Application Note - The Digestion of Soil Samples

Introduction:

This study evaluated the effectiveness of the *NOVA**WAVE*** microwave digestion system for the digestion of the soil sample.

Sample Type:

Soil sample

- Sample weight: 0.5g
- 4 Replicates

Supplies and Reagent:

1) *NOVA**WAVE*** SA Model*
2) Quartz 75 ml Vessels*
3) Teflon® Caps and Safety Pressure Release Caps, pre-set release pressure at 30 bar (435 psi) *
4) *Plasma***PURE** HNO_3 (70%), 5 ml*
5) Analytical Balance 4 Decimal Places, Mettler-Toledo
6) Spectroflame Modula FMD-07 ICP-OES, Spectro Analytical
7) ICP-MS PerkinElmer ELAN 6100
8) Mini X-Flow Nebulizer*
9) 1.2 mm Alumina Injector Torch*
9) Baffled Cyclonic Spray Chamber*
10) 10 ml Graduated Cylinder, Corning
11) *Digi***FILTER**s 0.45 um
12) *Digi***TUBE**s 50 ml

* Manufactured by **SCP SCIENCE**

Sample Preparation Procedure:

The soil samples were weighted on a 4 place analytical balance directly into the 75 ml quartz vessels. After adding 45 ml of DI water and 5 ml of HNO_3, the samples were digested in the *NOVA**WAVE*** following the instrument's heating profile noted below. After cooling, the samples were filtered through a *Digi***FILTER** into a *Digi***TUBE** and analyzed. Recoveries are given on an average of 4 different digestions.

*NOVA**WAVE*** Heating Program:

STAGE	RAMP TIME (Minutes)	PRESSURE (psi - limit)	TEMPERATURE (^{0}C)	HOLD TIME (Minutes)
1	10	435	175	10

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Recoveries:

Element Symbol	Wavelength (nm)	Mass (amu)	*NOVA**WAVE*** (ppm)	Std. Dev. (ppm)	Cert. Value (ppm)	Recovery (%)
Al	396.15	X	6334	288	6298	100
As	X	75	2.61	0.32	2.28	114
Ba	455.40	X	56.4	3.7	54.76	103
Bi	233.06	X	3.4	1.1	3.793	89
Ca	396.15	X	20180	612	21010	96
Ce	X	140	36.37	0.51	36.74	99
Co	230.79	X	4.6	0.6	5.47	84
Cd	X	112	0.25	0.253	0.22	113
Cr	283.56	X	106	13	122.9	86
Cu	327.35	X	18.7	1.4	17.29	108
Fe	259.94	X	11017	470	11320	97
K	X	39	880	28	866.2	101
La	X	139	9.3	1.6	10.76	86
Li	X	7	6.67	0.13	7.89	84
Mg	279.05	X	3456	103	3459	100
Mn	257.61	X	163	14	173.7	94
Mo	X	94	1.39	0.30	1.19	117
Na	589.59	X	1139	90	1081	105
Ni	221.65	X	9.5	1.5	10.81	88
P	177.40	X	715	22	730.3	98
Pb	182.22	X	29.3	7.0	35.09	84
Sb	X	121	2.34	0.13	2.4	98
Si	251.61	X	1231	213	1025	120
Sr	407.77	X	189	29	181.8	104
Ti	334.94	X	367	32	384.1	96
V	310.23	X	33.2	2.3	31.83	104
Zn	206.28	X	48.4	2.4	54.11	89

References:

USEPA 3015A MICROWAVE ASSISTED ACID DIGESTION OF AQUEOUS SAMPLES AND EXTRACTS.

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