Lead in Wipes by NIOSH 9100 by SOP 7040, Rev 9
Quantitative Analysis Report
Inductively Coupled Plasma-Mass Spectrometry

Micrograms per Wipe

Sample ID	Lead
Logo on sample was wiped	
Kooler Bag 0297-8904	0.32
Ghost Wipe*	0.11
Detection Limit:	0.01

Date Analyzed: 06-19-08

*The lead concentration is typical for this type of ghost wipe.

Quality Control Summary

Sample: Ghost Wipe

Analyte	Sample Result	Spike Conc	Spike Result	Spike % Rec	Spike Dup Result	Spike Dup % Rec	Spike RPD
Lead	0.11	10	9.87	98	9.8	97	1

Date Analyzed: 06-19-08

Quality Control Summary

Sample: Laboratory Fortified Blank (LFB)

Analyte	Sample Result	Spike Conc	Spike Result	Spike % Rec
Lead	ND	10	9.79	98

Date Analyzed: 06-19-08

Lead by SOP 7040, Rev 9
Quantitative Analysis Report
Inductively Coupled Plasma-Mass Spectrometry

Parts Per Million (µg/g)

Sample ID	Lead
Lunch Tote 0379-8040 (liner)	2.9
Detection Limit:	0.2

Date Analyzed: 06-19-08

Quality Control Summary

Sample: Batch QC

Analyte	Sample Result	Duplicate Result	Average Result	Sample RPD	Spike Conc	Spike Result	Spike % Rec
Lead	0.4	0.3	0.35	NA	291	167	57*

Date Analyzed: 06-19-08
* Low spike recovery (compared to LFB) due to probable matrix effects

Quality Control Summary

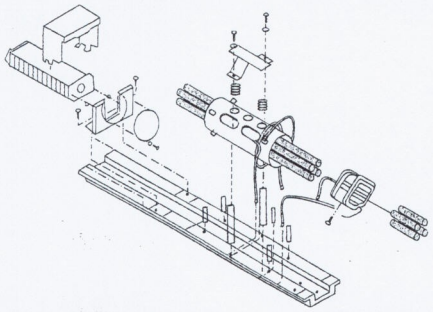
Sample: Laboratory Fortified Blank (LFB)

Analyte	Sample Result	Spike Conc	Spike Result	Spike % Rec
Lead	ND	300	302	101

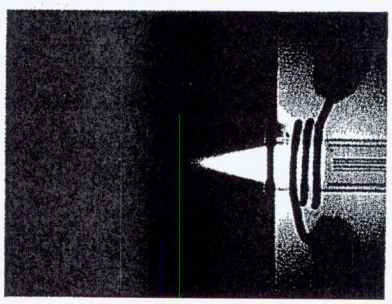
Date Analyzed: 06-19-08

WCAS

ICPMS Inductively Coupled Plasma Mass Spectrometry



Quadrupole mass spectrometer



Inductively coupled plasma

Trace elemental analysis

Inductively coupled plasma-mass spectrometry (ICPMS) is currently the most sensitive technique for determining metals in solution. ICPMS provides better sensitivity than graphite furnace atomic absorption (GFAA) and has the multi-element speed of ICP-optical emission spectroscopy (ICP-OES). Various regulatory agencies have published methods which use ICPMS including EPA Methods 200.8 and 6020, as well as USP<730>.

WCAS has developed numerous applications including:

Metals Screen: The determination of more than 60 elements in a sample.

Metals in Proteins and Peptides: Sub-ppm detection limits on 10 mg sample sizes.

Heavy Metals: An alternative to USP<231> using much smaller samples.

Various Elements: Fully validated trace analysis in a variety of APIs, drug products, and biological samples.

Lead (Pb) and other elements using isotope dilution ICPMS.

Speciation of elements such as As, Se, Pb, and Hg using GC and HPLC coupled with ICPMS.

How does it work?

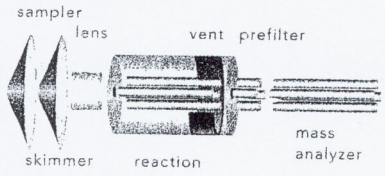
In a typical application, samples are placed in solution by acid digestion. The solution is then sprayed into flowing argon and passed into a torch which is inductively heated to approximately 6,000-9,000K. At this temperature, the gas and almost everything in it is atomized and ionized, forming a plasma rich in both excited and ionized atoms. In ICPMS, positive ions in the plasma are focused down a quadrupole mass spectrometer. By acquiring the mass spectrum of the plasma, data can be obtained for almost the entire periodic table in just minutes with detection limits in the range of µg/L to ng/L for most elements with typically 1-2 mL of sample solution consumed.

Quality Control includes:

Internal standards over the mass range
Multi-point calibration standards
Reference samples from NIST, USGS, etc.
Calibration check every 10 samples
Blanks prepared with every batch of samples ▸

ICPMS Inductively Coupled Plasma Mass Spectrometry

Duplicate and spiked samples for precision and accuracy
Monitoring multiple isotopes
Isotope dilution in some cases



Dynamic Reaction Cell (DRC)

Metals Screen by SCP 7040 Rev. 8
Inductively Couple Plasma Mass Spectrometry

Sample ID Protein Buffer in diluted 1:20

	ppm	Detection Limit		ppm	Detection Limit
Aluminum	ND	0.02	Molybdenum	ND	0.001
Antimony	ND	0.001	Neodymium	ND	0.001
Arsenic	ND	0.004	Nickel	0.003	0.001
Barium	ND	0.001	Niobium	ND	0.001
Beryllium	ND	0.001	Osmium	ND	0.001
Bismuth	ND	0.001	Palladium	ND	0.001
Boron	ND	0.70	Phosphorus	ND	6
Bromine	0.17	0.01	Platinum	ND	0.001
Cadmium	ND	0.001	Potassium	ND	1
Calcium	0.8	0.3	Praseodymium	ND	0.001
Cerium	ND	0.001	Rhenium	ND	0.001
Cesium	ND	0.001	Rhodium	ND	0.001
Chromium	0.029	0.007	Rubidium	ND	0.001
Cobalt	ND	0.001	Ruthenium	ND	0.001
Copper	ND	0.01	Samarium	ND	0.001
Dysprosium	ND	0.001	Selenium	0.007	0.005
Erbium	ND	0.001	Silver	ND	0.001
Europium	ND	0.001	Sodium	3506	0.08
Gadolinium	ND	0.001	Strontium	0.016	0.001
Gallium	ND	0.001	Tantalum	ND	0.001
Germanium	ND	0.001	Tellurium	ND	0.001
Gold	ND	0.003	Thallium	ND	0.001
Hafnium	ND	0.001	Thorium	ND	0.001
Holmium	ND	0.001	Thulium	ND	0.001
Iodine	ND	0.03	Tin	ND	0.001
Iron	ND	1	Titanium	ND	0.003
Lanthanum	ND	0.001	Tungsten	ND	0.001
Lead	ND	0.001	Uranium	ND	0.001
Lithium	ND	0.001	Vanadium	ND	0.01
Lutetium	ND	0.02	Ytterbium	ND	0.001
Magnesium	0.009	0.006	Yttrium	ND	0.001
Manganese	ND	0.001	Zinc	ND	0.01
Mercury	ND	0.001	Zirconium	ND	0.001

Date Analyzed: 1-20-03
Elements Not Analyzed: All Gases, C, S, Si, Sc, In, Tb

Metals screen sample report

The Latest Developments

Our ICPMS systems are equipped with the latest in reaction and collision cell technology to reduce or eliminate molecular ion interferences. We have this technology on both a PerkinElmer ELAN 6100 DRC (Dynamic Reaction Cell) and multiple Agilent 7500ce systems. This allows the best detection limits in difficult matrices.

WCAS uses ICPMS to measure trace metals in pharmaceuticals and raw materials. With very expensive drugs such as proteins and peptides, sub- ppm detection limits can be reached with only 10 mg samples. For health and safety professionals, unknown or unexpected elements can be identified and quantified from a variety of sample matrices. For manufacturers of high purity reagents, almost all trace metallic impurities can be determined, even the exotic elements.

In the health and environmental fields not only can it perform routine analysis of water, soil, air, etc. (EPA Methods 200.8 and 6020), it can also speciate elements using gas chromatography and liquid chromatography combined with ICPMS (GC- and LC-ICPMS). Elements such as As, Se, Hg, and Pb can exist in different valence states (e.g. As+3 or As+5) or attached to organic groups (e.g. methylmercury). GC- and LC-ICPMS allows both the separation of different species as well as very sensitive quantification.

Whatever the application, West Coast Analytical Service is an industry leader in trace element analysis. We currently have multiple ICPMS systems, and at the risk of sounding old, we have been doing trace metals analysis by ICPMS longer than any commercial laboratory (since 1984). In addition to offering routine metals analysis, we also offer research, method development, and method validation. ■

WCAS Bodycote TESTING GROUP

Where difficult analytical techniques are routine.

WEST COAST ANALYTICAL SERVICE, INC.
9240 Santa Fe Springs Road, Santa Fe Springs, CA 90670
tel 562 948 2225 *fax* 562 948 5850 *call center* 866 263 9268
www.wcas.com www.bodycotetesting.com