

Application News

Inductively Coupled Plasma Atomic Emission Spectrometry

Analysis of Pond Sediment

■ Description

The multi-type ICPE-9000 ICP emission spectrometer was used to analyze pond sediment. With the ICPE-9000, the semi-quantitation results can easily be obtained from the database (qualitative function), without generating calibration curves. Table 1 shows the semi-quantitation results. In addition, Table 2 shows the quantitation results obtained using the calibration curve method. These qualitative and quantitation results can be obtained simultaneously with a single analysis. Fig. 1 shows the spectral profiles, and Fig. 2 shows the calibration curves.

■ Sample

Pond sediment standard NIES No.2

■ Pretreatment

Add nitric acid and hydrofluoric acid to 0.4 g of sample, and conduct sample digestion using a high-pressure microwave digester. After letting the sample cool, heat the digested solution in a PTFE beaker, and volatilize to hardness. Add

nitric acid and hydrochloric acid to the sample, and perform heat digestion. After letting the sample cool, add Y (yttrium) as the internal standard element, adjust the volume to 20 mL, and use this as the analytical sample.

■ Analytical Conditions

Instrument	:	ICPE-9000
Radio Frequency	:	1.2 (kW)
Power	:	
Plasma Gas	:	10 (L/min)
Auxiliary Gas	:	0.6 (L/min)
Carrier Gas	:	0.8 (L/min)
Sample Introduction	:	Coaxial Nebulizer
Sample Aspiration	:	1.0 (mL/min)
Misting Chamber	:	Cyclone Chamber
Attached Instruments	:	Mini Torch
View Direction	:	Axial

Table 1: Semi-Quantitation Results of Pond Sediment Standard

1000 mg/L or greater	Al 2200	Fe 1600	Ti 100			
1mg/L or greater	Ca 39	Co 1.4	Cr 1.8	Cu 5.5	K 20	Mn 2.3 +
	Na 98	P 2.0	Pb 1.8	S 890	Si 1.1	Sr 1.8
	V 2.1	Y 45	Zn 1.3			
1 µg/L or greater	B 370	Ba 2.5	Be 4.1	Dy 69	Er 60	Eu 11
	Gd 90	La 60	Mg 32	Nb 68	Ni 900	Rh 150
	Sc 5.4	Yb 10	Zr 18			
Up to 1 µg/L						
Below detection limit						
µg/L	Ag < 65	As < 1900	Au < 360	Bi < 1600	Cd < 92	Ce < 100
	Ga < 390	Ge < 990	Hf < 1100	Hg < 47	Ho < 25	I < 790
	In < 850	Ir < 8300	Li < 1.2	Lu < 320	Mo < 340	Nd < 93
	Os < 2200	Pd < 110	Pr < 70	Pt < 1300	Re < 380	Ru < 1200
	Sb < 1700	Se < 2100	Sm < 75	Sn < 690	Ta < 570	Tb < 44
	Te < 3000	Th < 190000 +	Tl < 800	Tm < 21	U < 3100	W < 3500

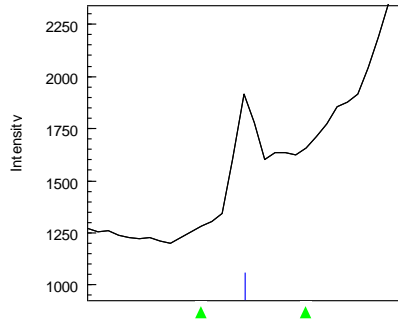
Measurement Solution Concentration (Sample 0.4g/20 mL)

Table 2: Quantitation Results of Pond Sediment Standard (µg/g)

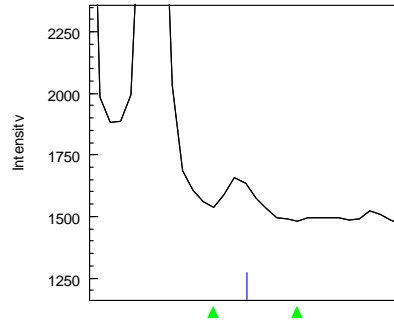
Element	Quantitation Value	Certified Value
Zn	330	343±17
Cu	199	210±12
Pb	101	105±6
Cr	72 .0	75±5
As	13	12±2
Cd	0 .8	0.82±0.06

*Values in parentheses are reference values

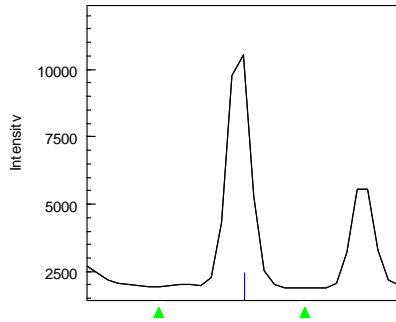
Pb 220.353 Best
Cond 1



Cd 228.802 Best
Cond 1



Cr 267.716 Best
Cond 1



As 189.042
Cond 1

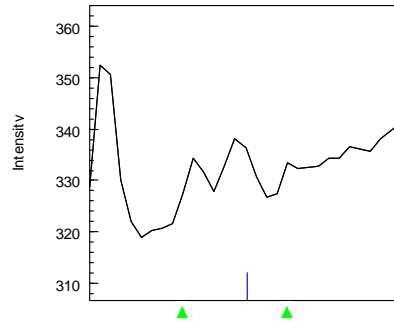


Figure 1: Spectral Profiles

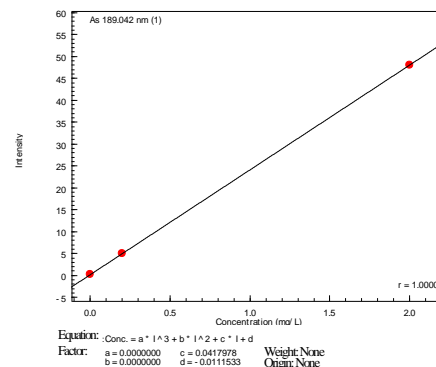
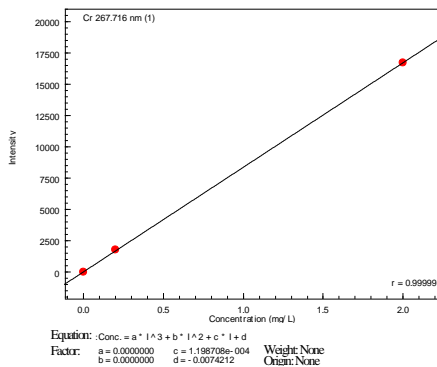
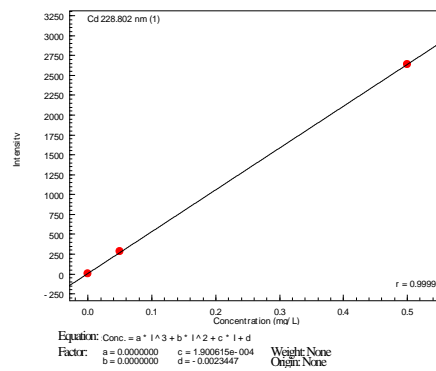
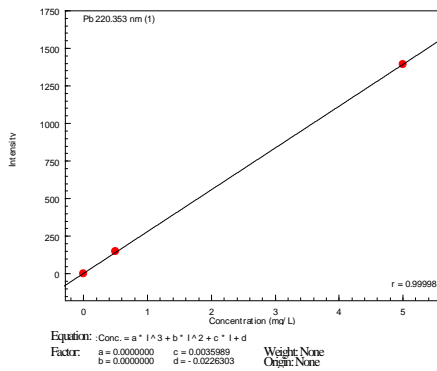


Figure 2: Calibration Curves