MGA-1000

Zeeman atomic absorption spectrometer

Direct determination of **heavy metals in blood** samples by GFAAS

INTRODUCTION

Determination of heavy metals in blood (and other biosamples) is a crucial task for many spheres including:

- clinical diagnostic;
- toxicology;
- forensic science;
- R&D in life science;
- occupational medicine in smelting, painting, electronic components manufacturing, and other industries.

The fundamental limitation for direct determination of heavy metals in blood samples by GFAAS is connected with chemical and spectral interferences, occurring at the atomization step.
Both chemical and spectral interferences can be eliminated after sample digestion. However, any mineralization is time-consuming and increases running cost, as well as exposures samples to the contamination risk.
A popular approach for chemical interferences elimination includes furnace temperature program optimization, use of matrix modifiers, and The Stabilized Temperature Platform Furnace (STPF) concept implementation.
Zeeman High-Frequency Polarization Modulation (ZHFPM) background correction system of MGA-1000 allows measuring selective and nonselective absorbance with 50 kHz frequency, which provides no errors even in a case of rapidly changing signals, which is typical for complex matrix samples like whole blood.

MEASUREMENT METHOD

Blood samples are taken using vacuum test tubes with lithium heparin as an anticoagulant, diluted with deionized water or 0.1 % (m/v) Triton X-100 solution. The diluted sample (10 µl) is then injected into the graphite furnace of the spectrometer mixed / along with the appropriate matrix modifier. Measurement data is collected and processed by the dedicated software included in the delivery set.

MEASURED CONCENTRATION IN WHOLE BLOOD

Element	Measured concentration, ppb
Chromium (Cr), Manganese (Mn), Nickel (Ni), Lead (Pb), Thallium (Tl)	>10
Beryllium (Be)	>2
Cadmium (Cd)	>0,2
Selenium (Se)	>20

EQUIPMENT AND REAGENTS

The following equipment and reagents are used for measurements:

- MGA-1000 graphite furnace atomic absorption spectrometer
- Hollow cathode lamps or Electrodeless discharge lamps for elements
- Calibration standard solution of analyzed elements
- Bidistilled or deionized water
- Magnesium matrix modifier for GFAAS
- Palladium matrix modifier for GFAAS
- Triton X-100

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