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

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Replacing GB/T 13197-1991

**Water quality. Determination of formaldehyde. Acetylacetone
spectrophotometric method**
(English Translation)

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Table of Contents

Foreword
1 Scope of application
2 Principle of the method
3 Interference and elimination
4 Reagents and materials
4.11 Formaldehyde standard use solution
5 Instruments and equipment
6 Samples
6.1 Acquisition and preservation
6.2 Preparation of samples
7 Analysis steps
7.1 Drawing of the calibration curve
7.2 Determination
7.3 Blank test
8 Calculation of results
9 Precision and accuracy
9.1 Repeatability
9.2 Reproducibility
9.3 Accuracy
10 Quality Assurance and Quality Control
10.1 Blank test
10.2 Calibration
10.3 Parallel analysis
10.4 Sample Plus Recycling

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 to develop and standardize the monitoring methods for formaldehyde in water.

The method for determining formaldehyde in surface water, groundwater and industrial

wastewater is specified in this standard.

This standard is a revision of the "Method for the determination of formaldehyde in water quality by acetylacetone spectrophotometry" (GB 13197-91).

This standard was first published in 1991, and the original standard drafting unit was the Beijing Environmental Protection Monitoring Center. This is the first revision. the Lord the content to be revised is as follows.

- the scope of application increases groundwater;
- Revise the color development conditions;
- Revise the calculation formula;
- Increase quality assurance and quality control.

The national environmental protection standard "Water quality approved and issued by the former National Environmental Protection Agency on August 31, 1991 since the implementation of this standard.

Determination of formaldehyde acetylacetone spectrophotometry (GB 13197-91) 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 Shipbuilding Industry Corporation, the 718th Research Institute.

This standard was approved by the Ministry of Environmental Protection on February 10, 2011.

This standard has been implemented since June 1, 2011.

This standard is explained by the Ministry of Environmental Protection.

Water quality - Determination of formaldehyde - Acetylacetone spectrophotometric method

1 Scope of application

This standard specifies the acetylacetone spectrophotometric method for the determination of formaldehyde in water.

This standard applies to the determination of formaldehyde in surface water, groundwater and industrial wastewater. This standard does not apply to printing and dyeing wastewater.

When the sample volume is 25 ml and the cuvette has an optical path length of 10 mm, the method detection limit is 0.05 mg/L, and the measurement range is 0.20 to 3.20 mg/L.

2 Principle of the method

Formaldehyde forms a yellow compound with acetylacetone in the presence of an excess of ammonium salt, which has maximum absorption at 414 nm.

The absorbance of the colored substance was basically unchanged within 3 h.

The chemical reaction formula is.

$$\text{H}-\text{NH}_3^+ \text{ } ^-\text{C}(\text{CH}_3)_2$$

$$\text{C}=\text{CH}_2$$

$$\text{CH}_3$$

$$\text{C}=\text{CH}_3 \text{ } ^-\text{CH}_2$$

$$\text{CH}_2 \text{ } ^-\text{C}$$

$$\text{CH}_3 \text{ } ^-\text{CH}_2\text{O}$$

3 Interference and elimination

The concentration of acetaldehyde in the water sample is less than 3 mg/L, and the propionaldehyde, butyraldehyde, acrolein, etc. are less than 5 mg/L, respectively, and do not interfere with the determination. Also when Methanol was 20 mg/L, phenol was 50 mg/L, and no interference was observed when free cyanide was 1 mg/L.

4 Reagents and materials

Unless otherwise stated in this standard, the reagents used should be analytically pure reagents that meet national or professional standards. The experimental water is distilled water.

Or water of the same purity.

4.1

Sulfuric acid. $\rho(\text{H}_2\text{SO}_4) = 1.84 \text{ g/ml}$.

4.2

Sodium hydroxide. $c(\text{NaOH}) = 1 \text{ mol/L}$.

Weigh 110 g of sodium hydroxide, dissolve in 100 ml of water, shake well, transfer to a polyethylene container, and place in a sealed container until the solution is clear. Measure 54 ml of the supernatant, diluted to 1 000 ml with water, and mixed.

4.3

Sulfuric acid solution. $c(1/2 \text{ H}_2\text{SO}_4) = 1 \text{ mol/L}$.

Measure 30 ml of sulfuric acid (4.1), slowly inject into 1000 ml of water, cool and mix.

4.4

Sulfuric acid solution. $c(1/2 \text{ H}_2\text{SO}_4) = 6 \text{ mol/L}$.

Measure 180 ml of sulfuric acid (4.1), slowly inject into 850 ml of water, cool and mix.

4.5

Iodine solution. $c(1/2 \text{ I}_2) \sim 0.05 \text{ mol/L}$.

Weigh 6.35 g of pure iodine and 20 g of potassium iodide, first dissolve in a small amount of water, then dilute to 1 000 ml with water. Iodine solution should be stored in the stopper the brown bottle is placed in the dark.

4.6

Acetylacetone solution.

Dissolve 50 g of ammonium acetate ($\text{CH}_3\text{COONH}_4$), 6 ml of glacial acetic acid (CH_3COOH) and 0.5 ml of acetylacetone ($\text{C}_5\text{H}_8\text{O}_2$) in 100 ml of water. This solution was stored at 4°C for stable storage for one month.

Note: The purity of acetylacetone has an effect on the absorbance of the blank test. Acetylacetone should be colorless and transparent, and if necessary, it should be refined by distillation.

4.7

Potassium dichromate reference solution. $c(1/6 \text{ K}_2\text{Cr}_2\text{O}_7) = 0.0500 \text{ mol/L}$.

Accurately weigh 2.4516 g of reference potassium dichromate baked at $110\text{--}130^\circ \text{C}$ for 2 h and cooled to room temperature. Dissolve in water and transfer to 1 000 ml.

In a volumetric flask, dilute to the mark with water and shake well.

4.8

Starch indicator. $\rho = 10 \text{ g/L}$.

Weigh 1 g of starch, add 5 ml of water to make a paste, add the paste to 90 ml of boiling water with stirring, and boil for 1 to 2 minutes.

Cool and dilute to 100 ml. Available now.

4.9

Sodium thiosulfate standard solution. $c(\text{Na}_2\text{S}_2\text{O}_3 \cdot 5\text{H}_2\text{O}) \sim 0.05 \text{ mol/L}$.

Weigh 12.5 g of sodium thiosulfate dissolved in boiled and cooled water and dilute to 1 000 ml. Add 0.4 g of sodium hydroxide and store in brown the inside of the color bottle was