

ICS 13.060
CCS Z 16

HJ

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

HJ 488-2009

Replacing GB/T 7483-1987

**Water quality. Determination of fluoride. Fluorine reagents
spectrophotometry**

水质 氟化物的测定 氟试剂分光光度法

(English Translation)

Issued on: September 27, 2009

Implemented on: November 1, 2009

Issued by: Ministry of Ecology and Environment

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Foreword

In order to implement the "Environmental Protection Law of the People's Republic of China" and the "Water Pollution Prevention and Control Law of the People's Republic of China" Body health, standardize monitoring methods for fluoride in water, and develop this standard.

This standard specifies methods for the determination of fluoride in surface water, groundwater and industrial wastewater.

This standard amends the "Fluorine Spectrophotometric Method for the Determination of Fluoride in Water Quality" (GB 7483-87), the original standard drafting list the location is the Baotou City Environmental Monitoring Station. This is the first revision.

The main revisions are as follows.

- Broaden the linear range of the method by adjusting the cuvette;
- Adjust and revise some text and sentence structure.

The national environmental protection standard "Water quality approved and issued by the former National Environmental Protection Agency on March 14, 1987 since the

implementation of this standard.

Determination of Fluoride Fluorescence Spectrophotometry (GB 7483-87) is abolished.

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

This standard is mainly drafted by. China Environmental Monitoring Center, Liaoning Provincial Environmental Monitoring Center Station.

This standard was approved by the Ministry of Environmental Protection on September 27, 2009.

This standard has been implemented since November 1, 2009.

This standard is explained by the Ministry of Environmental Protection.

Water quality - Determination of fluoride - Fluorescent reagent spectrophotometric method

1 Scope of application

This standard specifies the fluorine reagent spectrophotometric method for the determination of fluoride in surface water, groundwater and industrial wastewater.

This standard applies to the determination of fluoride in surface water, groundwater and industrial wastewater.

The detection limit of this method is 0.02 mg/L, and the lower limit of determination is 0.08 mg/L.

2 Principle of the method

The fluoride ion reacts with the fluorine reagent and cerium nitrate in an acetate buffer medium with a pH of 4.1 to form a blue ternary complex.

The absorbance at 620 nm is proportional to the fluoride ion concentration and the fluoride (F-) is quantified.

3 Reagents and materials

The reagents used in this standard are analytically pure reagents that meet the national standards unless otherwise stated. The experimental water is newly prepared.

Ionic water or fluoride-free distilled water.

3.1

Hydrochloric acid solution. $c = 1 \text{ mol/L}$.

Take 8.4 ml of hydrochloric acid dissolved in 100 ml of deionized water.

3.2

Sodium hydroxide solution. $c = 1 \text{ mol/L}$.

Weigh 4 g of sodium hydroxide in 100 ml of deionized water.

3.3

Acetone (CH_3COCH_3).

3.4

Sulfuric acid (H_2SO_4). $\rho_{20} = 1.84 \text{ g/ml}$.

Take 300 ml of sulfuric acid into a 500 ml beaker, place it on a hot plate for 1 h, cool it, and put it into a bottle for later use.

3.5

Glacial acetic acid (CH_3COOH).

3.6

Fluoride standard stock solution. Weigh the pure sodium fluoride (NaF) 0.221 0 g which has been dried at 105°C for 2 h, dissolved in deionized water.

Transfer to a 1 000 ml volumetric flask, dilute to the mark, mix and store in a polyethylene bottle, and use $100 \mu\text{g}$ of fluoride per ml.

3.7

Fluoride standard use solution. Pipette 20.00 ml of sodium fluoride standard stock solution (3.6), transfer to 1 000 ml volumetric flask, use deionized water Dilute to the mark and store in a polyethylene bottle. This solution contains $2.00 \mu\text{g}$ of fluoride per ml.

3.8

Fluorine reagent solution. $c = 0.001 \text{ mol/L}$.

Weigh 0.193 g of fluoro reagent [3 - methylamine - alizarin - diacetic acid, referred to as ALC, $\text{C}_{14}\text{H}_7\text{O}_4 \cdot \text{CH}_2\text{N}(\text{CH}_2\text{COOH})_2$], add 5 ml Wet in deionized water, add sodium hydroxide solution (3.2) to dissolve it, add 0.125 g of sodium acetate ($\text{CH}_3\text{COONa} \cdot 3\text{H}_2\text{O}$), use salt the acid solution (3.1) was adjusted to pH 5.0, diluted to 500 ml with deionized water, and stored in a brown bottle.

3.9

cerium nitrate solution. $c = 0.001 \text{ mol/L}$.

Weigh 0.443 g of lanthanum nitrate [$\text{La}(\text{NO}_3)_3 \cdot 6\text{H}_2\text{O}$], dissolve it with a small amount of hydrochloric acid solution (3.1), and adjust with 1 mol/L sodium acetate solution.

The pH was 4.1 and diluted to 1 000 ml with deionized water.

3.10

Buffer solution. pH = 4.1.

Weigh 35 g of anhydrous sodium acetate (CH_3COONa) dissolved in 800 ml of deionized water and add 75 ml of glacial acetic acid (CH_3COOH) (3.5).

Dilute to 1 000 ml with deionized water and adjust the pH to 4.1 on a pH meter with acetic acid or sodium hydroxide solution.

3.11

Mix the developer.

Take the fluorine reagent solution (3.8), buffer solution (3.10), acetone (3.3) and cerium nitrate solution (3.9) at a volume ratio of 3.1.3.3 Mix it. Formulated when ready to use.

4 Instruments and equipment

4.1

Spectrophotometer. A cuvette with an optical path of 30 mm or 10 mm.

4.2

pH meter.

5 Interference and elimination

In 25 ml of color developing solution containing 5 μg of fluoride, the following ions are present in excess of the following contents, which may interfere with the measurement and should be pre-steamed first.

Distillation. Cl^- 30 mg; SO_4^{2-} 5.0 mg; NO_3^- 3.0 mg; $\text{B}_4\text{O}_7^{2-}$ 2.0 mg; Mg^{2+} 2.0 mg; NH_4^+ 1.0 mg; Ca^{2+} 0.5 mg.

6.1 Acquisition and preservation

The fluoride sample was measured and collected and stored in a polyethylene bottle.

6.2 Preparation of samples

Unless it is proved that the pretreatment of the sample is unnecessary, the sample may be directly prepared for colorimetry, otherwise it shall be pre-distilled according to Appendix A.

7.1 Calibration curve

Add fluoride standard solution (3.7) 0.00, 1.00, 2.00, 4.00, 6.00, 8.00 ml to 6 25.0 ml volumetric flasks.