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

HJ 670-2013

**Water quality. Determination of orthophosphate and total
phosphorus. Continuous flow analysis(CFA) and Ammonium
molybdate spectrophotometry**

水质 磷酸盐和总磷的测定 连续流动-钼酸铵分光光度法

(English Translation)

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Table of Contents

Foreword

1 Scope of application

2 Normative references

3 Terms and definitions

4 Principle of the method

4.1 Working principle of continuous flow analyzer

4.2 Principle of chemical reaction

5 Flow detection cell 50mm 880nm 6 Degassing S Sample 0.8ml/min G Air

6 Reagents and materials

6.15 Potassium persulfate digestion reagent

6.16 Ammonium molybdate solution

6.17 Potassium tartrate storage solution

6.18 Ascorbic acid solution

6.19 Surfactant solution

6.20 Standard stock solution of potassium dihydrogen phosphate. $\rho(\text{P})=1000\text{mg/L}$

6.21 Potassium dihydrogen phosphate standard intermediate solution. $\rho(\text{P}) = 100.0\text{mg/L}$

6.22 Potassium dihydrogen phosphate standard use solution I. $\rho(\text{P}) = 10.0 \text{ mg/L}$

6.23 Potassium dihydrogen phosphate standard use solution II. $\rho(\text{P}) = 2.50\text{mg/L}$

6.24 Standard stock solution of sodium pyrophosphate. $\rho(\text{P}) = 500\text{mg/L}$

6.25 Standard use solution of sodium pyrophosphate (test hydrolysis efficiency). $\rho(\text{P}) = 2.50\text{mg/L}$

6.26 Standard stock solution of pyridoxal 5-phosphate. $\rho(\text{P}) = 500\text{mg/L}$

7 Instruments and equipment

8 Samples

9 Analysis steps

9.1 Instrument Commissioning

9.2 Calibration

9.3 Determination

9.4 Blank test

10 Calculation and representation of results

10.1 Calculation of results

10.2 Results are expressed

- 11 Precision and accuracy
 - 11.1 Precision
 - 11.2 Accuracy
- 12 Quality Control and Quality Assurance
 - 12.1 Blank test
 - 12.2 Calibration validity check
 - 12.3 Precision Control
 - 12.4 Accuracy Control
 - 12.5 System Performance Check
- 13 Precautions

Foreword

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 protect the environment, this standard is formulated to ensure human health and to regulate the determination of phosphate and total phosphorus in water.

This standard specifies the continuous flow-ammonium molybdate spectrophotometric method for the determination of phosphate and total phosphorus in water.

This standard is the first release.

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

This standard is mainly drafted by. Suzhou Environmental Monitoring Center Station.

This standard is verified by. Jiangyin Environmental Monitoring Station, Taihu Basin Water Environment Monitoring Center, and Jilin City Environmental Protection Monitoring Station, Tianjin Water Environment Monitoring Center and Yellow River Basin Water Environment Monitoring Center and Suzhou Environmental Monitoring Center Station.

This standard was approved by the Ministry of Environmental Protection on October 25, 2013.

This standard has been implemented since January 1, 2014.

This standard is explained by the Ministry of Environmental Protection.

Water quality - Determination of phosphate and total phosphorus - Continuous flow - Ammonium molybdate spectrophotometric method

1 Scope of application

This standard specifies the continuous flow-ammonium molybdate spectrophotometric method for the determination of phosphate and total phosphorus in water.

This standard applies to the determination of phosphate and total phosphorus in surface water, groundwater, domestic sewage and industrial wastewater.

When the detection optical path is 50mm, the detection limit of the method for determining phosphate (in terms of P) is 0.01mg/L, and the measurement range is 0.04~1.00mg/L; the detection limit of total phosphorus (in P) is 0.01mg/L, and the measurement range is 0.04~5.00mg/L.

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 11893 Determination of total phosphorus in water - Ammonium molybdate spectrophotometric method HJ/T 91 Surface Water and Wastewater Monitoring Technical Specifications HJ/T 164 Technical Specifications for Groundwater Environmental Monitoring

3 Terms and definitions

The following terms and definitions apply to this standard.

Phosphate (orthophosphate) Refers to the sum of orthophosphates (including PO_4^{3-} , HPO_4^{2-} , H_2PO_4^-) in the samples measured under the conditions specified in this standard.

In P.

4.1 Working principle of continuous flow analyzer

The sample and the reagent enter the chemical reaction module under the push of the peristaltic pump, and continuously flow in the closed pipeline, and are pressed by the bubble.

They are regularly spaced at regular intervals and mixed and reacted in a specific order and proportion. After the color development is completed, they enter the flow detection cell.

Photometric detection.

4.2.1 Determination of phosphate

The orthophosphate in the sample reacts with ammonium molybdate to form a phosphorus molybdenum heteropoly acid in an acidic medium in the presence of a cerium salt, and the combination the material was immediately reduced by ascorbic acid to form a blue complex,

and the absorbance was measured at a wavelength of 880 nm. See the workflow diagram, see figure 1.

4.2.2 Determination of total phosphorus

The sample was added with potassium persulfate solution, and subjected to ultraviolet digestion and acidic hydrolysis at $107^{\circ}\text{C} \pm 1^{\circ}\text{C}$. All forms of phosphorus were completely oxidized.

For the determination of normal phosphate and orthophosphate, see 4.2.1. Refer to the work flow chart, as shown in Figure 2.

1 Peristaltic pump 2 Mixed reaction ring 3 Dialyzer (unit) 4 Heating bath (circle) 40°C

5 Flow detection cell 50mm 880nm 6 Degassing S Sample 0.8ml/min G Air

R1 acid reagent I 0.32ml/min (6.12) R2 surfactant solution 0.80ml/min (6.19) W waste liquid R3 ammonium molybdate solution 0.23ml/min (6.16) R4 ascorbic acid solution 0.23ml/min (6.18)

Figure 1 Flow chart of continuous flow-ammonium molybdate spectrophotometric determination of phosphate

1 peristaltic pump 2 mixed reaction ring 3 dialyzer (unit) 4 heating bath (circle) 107°C , 40°C

5 UV digestion device 6 bubble removal 7 flow detection cell 50mm 880nm S sample 0.80ml/min R1 potassium persulfate digestion reagent 0.32ml/min (6.15) R2 acid reagent II 0.16ml/min (6.13) G air R3 alkali reagent 0.16ml/min (6.14) R4 surfactant solution 0.80ml/min (6.19) W waste liquid R5 ammonium molybdate solution 0.23ml/min (6.16) R6 ascorbic acid solution 0.23ml/min (6.18) ReS secondary injection 1.00ml/min

Figure 2 Flow chart of continuous flow-ammonium molybdate spectrophotometric determination of total phosphorus

5 interference and elimination

5.1

Arsenic, chromium and sulfur in the sample will interfere with the determination. For the elimination method, see GB 11893.

5.2

The turbidity or chromaticity of the sample will interfere with the measurement and can be eliminated by the dialysis unit. See Figure 1, 2 (3).