

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

### HJ 908-2017

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**Water quality--Determination of chromium(VI)--Flow injection  
analysis(FIA) and diphenylcarbazide spectrometric method**

水质 六价铬的测定 流动注射-二苯碳酰二肼光度法

**(English Translation)**

**Issued on: December 29, 2017**

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### Foreword

In order to implement the "Law of the People's Republic of China on Environmental Protection" and the "Law of the People's Republic of China on Prevention and Control of Water Pollution", protect the environment, Protection of human health, standardize the determination of hexavalent chromium in water, the development of this standard.

This standard specifies the determination of surface water, groundwater and domestic wastewater hexavalent chromium flow injection - diphenyl carbazide luminosity law.

Appendix A of this standard is an informative annex.

This standard is released for the first time.

This standard by the Environmental Protection Department of Environmental Monitoring Division and Science and Technology Standards Division to develop.

This standard was drafted. Fuzhou Environmental Monitoring Center Station.

This standard verification unit. Beijing Environmental Protection Monitoring Center, Fujian Provincial Environmental Monitoring Center Station, Gansu Province, disease prevention Control Center, Guangzhou City Environmental Monitoring Center Station, Yanqing County

Environmental Protection Monitoring Station, Yunnan Provincial Agricultural Environmental Protection Monitoring Station and Qian'an City Center for Disease Control and Prevention.

This standard MEP approved on December 29, 2017.

This standard since April 1, 2018 come into operation.

This standard is interpreted by the MEP.

Water quality - Determination of hexavalent chromium - Flow injection - diphenylcarbazide spectrophotometric method Warning. acetone, concentrated sulfuric acid used in the experiment harmful to human health, the reagent preparation process should be carried out in a fume hood, Operation should be required to wear protective equipment, avoid contact with skin and clothing.

## 1 Scope of application

This standard specifies the determination of hexavalent chromium in water by flow injection - diphenyl carbazide spectrophotometry.

This standard applies to the determination of hexavalent chromium in surface water, groundwater and domestic sewage.

When the detection path length is 10 mm, the detection limit of this standard method is 0.001 mg/L, the lower limit of determination is 0.004 mg/L.

The undiluted sample has an upper limit of 0.600 mg/L, which should be measured after dilution beyond the upper limit of the assay.

## 2 Normative references

This standard references the following documents or the terms. For undated references, the effective version applies to this book standard.

HJ/T 91 Technical Specifications for Surface Water and Sewerage Monitoring HJ/T 164 Groundwater Environmental Monitoring Technical Specifications

## 3 Method principle

In a closed pipeline, a certain volume of sample is injected into the continuous flow of acidic carrier liquid, the sample and reagent in the chemical reaction the module should be mixed in a specific order and the proportion of non-complete reaction conditions, the sample of hexavalent chromium and diphenylcarbodiimide Hydrazine generates a purple compound and enters the flow cell for measurement of absorbance at a wavelength of 540 nm. In a certain range, Sample concentration of hexavalent chromium and its corresponding absorbance showed a linear relationship.

Reference workflow shown in Figure 1.

1. Peristaltic pump; 2. Injection valve; 3. Reaction loop; 4. Detection cell (540 nm); S. Sample; C. Carrier liquid; R. Color developer;

Figure 1 flow injection - diphenyl carbazide spectrophotometric determination of hexavalent chromium reference workflow

## 4 Interference and elimination

### 4.1

Sample turbidity or color, interference hexavalent chromium determination, zinc salt precipitation separation method can be used after pretreatment. Such as After the separation of zinc salt, there is still color, color correction is required.

### 4.2

Part of the metal ions interfere with determination of hexavalent chromium. When the hexavalent chromium content of 0.1 mg/L, the use of zinc salt precipitation pre-separation Ni<sup>2+</sup> ≤ 0.200 mg/L, Mo<sup>6+</sup> ≤ 160 mg/L, Hg<sup>2+</sup> ≤ 160 mg/L, V<sup>5+</sup> ≤ 2.0 mg/L, Fe<sup>3+</sup> ≤ 200 mg/L, Cu<sup>2+</sup> ≤ 100 mg/L, Co<sup>2+</sup> ≤ 60 mg/L do not interfere with the determination.

### 4.3

water reducing substances and oxidizing substances interfere with determination of hexavalent chromium. When the hexavalent chromium content of 0.1 mg/L, the sample Reducing substances S<sub>2</sub>O<sub>3</sub><sup>2-</sup> ≤ 5.0 mg/L, Fe<sup>2+</sup> ≤ 0.20 mg/L, S<sup>2-</sup> ≤ 2.0 mg/L, SO<sub>3</sub><sup>2-</sup> ≤ 2.0 mg/L do not interfere with the determination, Oxidizing substances Active chlorine ≤ 0.7 mg/L does not interfere with the determination.

### 4.4

When the sample metal ions, reducing substances and oxidizing substances and other interfering substances concentration exceeds the range of 4.2 and 4.3, Other methods should be used for analysis.

## 5 Reagents and materials

Unless otherwise specified, the analysis of the use of analytical reagents in line with national standards, experimental water for the newly prepared deionized Water or distilled water.

### 5.1

Sodium hydroxide (NaOH).

**5.2**

Diphenylcarbazide ( $\text{C}_{13}\text{H}_{14}\text{N}_4\text{O}$ ).

**5.3**

Zinc sulfate ( $\text{ZnSO}_4 \cdot 7\text{H}_2\text{O}$ ).

**5.4**

Acetone ( $\text{C}_3\text{H}_6\text{O}$ ).

**5.5**

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

**5.6**

Phosphate.  $\rho(\text{H}_3\text{PO}_4) = 1.69 \text{ g/ml}$ , excellent grade pure.

**5.7**

potassium dichromate ( $\text{K}_2\text{Cr}_2\text{O}_7$ ). excellent grade pure.

After drying at  $110^\circ\text{C}$  2 h, placed in a desiccator cooled standby.

**5.8**

Sodium hydroxide solution.  $\rho(\text{NaOH}) = 4 \text{ g/L}$ .

**5.9**

Sodium hydroxide solution.  $\rho(\text{NaOH}) \sim 50 \text{ g/L}$ .

**5.10**

hexavalent chromium standard stock solution.  $\rho = 100 \text{ mg/L}$ .

Weigh accurately 0.1415 g potassium dichromate (5.7), dissolved in water, dissolved and then transferred to 500 ml volumetric flask, with water Set the volume to mark, shake well. The solution at  $1^\circ\text{C} \sim 5^\circ\text{C}$  closed refrigeration, can be stable for 1 year. Or buy directly from the market Standard solution.

**5.11**

hexavalent chromium standard solution.  $\rho = 1.00 \text{ mg/L}$ .

Appropriate amount of hexavalent chromium standard stock solution (5.10) diluted step by step to  $1.00 \text{ mg/L}$ . The solution is sealed at  $1^\circ\text{C}$  to  $5^\circ\text{C}$  Frozen, stable 5 d.

**5.12**

developer.

Slowly add 40 ml of sulfuric acid (5.5) and 40 ml of phosphoric acid (5.6) to 700 ml of water. Weigh 0.40 g Diphenylcarbazide (5.2) is dissolved in 200 ml of acetone (5.4), stirred until it is completely dissolved, and added to the above sulfuric acid-Phosphoric acid mixed