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**Testing methods for water quality by flow
analysis—Part 1: Ammonium nitrogen**

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Contents

	Page
Introduction	1
1 Scope	1
2 Normative references	1
3 Terms and definitions	2
4 Common matters	2
4.1 General	2
4.2 Water	2
4.3 Reagents	3
4.4 Glassware	3
5 Sample	3
5.1 Sampling	3
5.2 Handling of sample	3
6 Measurement	3
6.1 Classification of measuring methods	3
6.2 FIA method by gaseous diffusion • pH indicator discolouration	4
6.3 FIA method of indophenol blue colouring by phenol	7
6.4 CFA method of indophenol blue colouring by salicylic acid	10
6.5 CFA method of indophenol blue colouring by phenol	12
6.6 Measurement operation	14
6.7 Calculation of concentration	15
7 Expression of results	15
8 Test report	16
Annex JA (informative) Comparison table between JIS and corresponding International Standard	17

Foreword

This translation has been made based on the original Japanese Industrial Standard established by the Minister of Economy, Trade and Industry through deliberations at the Japanese Industrial Standards Committee according to the proposal for establishment of Japanese Industrial Standard submitted by Japan Environmental Measurement and Chemical Analysis (JEMCA)/Japanese Standards Association (JSA) with the draft being attached, based on the provision of Article 12 Clause 1 of the Industrial Standardization Law.

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JIS K 0170 series consists of the following 9 parts under the general title

“Testing methods for water quality by flow analysis”:

Part 1: Ammonium nitrogen

Part 2: Nitrite nitrogen and nitrate nitrogen

Part 3: Total nitrogen

Part 4: Orthophosphate and total phosphorus

Part 5: Phenol index

Part 6: Fluoride

Part 7: Chromium (VI)

Part 8: Anionic surfactants

Part 9: Cyanide compounds

Testing methods for water quality by flow analysis—

Part 1: Ammonium nitrogen

Introduction

This Japanese Industrial Standard has been prepared based on the second edition of ISO 11732 published in 2005, with some of the technical contents modified so as to make them applicable to apparatuses, etc. used in Japan.

The portions with continuous sidelines or dotted underlines are the matters in which the contents of the corresponding International Standard have been modified. A list of modifications with explanations is given in Annex JA.

1 Scope

This Standard specifies the method of determination for the ammonium nitrogen contained in industrial water, industrial wastewater, etc. by using the flow analysis according to absorption spectrophotometry. The method is also applicable to surface water, ground water, seepage water, etc.

It does not apply to samples with much suspended matter.

NOTE: The International Standard corresponding to this Standard and the symbol of degree of correspondence are as follows:

ISO 11732:2005 *Water quality—Determination of ammonium nitrogen—Method by flow analysis (CFA and FIA) and spectrometric detection* (MOD)

The symbols which denote the degree of correspondence in the contents between the relevant International Standard and JIS are IDT (identical), MOD (modified), and NEQ (not equivalent) according to ISO/IEC Guide 21-1.

WARNING The reagents shall be handled with utmost attention, ensuring compliance with the relevant laws, ordinances, regulations and the like.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this Standard. The most recent editions of the standards (including amendments) indicated below shall be applied.

JIS K 0050 *General rules for chemical analysis*

JIS K 0094 *Sampling methods for industrial water and industrial wastewater*

JIS K 0101 *Testing methods for industrial water*

JIS K 0102 *Testing methods for industrial wastewater*

JIS K 0115 *General rules for molecular absorptiometric analysis*

JIS K 0126	<i>General rules for flow analysis</i>
JIS K 0211	<i>Technical terms for analytical chemistry (General part)</i>
JIS K 0215	<i>Technical terms for analytical chemistry (Analytical instrument part)</i>
JIS K 0557	<i>Water used for industrial water and wastewater analysis</i>
JIS K 8107	<i>Disodium dihydrogen ethylenediamine tetraacetate dihydrate (Reagent)</i>
JIS K 8116	<i>Ammonium chloride (Reagent)</i>
JIS K 8121	<i>Potassium chloride (Reagent)</i>
JIS K 8180	<i>Hydrochloric acid (Reagent)</i>
JIS K 8228	<i>Magnesium perchlorate (Reagent)</i>
JIS K 8288	<i>Trisodium citrate dihydrate (Reagent)</i>
JIS K 8308	<i>Cresol red (Reagent)</i>
JIS K 8397	<i>Sodium salicylate (Reagent)</i>
JIS K 8536	<i>Potassium sodium(+)-tartrate tetrahydrate (Reagent)</i>
JIS K 8576	<i>Sodium hydroxide (Reagent)</i>
JIS K 8625	<i>Sodium carbonate (Reagent)</i>
JIS K 8722	<i>Sodium pentacyanonitrosylferrate (III) dihydrate (Reagent)</i>
JIS K 8798	<i>Phenol (Reagent)</i>
JIS K 8841	<i>Bromocresol purple (Reagent)</i>
JIS K 8842	<i>Bromothymol blue (Reagent)</i>
JIS K 8863	<i>Boric acid (Reagent)</i>
JIS K 8951	<i>Sulfuric acid (Reagent)</i>
JIS R 3503	<i>Glass apparatus for chemical analysis</i>
JIS R 3505	<i>Volumetric glassware</i>

3 Terms and definitions

For the purpose of this Standard, the terms and definitions given in JIS K 0101, JIS K 0102, JIS K 0115, JIS K 0126, JIS K 0211 and JIS K 0215 apply.

4 Common matters

4.1 General

The general matters common to chemical analyses shall be in accordance with JIS K 0050. The general requirements relating to the flow analysis shall be in accordance with JIS K 0126.

4.2 Water

The water used in this Standard shall be the water of A3 or A4 specified in JIS K 0557.

4.3 Reagents

The reagents to be used shall be those specified in Japanese Industrial Standards and shall not be such that they impair the measurement. In the case of using reagents not specified in Japanese Industrial Standards, those reagents shall not be such that they impair the measurement. The reagent blank shall be periodically checked.

NOTE: The concentration indicated in parentheses at the rear of the designation of reagent solution, except when it is a reference solution, is an approximate concentration.

4.4 Glassware

The glassware to be used, unless otherwise specified, shall be in accordance with JIS R 3503 and JIS R 3505.

5 Sample

5.1 Sampling

The sampling, sample container, water sampler and sampling operation shall be in accordance with JIS K 0094. For the sample container, a polyethylene bottle with ground-in stopper and a glass bottle with ground-in stopper shall be used.

A polypropylene bottle with ground-in stopper, a polystyrene bottle with ground-in stopper or a polycarbonate bottle with ground-in stopper may be used.

5.2 Handling of sample

The test shall be carried out immediately after sampling. When this is not practicable, the sample shall be preserved according to 3.3 b) 2) of JIS K 0102 and tested as early as possible.

The sample is applied after ammonium ion is separated from the coexisting substance by pretreatment (distillation method). However, for samples not containing interfering substance, this distillation operation may be omitted.

6 Measurement

6.1 Classification of measuring methods

Classification of measuring methods shall be in accordance with table 1.

Table 1 Classification of measuring methods

Classification of measuring method	Clause					
	Reagent and preparation of reagent solution	Apparatus	Measuring operation	Calculation of concentration	Expression of results	Test report
FIA method of gaseous diffusion •pH indication discolouration	6.2.3	6.2.4	6.6	6.7	7	8
<u>FIA method of indophenol blue colouring by phenol</u>	6.3.3	6.3.4				
CFA method of indophenol blue colouring by salicylic acid	6.4.3	6.4.4				
<u>CFA method of indophenol blue colouring by phenol</u>	6.5.3	6.5.4				
NOTE: FIA means the flow injection analysis and CFA means the continuous flow analysis.						

6.2 FIA method of gaseous diffusion • pH indicator discolouration

6.2.1 Principle

The sample is injected into a continuous carrier stream in a capillary and mixed with a continuously streaming flow of alkaline reaction solution. The ammonium formed is separated in a gas-liquid separator from the solution and taken up by a streaming flow of absorbing solution containing a pH indicator. The colour change due to the resulting pH shift is measured as the absorbance at a wavelength in the vicinity of 580 nm to determine ammonium nitrogen.

Range of determination N : 0.1 mg/L to 10 mg/L

NOTE: Though it differs depending on the apparatus and measuring conditions, repeatability of this method, expressed by relative standard deviation (%), is not more than 10 %.

6.2.2 Interferences

The volatile amines, if present, diffuse through a gas permeable membrane, lead to a pH shift of the absorbing solution and give a positive error. Significant concentrations of volatile amines can be reduced by distilling the sample adjusted to pH 5.8 prior to the analysis.

Strong acidic or buffered samples can interfere with generation of ammonium, leading to a negative error. In these cases, the pH of the sample shall be adjusted to the range of 3 to 5 by the addition of sodium hydroxide solution.

A high concentration of metal ions than can precipitate as hydroxides will give poorly reproducible results. The addition of a suitable complexing agent, such as disodium di-