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**HJ**

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

**HJ 586-2010**

Replacing GB/T 11898-1989

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**Water quality. Determination of free chlorine and total chlorine.  
Spectrophotometric method using N, N-diethyl-1,  
4-phenylenediamine  
(English Translation)**

**Issued on: September 20, 2010**

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## Foreword

To protect the environment and protect the human body in order to implement the Environmental Protection Law of the People's Republic of China and the Law of the People's Republic of China on Water Pollution Prevention and Control this standard is developed for the determination of free chlorine and total chlorine in water.

This standard specifies the determination of free water in landscape water for the determination of surface water, industrial wastewater, medical wastewater, domestic sewage, water and sewage.

N,N-Diethyl-1,4-phenylenediamine spectrophotometry and on-site determination of chlorine and total chlorine.

This standard is for the determination of free chlorine and total chlorine in water. N,N-Diethyl-1,4-phenylenediamine spectrophotometry (GB 11898-89) Revision.

This standard was first published in 1989. The original standard was drafted. Anhui Environmental Monitoring Center, China Academy of Preventive Medicine Environmental Health Health Monitoring Institute and Anhui Wuhu Environmental Monitoring Center Station. This is the first revision. The main contents of the revision are as follows.

- Revised the scope of application of the method;
- Increased the preservation method of the sample and modified the amount of buffer solution added;
- Adjusted the measurement wavelength;
- Increased the low concentration calibration curve and reduced the detection limit of the method for determining free chlorine and total chlorine in surface water;
- Added precautionary clauses;
- Added on-site measurement methods for free chlorine and total chlorine.

From the date of implementation of this standard, the national environmental protection

standard "Water" approved and issued by the former National Environmental Protection Agency on December 25, 1989 Determination of free chlorine and total chlorine N,N-diethyl-1,4-phenylenediamine spectrophotometry (GB 11898-89) abolished.

Appendix A and Appendix B of this standard are normative appendices.

This standard was formulated by the Science and Technology Standards Department of the Ministry of Environmental Protection.

This standard is mainly drafted by. Dalian Environmental Monitoring Center.

This standard is verified by. Liaoning Provincial Environmental Monitoring Experimental Center, Anshan Environmental Monitoring Center, Yingkou Environmental Monitoring Center, Shenyang City Environmental Monitoring Center and Jinzhou Environmental Monitoring Center.

This standard was approved by the Ministry of Environmental Protection on September 20, 2010.

This standard has been implemented since December 1, 2010.

This standard is explained by the Ministry of Environmental Protection.

Determination of free chlorine and total chlorine in water N,N-diethyl-1,4-phenylenediamine spectrophotometry Warning. Mercury salt is a highly toxic chemical. Wear protective equipment as required to avoid contact with skin and clothing. Waste after inspection the liquid should be properly and safely handled.

## 1 Scope of application

This standard specifies the spectrophotometric method for the determination of free chlorine and total chlorine in water.

This standard applies to free chlorine in landscape water reclaimed from surface water, industrial wastewater, medical wastewater, domestic sewage, intermediate water and sewage.

Determination of total chlorine. This standard does not apply to the determination of turbid or high chroma water samples.

For high concentration samples, using a 10 mm cuvette, the detection limit (in terms of Cl<sub>2</sub>) of this method is 0.03 mg/L, the measurement range (to the Cl<sub>2</sub> count is 0.12 to 1.50 mg/L. For low concentration samples, using a 50 mm cuvette, the detection limit of this method (in terms of Cl<sub>2</sub>) is 0.004 mg/L, the measurement range (in terms of Cl<sub>2</sub>) is 0.016 to 0.20 mg/L.

For samples with free chlorine or total chlorine concentration above the upper limit of the method, the sample can be measured after appropriate dilution.

On-site determination of free chlorine and total chlorine in water was carried out in

accordance with Appendix A.

## 2 Normative references

The contents of this standard refer to the terms in the following documents. For undated references, the valid version applies to this standard.

GB/T 5750.10 Standard Test Method for Drinking Water Standards for disinfection  
by-products GB/T 5750.11 Standard Test Method for Drinking Water Standards

## 3 Terms and definitions

The following terms and definitions apply to this standard.

**Free chlorine** free chlorine Refers to chlorine in the form of hypochlorous acid, hypochlorite ions and dissolved elemental chlorine.

**Chlorine combined chlorine** Refers to chlorine in the form of chloramines and organic chloramines.

**Total chlorine** total chlorine Refers to chlorine in the form of "free chlorine" or "chlorinated chlorine", or both.

**Chloramine** chloramines A derivative in which one, two or three hydrogen atoms of ammonia are replaced by chlorine atoms as determined by the method (eg monochloramine, dichloramine, nitrogen trichloride) and chlorinated derivatives of organic nitrogen compounds.

The composition of free chlorine and total chlorine is shown in Table 1.

Table 1 Nouns and their composition

Noun composition

**Free chlorine** (free residual chlorine) Active free chlorine elemental chlorine, hypochlorous acid Potential free chlorine hypochlorite **Total chlorine** (total residual chlorine) elemental chlorine, hypochlorous acid, hypochlorite, chloramine

### 4.1 Determination of free chlorine

At pH 6.2-6.5, free chlorine reacts directly with N,N-diethyl-1,4-phenylenediamine (DPD) to form a red complex.

The absorbance was measured at a wavelength of 515 nm.

Since the free chlorine standard solution is unstable and difficult to obtain, this standard uses a iodine molecule or [I<sub>3</sub>]<sup>-</sup> instead of free chlorine as a calibration curve. Potassium iodate Benchmarking, under acidic conditions, reacts with potassium iodide as follows. IO<sub>3</sub><sup>-</sup>