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**NATIONAL OCCUPATIONAL HEALTH STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

GBZ/T 316.2-2018

**Determination of lead in blood -- Part 2: Inductively coupled
plasma mass spectrometry method**

血中铅的测定 第2部分：电感耦合等离子体质谱法

(English Translation)

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Foreword

This standard is formulated in accordance with the Law of the People's Republic GBZ/T 316-2018 "Determination of lead in blood" is divided into three parts.

- Part 1. Graphite furnace atomic absorption spectrometry;
- Part 2. Inductively coupled plasma mass spectrometry;
- Part 3. Atomic Fluorescence Spectrometry.

This part is the second part of GBZ/T 316.

This part is drafted in accordance with the rules given in GB/T 1.1-2009.

This standard was drafted. China Center for Disease Control and Prevention, Occupational Health and Poison Control Institute, Jiangsu Provincial Center for Disease Control and Prevention, Guangdong Provincial Institute of Occupational Disease Prevention and Control and Shandong Institute of Occupational Disease Prevention and Control.

1 Scope

This part of GBZ/T 316 specifies inductively coupled plasma mass spectrometry for lead in blood.

This section applies to the determination of lead in the blood of occupational contacts.

2 Normative references

The following documents are indispensable for the application of this document. For dated references, only the dated version applies to this document.

For undated references, the latest edition (including all amendments) applies to this document.

General rules for biological monitoring of GBZ/T 295 occupational population

3 Principle

Blood samples (hereinafter referred to as blood samples) were directly diluted with 0.5% nitric acid-0.01% Triton diluent, using Lu (Lu) as an internal standard.

Inductively coupled plasma mass spectrometry was used to determine lead (m/z : 206, 208) content in standard mode.

4 Instruments

4.1

Covered polyethylene plastic bottle, 100 mL.

4.2

Polyethylene centrifuge tube, 15 mL.

4.3

Volumetric flask, 10 mL.

4.4

Micropipettes with a range of 100 μ L to 1000 μ L.

4.5

Inductively coupled plasma mass spectrometer.

5 Reagent

5.1

Deionized water.

5.2

Nitric acid. $\rho_{20}=1.42\text{g/mL}$, excellent grade pure.

5.3

Nitric acid solution. 0.5% (volume fraction).

5.4

Triton X-100, analytical grade.

5.5

Triton X-100 solution, 1% (volume fraction).

5.6

Diluent. 10 mL Triton X-100 solution (1%) was placed in 1 L nitric acid solution (0.5%).

5.7

Internal standard solution. unit standard solution, diluted with a 0.5% (volume fraction) nitric acid solution to a 10.0 µg/L solution before use.

5.8

Standard solution. lead single element standard solution, diluted with standard solution of 0.5% (volume fraction) nitric acid solution to 10.0mg/L before use.

liquid.

6 Sample collection, transportation and storage

According to GBZ/T 295.

The collected samples and sample blanks are placed in a clean container for refrigerated transport.

The sample can be stored for half a year at -20 °C.

7 Analysis steps

7.1

Instrument operation.

- a) Cooling gas flow rate. 12.5 L/min
- b) Auxiliary gas flow rate. 0.7 L/min
- c) Atomizing gas flow rate. 0.92 L/min
- d) Peristaltic pump speed. 30r/min
- e) Nebulizer temperature. 3 ° C
- f) Online internal standard. 10.0µg/L

7.2

Sample Handling. Remove the chilled blood sample and return to room temperature. After fully shaking and mixing, transfer 0.50 mL of blood sample to 15 mL.

In a polyethylene centrifuge tube, 4.50 mL of diluent was added, and the mixture was shaken and measured.

7.3

Treatment of sample blank. 2.0 mL water was taken with a blood collection needle and placed in a blood collection tube, shaken, and the remaining treatment steps were the same as the sample.

7.4

Configuration and determination of the standard curve. dilute the standard solution with nitric acid solution to mark 0.0, 1.0, 5.0, 10.0, 50.0, 100 µg/L Quasi-series. Determine each standard solution, and simultaneously measure the internal standard solution, the ratio of the response value of the standard series lead to the internal standard response value to the corresponding lead Concentration (µg/L) plots the standard curve or calculates the regression equation.

7.5

Sample determination. After the sample is processed, the sample solution and the sample blank solution are determined by the operating conditions of the measurement standard series;

Or the regression equation to obtain the concentration of lead (µg/L).

8 Calculation

Calculate the concentration of lead in the blood sample according to formula (1).

$$C = 10C_0 \quad (1)$$

In the formula.

C--the concentration of lead in blood, in micrograms per liter (µg/L);

10--sample dilution factor;

C₀--The concentration of lead in the diluted blood sample obtained by the standard curve or regression equation (minus blank sample) in micrograms per liter (µg/L).

9 Description