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

GBZ/T 302-2018

**Determination of antimony in urine -- Atomic fluorescence
spectrometry method**

尿中锑的测定 原子荧光光谱法

(English Translation)

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Foreword

This standard is formulated in accordance with the Law of the People's Republic this standard was drafted in accordance with the rules given in GB/T 1.1-2009.

This standard is mainly drafted by. School of Public Health, Tongji Medical College, Huazhong University of Science and Technology, Wuhan Occupational Disease Prevention and Treatment Institute, Guangxi Zhuangzu Administrative District Hospital for Occupational Diseases.

1 Scope

This standard specifies atomic fluorescence spectrometry for the determination of bismuth in urine.

This standard applies to the measurement of urinary fistula in occupational exposure personnel.

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

Urine sample (hereinafter referred to as urine sample) is digested with hydrogen peroxide-nitric acid-nickel nitrate solution, and under acidic conditions, L-cysteine will be five.

The valence is reduced to trivalent ruthenium, and potassium borohydride is added to reduce hydrogen sulfide, which is decomposed into atomic state by argon gas into a quartz atomizer.

The 217.6 nm long hollow cathode lamp emits atomic fluorescence, and the atomic fluorescence intensity is measured. The fluorescence intensity generated is equal to the strontium content in the solution.

Proportional, quantitative compared to the standard curve.

4 Instruments

4.1

Packed polyethylene plastic bottle, 100 mL.

4.2

urine hydrometer.

4.3

Erlenmeyer flask, 100 mL.

4.4

Colorimetric tube, 10 mL.

4.5

Pipette, 1.0 mL, 5.0 mL, 10.0 mL.

4.6

Micropipettes, 100 L, 200 L, 1000 L.

4.7

Temperature control electric heating plate.

4.8

Constant temperature water bath.

4.9

Atomic Fluorescence Spectrometer, Hollow Cathode Lamp.

5 Reagent

5.1

The experimental water is deionized water, and the acid is excellent grade.

5.2

Nitric acid, $\rho = 1.42 \text{ g/cm}^3$.

5.3

Hydrochloric acid, $\rho = 1.179 \text{ g/cm}^3$.

5.4

Hydrogen peroxide (30%), analytically pure.

5.5

Hydrochloric acid solution. 5% (volume fraction).

5.6

Nickel nitrate solution. 12.5 g/L, take 20 g of nickel nitrate $[\text{Ni}(\text{NO}_3)_2 \cdot 6\text{H}_2\text{O}]$, analytically pure, dissolved in water and diluted to 1000 mL spare.

5.7

Potassium Hydroxide Solution. 1 g/L, take 0.1 g of potassium hydroxide (excellent grade), dissolve in water and dilute to 100 mL, and prepare before use.

5.8

Potassium borohydride solution. 10 g/L, take 1 g of potassium borohydride (analytical grade), dissolve and dilute to 100 with 1 g/L potassium hydroxide solution mL, prepared before use.

5.9

L-cysteine solution. 10.0 g/L, take 1 g of L-cysteine (biochemical reagent) in a 100 mL beaker, dissolve in water and dilute Release to 100 mL, prepared before use.

5.10

standard solution. use the nationally recognized standard solution.

5.11

Standard application solution. Accurately absorb 2.5 mL of standard solution (100.0 g/mL) into a 25 mL volumetric flask, and bring up to volume with water.

This is a standard stock solution at a concentration of 10.0 µg/mL. Dilute the standard stock solution to 1.0 µg/mL standard application solution with water.

6 Sample collection, transportation and storage

6.1

According to GBZ/T 295 for urine sample collection, the polyethylene plastic bottle is used to collect the urine sample ≥ 50 mL, and the urine specific gravity is measured in time.

6.2

Sample blank. 2 samples of urine collection with the same batch number as the sample collection were randomly selected as sample blanks.

6.3

Sample transportation. Store the collected samples and sample blanks in a clean container for refrigerated transport.

6.4

Sample storage. It can be stored for 3 days at room temperature, 7 days at 4 °C, and stored for 14 days at -8 °C.

7 Analysis steps

7.1

Instrument operation reference conditions. lamp current is 80 mA, negative high voltage is 270 V, atomizer temperature is 200 °C, atomizer height is 8 mm, the carrier gas is argon, the carrier gas flow rate is 400 mL/min, the shielding gas flow rate is 800 mL/min, and the measurement method is peak area, current carrying.

5% hydrochloric acid solution, reducing agent. 10 g/L potassium borohydride solution.

7.2

Drawing of the standard curve. Take 6 colorimetric tubes and add 0.0 µL, 20.0 µL, 50.0 µL, 100.0 µL, 150.0 µL, respectively.

200.0 µL of standard application solution, add 0.5 mL of hydrochloric acid, 2.0 mL of L-cysteine solution, and dilute to 10 mL with water.

In the standard series of 0.0 µg/L, 2.0 µg/L, 5.0 µg/L, 10.0 µg/L, 15.0 µg/L, 20.0 µg/L.

Reference instrument Operating conditions, the atomic fluorescence photometer is adjusted to the best measurement state. First enter the blank value measurement state, and continuously use the first tube to obtain the sample.

A stable blank value is obtained, and after the automatic deduction is performed, each standard tube is sequentially determined. The measured fluorescence intensity value and