Application Note -The Digestion of Waste Water

Introduction:

This study evaluated the effectiveness of the *Nova***WAVE** microwave digestion system for the digestion of waste water samples.

Sample Type:

Waste water- Municipal waste water in house.QC sample.

- Sample volume: 5 ml
- 4 Replicates

Supplies and Reagents:

1) *Nova***WAVE SA** Model*
2) Quartz 75 ml Vessels*
3) Teflon® Caps and Safety Pressure Release Caps at 30 bar(435psi)*
4) *Plasma***PURE** HNO_3 (70%), 1 ml*
5) *Plasma***PURE** HCl, 1:1 (1 ml)*
5) Analytical Balance 4 Decimal Places, Mettler-Toledo
6) ICP-MS Perkin-Elmer ELAN 6100
7) Mini-X-Flow Nebulizer*
8) 1.2mm Alumina Injector Torch*
9) Baffled Cyclonic Spray Chamber*
10) 10 ml Graduated Cylinder, Corning

* Manufactured by **SCP SCIENCE**

Sample Preparation Procedure:

The waste water sample was measured in a graduated cylinder and transferred into a 75 ml quartz vessel. After adding 25 ml of DI water, 1 ml of HNO_3 and 1 ml of 1:1 HCl:H_2O, the sample was digested in the *Nova***WAVE** following the instrument's heating profile noted below. After cooling, samples were normalized to 50 ml with DI water.

*NOVA***WAVE** Heating Program:

STAGE	RAMP TIME (MINUTES)	PRESSURE (PSI – LIMIT)	TEMPERATURE (°C)	HOLD TIME (MINUTES)
1	10	435	175	10

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Recoveries:

Element	Mass (amu)	*Nova***WAVE** (ppm)	Std. Dev. (ppm)	Known Valuez (ppm)	Recovery (%)
Li	7	0.026	0.004	0.029	90
Na	23	181	1	181	99
Mg	24	21.8	1.1	22.6	96
Al	27	1131	9	1183	96
P	31	0.124	0.007	0.115	108
K	39	1.4	0.3	1.34	104
Ca	43	3.9	0.2	3.9	100
Ti	48	3.21	0.03	3.12	103
Cr	52	8675	80	8769	99
Mn	55	6.5	0.2	6.8	96
Fe	57	7.15	1.3	6.79	105
Cu	63	50.6	0.5	56.1	90
Zn	68	20.0	0.7	21.9	91
Sr	88	0.080	0.009	0.075	107
Sb	121	49.8	2.3	55.2	90
Ba	138	0.035	0.008	0.033	106
La	139	0.56	0.03	0.51	110
Tl	205	4.4	0.1	4.3	102
Bi	209	16.8	1.8	16.8	100

Conclusion:

For determination of trace metals in waste water, the Ministry of Environment of Quebec sets the acceptable range of recoveries at 15%. All recoveries are within this range. Therefore, the *NOVA***WAVE** system is suitable for waste water digestion.

References:

Certificate of Analysis SC9261560 from **SCP SCIENCE**
Certificate of Analysis NIST CRM 1059c
USCPSC-CH-E1001-08 method

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