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

**GB/T 11446.5-2013**

Replacing GB/T 11446.5-1997

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**Test method for measuring trace metals in electronic grade  
water by atomic absorption spectrophotometry**

电子级水中痕量金属的原子吸收分光光度测试方法

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## Foreword

The expected structure of GB/T 11446 is as follows: - GB/T 11446.1 Electronic grade water; - GB/T 11446.2 (To be determined); - GB/T 11446.3 Generic rules for test methods of electronic grade water; - GB/T 11446.4 Test method for resistivity of electronic grade water; - GB/T 11446.5 Test method for measuring trace metals in electronic grade water by atomic absorption spectrophotometry; - GB/T 11446.6 Test method for SiO<sub>2</sub> in electronic grade water by spectrophotometer; - GB/T 11446.7 Test method for trace anion in electronic grade water by ion chromatography; - GB/T 11446.8 Test method for total organic carbon in electronic grade water; - GB/T 11446.9 Test method for particles in electronic grade water by instrument; - GB/T 11446.10 Test method for total bacterial count in electronic grade water by membrane filters. This part is Part 5 of GB/T 11446. This part was drafted in accordance with the rules given in GB/T 1.1-2009. This part replaces GB/T 11446.5-1997 "Test method for measuring trace metals in electronic grade water by atomic absorption spectrophotometry". Compared with GB/T 11446.5-1997, this Part mainly has the following changes. - In "

1 Scope", ADD the test method for the determination of trace metal iron and lead in electronic grade water, by the use of flameless (or flame) atomic absorption spectrophotometer. It is stipulated that "other instruments, which have an equivalent

sensitivity, can also be used, such as inductively coupled plasma/mass spectrometer (or inductively coupled plasma emission spectrometer)" (see Chapter 1); - ADD the test method for the determination of trace metal iron and lead in electronic grade water, by the use of the flameless (or flame) atomic absorption spectrophotometer, to this standard; - ADD "

## 1 Scope

GB/T 11446.5-2013 is the Chinese national standard on test method for measuring trace metals in electronic grade water by atomic absorption spectrophotometry, in the field of electronics. The /T suffix marks it as a recommended standard: it is not compulsory by itself, but it becomes binding as soon as a contract, a tender or a customer specification calls it up - which in practice is how most foreign buyers meet it. It was issued on 31 December 2013 by the General Administration of Quality Supervision, Inspection and Quarantine of the People's Republic of China; Standardization Administration of China, and has been in force since 15 August 2014. Classification: ICS 31.030, CCS L90. This page is published from the official record of the standard held by the Chinese standards administration: the identification, the dates, the classification and the issuing body are taken from there. The clause text, the tables and the numeric limits are in the document itself, which is delivered complete in English translation.

This Part of GB/T 11446 specifies the test method, for the determination of trace metals copper, zinc, nickel, iron, lead, sodium, potassium, in electronic grade water, by a flameless (or flame) atomic absorption spectrophotometer. Other instruments, which have comparable sensitivity, such as inductively coupled plasma/mass spectrometer (or inductively coupled plasma emission spectrometer) can also be used, for measurement. Flameless atomic absorption spectrophotometry is suitable for the determination of trace metals, in EW-I ~ EW-III electronic grade water. The detection limit (mass score) of the method shall be less than  $1 \times 10^{-9}$ . Flame atomic absorption spectrophotometry is suitable for the determination of trace metals in EW-IV electronic grade water.

## 2 Normative references

The following documents are essential to the application of this document. For the dated documents, only the versions with the dates indicated are applicable to this document; for the undated documents, only the latest version (including all the amendments) is applicable to this standard.

GB/T 11446.1-2013 Electronic grade water

GB/T 11446.3-2013 Generic rules for test methods of electronic grade water

## 3 Terms and definitions

The terms and definitions as defined in GB/T 11446.3-2013, as well as the following terms and definitions, apply to this document.

## 4 Principles of the method

The determination of trace metals, by atomic absorption spectrophotometry, is based on the light radiated from the light source, with the characteristic spectrum of the element to be measured, which is absorbed by the atoms of the element to be measured in the ground state in the sample vapor. The content of the elements to be measured, in the specimen, is determined by the weakening of the radiation characteristic spectrum.

## 5 Disturbing factors

5.1 The impact of reagent purity, equipment cleanliness, indoor cleanliness, contamination as caused by operation techniques, during sampling and operation, shall be strictly considered.

5.2 Water samples shall be analyzed as soon as possible. The longer the storage time, the greater the possibility of contamination. If immediate analysis is not possible, seal the sample bottle in a plastic bag; store it in the refrigerator.

## 6 Reagents

6.1 Blank water EW-I electronic grade water, which is specified in GB/T 11446.1-2013.

### 6.2 Nitric acid ( $\rho =$

1.42 g/mL) MOS grade and above.

6.3 Hydrochloric acid 1+1 (volume fraction), which is prepared by the hydrochloric acid of MOS grade and above.

6.4 Standard solution Use the grade-2 standard materials, which are approved by the General Administration of Quality Supervision, Inspection and Quarantine of the People's Republic of China.

## 7 Measuring instruments

7.1 Atomic absorption spectrophotometer It includes four parts. hollow cathode lamp, atomization system-graphite furnace (or flame atomizer), spectroscopy system, detection and recording system.

### 7.4 Pipette

0.2 mL ~

### 7.5 Polyethylene volumetric flask

25.0 mL ~ 100 mL.

## 8 Operation procedures

8.1 Selection of instrument conditions Choose the best instrument parameters (lamp current, under seam width, etc.), according to different types of instruments; see Appendix A. Refer to Appendix A, for the selection of working conditions of graphite furnace atomizer.

### 8.3 Drawing of working curve

8.3.1 Preparation of standard series of working solutions The standard solution is diluted, step by step, to prepare the corresponding series, as shown in Table

1. The acidity of the standard solution is consistent with the acidity of the specimen.

8.4 Determination of water samples Draw a certain amount of water sample into the graphite tube (or spray the water sample in the flame). After measuring the absorbance, find out the element content, which is corresponding to the absorbance, from the working curve.

## 9 Precision

The precision of this method is as shown in Table 2.