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

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**Water quality. Determination of the total amount of the color
developing agent. 169 coupler spectrophotometry**

水质 彩色显影剂总量的测定 169成色剂分光光度法

(English Translation)

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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 formulated for the health and regulation of the total amount of color developing agents in wastewater.

This standard specifies the 169 coupler spectrophotometric method for determining the total amount of color developing agent in wastewater.

Appendix A of this standard is an informative annex.

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

This standard was drafted. Beijing Environmental Protection Monitoring Center.

This standard was approved by the Ministry of Environmental Protection on October 21, 2010.

This standard has been implemented since January 1, 2011.

This standard is explained by the Ministry of Environmental Protection.

Determination of the total amount of water-based color developing agents 169 Coupler spectrophotometric method

1 Scope of application

This standard specifies the 169 coupler spectrophotometric method for determining the total amount of color developing agent in water.

This standard applies to the determination of the total amount of color developing agent in the printing wastewater.

When using a 20 mm cuvette with a sample volume of 20.0 ml, the method detection limit is 1.03×10^{-6} mol/L, which is equivalent to p-aminodiethyl Aniline hydrochloride (TSS) 0.27 mg/L; the lower limit of determination is 4.12×10^{-6} mol/L, equivalent to p-aminodiethylaniline hydrochloride (TSS) 1.08 Mg/L; the upper limit of determination is 8.55×10^{-5} mol/L, which is equivalent to 25.0 mg/L of p-aminodiethylaniline hydrochloride (TSS).

2 Normative references

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

GB/T 6682 Analytical laboratory water specifications and test methods

3 Terms and definitions

The following terms and definitions apply to this standard.

Color developer. the latent image produced by exposure of the photosensitive material appears as a visible image, and interacts with the coupler of the emulsion layer to form an organic Dyeing agent. Commonly used color developing agents include p-aminodiethylaniline hydrochloride (TSS), 2-amino-5-diethylaminotoluene hydrochloride (CD-2), 4-amino-N-ethyl-N-(beta-methanesulfonamideethyl) m-toluidine sulfate (CD-3), 4-amino-N-ethyl-N (beta- Hydroxyethyl) M-toluidine sulfate (CD-4), etc., the structural formula is shown in Appendix A.

4 Principle of the method

The color developing agent in the printing wastewater can be oxidized by the oxidizing agent, and the oxide is immediately coupled when it encounters the water-soluble color forming agent in the alkaline solution.

Form a dye. Maximum absorption of different structures of developer (TSS, CD-2, CD-3,

CD-4) and 169 coupler couples the spectral wavelengths are all at 550 nm, and the absorbance and color developer content are in accordance with Lambert-Beer law.

This method does not include a black and white developer.

Taking TSS as an example, the chemical reaction formula is as follows.

C₂H₅H₅C₂

NH₂

SO₃H

H₂C C

C₁₇H₃₅

SO₃H

C₁₇H₃₅NN

H₅C₂

H₅C₂

Cu²

(TSS) (169 coupler) (magenta dye)

5 Reagents and materials

Unless otherwise stated, analytically pure reagents that meet national standards were used for the analysis. The experimental water is in accordance with GB/T 6682, Level 3.

5.1

Sodium hydroxide (NaOH). excellent grade pure.

5.2

Copper sulfate (CuSO₄·5H₂O). analytically pure.

5.3

anhydrous sodium carbonate (Na₂CO₃). analytically pure.

5.4

Sodium nitrite (NaNO₂). analytically pure.

5.5

Ammonium chloride (NH₄Cl). analytically pure.

5.6

sodium sulfite (Na_2SO_3). analytically pure.

5.7 169 coupler.

5.8 169 coupler solution. $w = 0.5\%$.

Weigh 0.5 g of 169 coupler (5.7) into a beaker with 100 ml of distilled water, and add 1 or 2 sodium hydroxide with stirring.

(5.1), completely dissolve, shake, and transfer to a brown reagent bottle.

5.9

Mix the oxidizer solution.

0.5 g of copper sulfate (5.2), 5.0 g of anhydrous sodium carbonate (5.3), 5.0 g of sodium nitrite (5.4) and 5.0 g of ammonium chloride (5.5) Dissolve in water, dilute to 100 ml, shake well, and store in brown reagent bottle.

5.10

Color developer TSS standard solution. $\rho = 0.10 \text{ mg/ml}$.

Accurately weigh 0.100 g photographic grade color developer TSS, dissolved in a small amount of distilled water, pre-dissolved into 0.1 g Na_2SO_3 (5.6) as a protective agent, transfer it to a 1 000 ml volumetric flask, dilute it to the mark with water, shake it, and store in a polyethylene bottle. This standard solution contains per ml 0.10 mg color developer TSS, ready for use.

Note: TSS is recommended for the developer standard solution. TSS is the most used in production, and the relative molecular mass (262.33) is moderate and stable.

6 Instruments and equipment

6.1

Visible spectrophotometer. equipped with a cuvette with an optical path of 10 mm.

6.2

with colorimetric tube. 50 ml.

7.1 Sample collection

Color developers are unstable and are easily oxidized to terpenoids. The sample is filled with brown glass bottles and the sample should be protected from light, heat and vibration. move.