

ICS 13.100
CCS C 60



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

GBZ/T 305-2018

**Determination of manganese in urine -- Graphite furnace atomic
absorption spectrometry method**

尿中锰的测定 石墨炉原子吸收光谱法

(English Translation)

Issued on: August 16, 2018

Implemented on: January 1, 2019

Issued by: National Health and Family Planning Commission

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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. Shenzhen Occupational Disease Prevention and Control Institute, Guangdong Provincial Occupational Disease Prevention and Control Institute, Shenzhen Luohu District Disease Prevention and Control Heart, Shenzhen Yantian District Center for Disease Control and Prevention.

1 Scope

This standard specifies graphite furnace atomic absorption spectrometry for the determination of manganese in urine.

This standard applies to the determination of manganese in the urine 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

Urine sample (hereinafter referred to as urine sample) is diluted with 1% nitric acid solution and directly used in graphite furnace atomic absorption spectrometry at a wavelength of 279.5 nm.

The method measures the concentration of manganese in the urine.

4 Instruments

4.1

Covered wide-mouth polyethylene plastic bottle. 100 mL.

4.2

urine hydrometer.

4.3

with colorimetric tube. 10 mL.

4.4

vortex oscillator.

4.5

Volumetric flask. 10 mL, 50 mL, 100 mL.

4.6

Scale pipette. 1 mL, 2 mL, 10 mL.

4.7

Atomic Absorption Spectrometer. with graphite furnace, Zeeman or xenon lamp background correction device and manganese hollow cathode lamp.

5 Reagent

5.1

Experimental water. deionized water.

5.2

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

5.3

Nitric acid solution, 1 % (V/V).

5.4

Standard solution, using nationally recognized manganese single element standard solution.

5.5

Quality control sample. standard urine sample, contact person mixed urine or spiked normal person mixed urine.

6 Sample collection, transportation and storage

6.1

Environmental conditions. The place where the urine is collected should be clean and tidy, and there is no source of manganese pollution.

6.2

Sample collection. Collect about 50 mL of urine once in a wide-mouth polyethylene plastic bottle, mix well, and take out part of the urine to measure the specific gravity as soon as possible.

Nitric acid was added in a ratio of 1% by volume. If the urine specific gravity is 1.030, it should be resampled.

6.3

Sample transport. The collected samples can be transported at room temperature.

6.4

Sample storage. The sample can be stored in the refrigerator at 0 °C ~ 4 °C for 14 days.

7.1 Instrument operating conditions

The atomic absorption spectrometer was adjusted to the optimum measurement state with reference to the instrument conditions of Table 1.

Table 1 Instrument operation reference conditions

Instrument condition Graphite furnace condition Step temperature Warming slope °C/s
 Residence time Wavelength 279.5 nm Dry 50~110 20 10 Slit 0.2 nm 110~130 5 15 Lamp
 current 9.6 mA Ashing 1000 150 20 Injection volume 10 µL atomization 1800 0 3
 (discontinued) Carrier gas argon 0.2 L/min cleaning 2500 0 4 Graphite tube pyrolysis
 coating - - - Background correction Zeeman or Xenon lamp - - -

7.2 Sample Processing

After the collected urine sample is placed at room temperature, mix well, take 2.0 mL in a plug colorimetric tube, add 8.0 mL nitric acid solution, mix After uniformity, it can be directly measured. Take a nitric acid solution as a reagent blank.

7.3 Preparation and determination of uranium manganese standard series

7.3.1

Dilute the manganese single element standard solution to a 20 µg/L standard application solution with a nitric acid solution. Take 7 10 mL volumetric flasks, numbered for the 1~7, take the above manganese standard application solution 0.0 mL, 1.0 mL, 2.0 mL, 3.0 mL, 4.0 mL, 5.0 mL, 6.0 mL, respectively.

The nitric acid solution was made up to the mark and formulated into 0 µg/L, 2 µg/L, 4 µg/L, 6 µg/L, 8 µg/L, 10 µg/L, and 12 µg/L manganese standard series.

7.3.2

Refer to the instrument operation reference conditions, adjust the atomic absorption spectrometer to the best measurement state, and measure each standard series, 2~7 After subtracting the absorbance value of No. 1, the absorbance value is plotted against the manganese concentration (µg/L) or the regression equation is calculated.

7.4 Sample determination

The sample and reagent blanks are determined using the operating conditions of the assay standard series, and the absorbance values of the sample tubes are subtracted from the absorbance values of the reagent blanks.

The concentration of manganese (µg/L) is then calculated from a standard curve or a regression equation.

8 Calculation

Calculate the concentration of manganese in the urine according to formula (1).

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