

Inductively Coupled Plasma - Mass Spectroscopy (ICP-MS) ASG-ICP-101

Inductively Coupled Plasma Mass Spectroscopy (ICP-MS) is a method to determine elemental composition in a variety of materials. In most cases, the sample must first be dissolved. The sample solution is introduced into a high temperature plasma which is a stream of argon gas excited by an electromagnetic field. The extremely high temperature of the plasma generates positively charged ions, which are directed into the mass detector and measured. Concentrations of unknowns (calculated by the software) are based on the mass abundance of the unknown and that of known standards.

Sample types amenable to ICP-MS analysis include aqueous and extracts (acid, aqueous or base) of dry powders. ICP-MS provides very low detection limits (ppm, ppb) and a wide linear dynamic range that is relatively free from interelement effects.

The table below lists the elements, sample types, and detection limits for routine ICP- analysis.

Sample Type	Waters	Calcium Carbonate	Talc, Barite, Mica	Refractory and their Raw Materials
Units	ug/ml	ug/g	ug/g	%
Wt./Vol (g/ml)	As Received	1/100	2/100	1/100
Al	0.01	-	-	-
As	0.01	0.1	0.1	-
B	-	-	-	0.001
Ba	0.01	-	1.0	-
Bi	0.01	3	0.1	-
Ca	0.06	5		-
Cd	0.01	0.1	0.2	-
Co	0.01	4	1	-
Cr	0.01	0.6	1	-
Cu	0.01	2	1	-
Fe	0.01			-
Hg	0.05	0.5	0.5	-
K	0.05	-	-	-
Mg	0.03	-	-	-
Mn	0.01	-	-	-
Mo	0.01	0.1	-	-
Na	0.02	24	-	0.001
Ni	0.01	4	3	-
P	0.02	-	-	-
Pb	0.01	0.3	0.3	-
Sb	0.01	2	-	-
Si	0.20	-	-	-
Sn	0.01	0.2	-	-
Sr	0.01	-	-	-
Ti	0.01	-	-	-
V	0.01	0.5	1	-
Zn	0.01	4	6	-

<u>Types of Sample</u>	<u>Sample Size</u>	<u>Turnaround</u>
CaCO ₃ (PCC, Slurry, Limestone), Grit, and Dolomite	2 g Minimum	2 Days Minimum
Waters (Process, condensates, city, supernatants, filtrates, etc.)	50 - 100 ml	2 Days Minimum
CaCO ₃ (Water soluble species in PCC Slurry)	Slurry 100 ml Powder 5-10g	2 Days Minimum
Paper Samples	5 - 10 g	2 Days Minimum
Inks	50 - 100 ml	2 Days Minimum
Refractory and refractory raw materials	1 g Minimum	2 Days Minimum

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