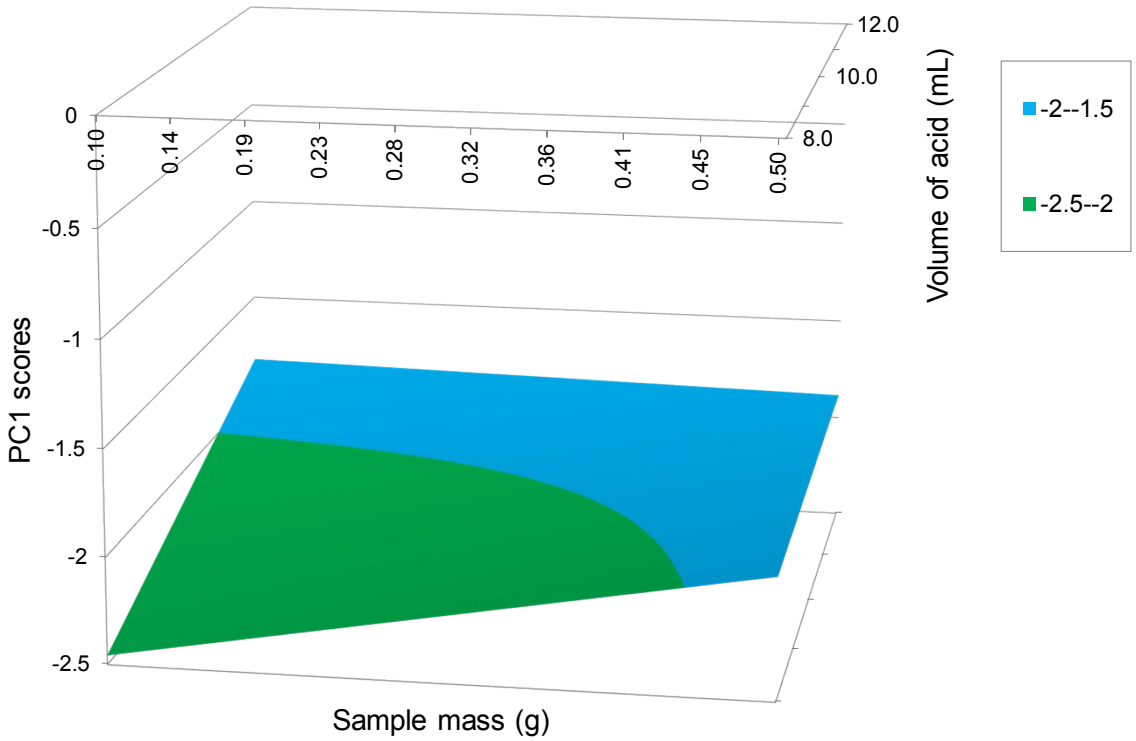

Figure S4 Surface plot for optimized condition using HNO_3 50% v/v.