



Determination of Calcium, Magnesium, Aluminium and Barium Content in Cored Wire

1 Sample solution preparation :

0.1000g well-mixed sample (precision to 0.0001g) was weighed and placed in a PTFE beaker, 5mL HNO₃ was added, HF was added slowly drop by drop, until violent reaction stops. 5mL HClO₄ was added, heated to smoke until near dry, cooled down slightly, 3mL HClO₄ was again added, heated to smoke to near dryness. 10mL HCl was added, heated to dissolve the salt, cooled to room temperature, transferred to a 50mL volumetric flask, diluted up to the volume with deionized water, shaken, spared for later use.

2 Experimental equipment and reagents :

AA7000 series atomic absorption spectrophotometer (with Ca, Mg, Al, Ba hollow cathode lamp, EWAI Inc.)

Temperature-controlled hot plate

PTFE beaker

PTFE volumetric flask

Hydrochloric acid (HCl): excellent grade purity

Nitric acid (HNO₃): excellent grade purity

Hydrofluoric acid (HF): excellent grade purity

Perchloric acid (HClO₄): excellent grade purity

100 g/L lanthanum chloride solution: 11.73g lanthanum oxide was weighed and placed in a 100mL volumetric flask, first wet with small amount of water and then 37.5mL hydrochloric acid was added, deionized water was added to dilute up to the volume.

Calcium standard solution (National Reference Materials Research Center)

Magnesium standard solution (National Reference Materials Research Center)

Aluminium standard solution (National Reference Materials Research Center)

Barium standard solution (National Reference Materials Research Center)

3 Instrument conditions

Parameter	Wavelength (nm)	Slit width (nm)	Burner height (mm)	Fuel gas flow rate (L/min)	Lamp current (mA)	Flame type
Ca	422.7	0.2	10	1.5	3	Air – acetylene



Mg	285.2	0.2	10	1.5	2	Air – acetylene
Al	309.3	0.2	5	3	3	Nitrous oxide – acetylene
Ba	553.6	0.2	10	4	3	Nitrous oxide – acetylene

4 Standard solution preparation

For each 100mL Mg and Ca standard solution, 1.5 mL of 100 g/L lanthanum chloride solution should be added respectively.

Element	Concentration (µg/mL)				
Ca	0	0.5	1.0	2.0	3.0
Mg	0	0.01	0.05	0.1	0.2
Al	0	5	10	15	20
Ba	0	1.0	5.0	10.0	20.0

5 Standard curve

When measuring Ca and Mg sample solution, the concentration of lanthanum chloride needs to be the same as that in standard solution.



