

Atomic Absorption Screening Method Guide

Al in blood serum

Key Words

- Blood Serum
- Aluminium
- Graphite Furnace
- Atomic Absorption
- Rapid Screening Method

Principle

The sample is diluted 1+5 with a special diluent containing 0.1% m/v Triton X-100 and 1% v/v nitric acid in deionised water, and aluminium is determined by graphite furnace atomic absorption spectrometry using ELC cuvettes.

Reagents

Concentrated nitric acid (Spectrosol or equivalent)

Triton X-100 (High purity grade or equivalent)

Diluent mixture

Weigh 0.1 gram of Triton X-100 into a 100 mL flask, add about 50 mL deionised water and then transfer 1 mL of concentrated nitric acid into the flask. Dilute to volume with deionised water and mix well.

Instrument Parameters

Spectrometer | Al serum (Al)

Measurement Mode: Absorption | Cook Book

Number of Resamples: 2 | High Resolution

Fast Resamples | Background Correction: Zeeman

Measurement Time (s): 3.0 | Use Flier Rejection

Wavelength (nm): 309.3 | Rejection Limit (%): 95

Lamp Current (%): 80 | Use Test

Bandpass (nm): 0.5 | RSD Test

Optimize Spectrometer Parameters | Use Test

Signal: Transient Area | If RSD greater than: 0 %

Transient Peak Measurement | AND signal greater than: 0.1 Abs.s

Measure From (s): 0.00 Tg: 3.00 | Then: Flag and Continue

Pooled serum blank standard (Example contained 0 µmol/L Al, certified Sero reference material)

Pooled serum high standard (Example contained 6.2 µmol/L Al, local reference material)

Working standards

Prepare working blank and top standard by dilution with the special diluent, using the same procedure as for samples.

Sample Preparation

The serum samples were prepared in acid washed tubes immediately before analysis. 200µL portions of serum were mixed with 800 µL of the special diluent containing 0.1% m/v Triton X-100 and 1.0% v/v nitric acid. Ensure that the solution is thoroughly mixed before analysis.

Furnace | Al serum (Al)

Cuvette: ELC | Injection Temperature (°C): 40 | Programme Time (secs): 100.0

Furnace Programme

	Temp (°C)	Time (s)	Ramp (°C/s)	Gas Type	Gas Flow	RD	RS	TC	ML
1	90	40.0	5	2 Inert	0.2 L/min				
2	100	10.0	2	2 Inert	0.2 L/min				
3	1450	20.0	150	2 Inert	Off				
4	2100	3.0	0	2 Inert	Off	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	
5	2500	3.0	0	2 Inert	0.2 L/min				<input checked="" type="checkbox"/>
6	0	0.0	0	2 Inert	Off				
7	0	0.0	0	2 Inert	Off				
8	0	0.0	0	2 Inert	Off				
9	0	0.0	0	2 Inert	Off				

Clean Cuvette if sample greater than: Abs.s

Calibration | Al serum (Al)

Method: Normal Linear Least Squares Fit | Use Stored Calibration

Concentration Units: µmol/L

Standards: 1 | Default Ratios

Standard Concentrations

Master Standard Conc:	6.2		
1	6.200	8	0.000
2	2.000	7	0.000
3	0.000	8	0.000
4	0.000	9	0.000
5	0.000	10	0.000

Scaling Factor: 1 | Scaled Units: µmol/L

Calibration Checks

Acceptable Fit: 0.995

Excess Curvature Limits

From (%): 10 | To (%): 40

Rescale limit: 10 %

If any calibration checks fail: Retest

Sampling | Al serum (Al)

FS95 | Slow Solution Uptake | Automatic Spike

Sample Preparation: None | Slow Solution Injection | Spike Volume (µL): 20.0

Saggle Volume (µL): 15.0 | Sampling Delay | Washes: 3

Intelligent Dilution Threshold (%): 100

Working Volume (µL): 15.0

Standard Preparation: Fixed Volume

Standard Additions: None | Volumes... | Reagent Details...

Wash Autosampler if sample greater than: Abs.s

Matrix Modification

Name	Volume (µL)	Order	Method
1	20.0	1	None
2	20.0	2	None
3	20.0	3	None
4	20.0	4	None
5	20.0	5	None
6	20.0	6	None

This analysis is at severe risk from contamination, all autosampler cups should be acid washed before use and checked that they give acceptable blank signals. Clean room operation considerably reduces the risk.

The use of slow injection into a warmed cuvette minimises the effect of sample viscosity and improves the drying performance.

Background correction using either deuterium or Zeeman-based systems may be used.

Results

Sample	Serum (1)	Serum (2)	Serum (3)	Serum (4)	Serum (5)
Aluminium found (µmol/L)	0.4	1.7	0.2	0.2	0.3
Reference value (µmol/L)	0.4	1.7	0.2	0.1	0.3

The method of sample treatment described in this publication should be performed only by a competent chemist or technician trained in the use of safe techniques in analytical chemistry. Users should acquaint themselves with particular hazards which may be incurred when toxic materials are being analysed and handled in the instruments, and the instrument must be used in accordance with the operating and safety instructions given in the Operators manual.

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