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**Urine-absorbing aids for
incontinence—Measurement of
airborne respirable polyacrylate
superabsorbent materials—
Determination of dust in collection
cassettes by sodium atomic
absorption spectrometry**

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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 of establishing a Japanese Industrial Standard from Japan Hygiene Products Industry Association (JHPIA)/Japanese Standards Association (JSA) with a draft of Industrial Standard based on the provision of Article 12 Clause 1 of the Industrial Standardization Law.

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Urine-absorbing aids for incontinence— Measurement of airborne respirable polyacrylate superabsorbent materials— Determination of dust in collection cassettes by sodium atomic absorption spectrometry

Introduction

This Japanese Industrial Standard has been prepared based on the first edition of **ISO 17191** published in 2004 with some modifications of the technical contents.

Major modifications of **ISO 17191** are such that the description of sampling method in the personal exposure measurement method (hereafter referred to as “personal method”) is added and the sample collecting devices having the performance equivalent to those specified in **ISO** is made to be usable.

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

1 Scope

This Standard specifies the personal method for the determination of polyacrylate superabsorbent material powders (hereafter referred to as “PA dust”) in airborne dust by measuring sodium using the atomic absorption spectrometry. PA dust sample shall be collected in polystyrene acrylonitrile air-monitoring cassettes with polytetrafluoroethylene filters and porous plastic backing pads. This method is applicable to the determination of PA dust sample collected in the range of 0.2 µg to 60 µg (detection limit: 0.2 µg).

Note that this test method is applicable only to the measurement of PA dust amount during handling operation of polyacrylate superabsorbent materials, and does not apply to the specification of the product which utilizes the polyacrylate superabsorbent materials and the superabsorbent materials.

NOTE : The International Standard corresponding to this Standard is as follows.

ISO 17191:2004 *Urine-absorbing aids for incontinence—Measurement of airborne respirable polyacrylate superabsorbent materials—Determination of dust in collection cassettes by sodium atomic absorption spectrometry* (MOD)

In addition, 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**.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this Standard. For the standard with the indication of year,

the edition of the indicated year shall be applied and not any revisions made thereafter (including amendments). For those with no indication of year, the most recent editions (including amendments) shall be applied.

JIS K 0121 General rules for atomic absorption spectrometry

JIS K 0557 Water used for industrial water and wastewater analysis

JIS K 8121 Potassium chloride (Reagent)

JIS K 8839 2-Propanol (Reagent)

ISO 3696:1987 Water for analytical laboratory use—Specification and test methods

3 Principle

An atomic absorption spectrometry is used to determine the sodium content in PA dust collected in the air-monitoring cassette. Sodium is determined after being released from PA dust by exchanging with potassium in a potassium chloride solution. Then, the amount of dissolved sodium is determined using an atomic absorption spectrometry, and the mass of PA dust collected is calculated by subtracting the mass of blank sodium present in the air-monitoring cassette.

To minimize noise from the trace amount of sodium present in natural environment, the air-monitoring cassette shall be washed before the collection of PA dust. For the analysis, the specified amount of potassium chloride solution shall be sucked from the air-monitoring cassette and directly sprayed into the sample atomization chamber (spray chamber) of an atomic absorption spectrometer.

4 Reagents

Reagents used for this measurement method shall be as follows. Potassium chloride (4.1) and 2-propanol (4.3) shall be stored in glass containers, and other reagents and solutions shall be stored in plastic containers.

The sodium content of reagents and solutions specified in 4.1, 4.2, and 4.3 shall be analyzed by atomic absorption spectrometry before cleaning the air-monitoring cassette or determining the sodium content.

4.1 Potassium chloride That used for the electric conductivity measurement specified in JIS K 8121 or that whose sodium content is 10 µg/g or under.

4.2 Water That specified in JIS K 0557, preferably whose sodium content is under 0.01 mg/L, or that conforming Grade 1 of ISO 3696 whose sodium content is under 0.1 mg/L.

4.3 2-propanol (IPA) That specified in JIS K 8839.

4.4 Sodium reference solution [Na 1 000 mg/L ¹⁾]

Note ¹⁾ 1 mg/L = 1 ppm

4.5 Potassium chloride solution Concentration ρ (KCl) = 2 000 mg/L

Take 2.0 g of potassium chloride (4.1) to dissolve in water (4.2) up to 1 L in a polypropylene flask. The sodium content of this solution shall be under 0.1 mg/L.

4.6 Sodium standard solution That of the product of specific reference material (national measurement standards) within guaranteed period.

The concentration ρ (Na) used for atomic absorption spectrometry shall be 0.1 mg/L, 0.5 mg/L, 1.0 mg/L and 2.0 mg/L.

Take 0.05 ml to 2 ml of sodium standard solution of 1 000 mg/L (4.4) stepwise (0.05 ml, 0.25 ml, 0.5 ml, and 1 ml) into a polypropylene volumetric flask of 1 000 ml, add 100 ml of 2-propanol (4.3) and add 2 000 mg/L of potassium chloride solution up to the marked line.

4.7 Atomic absorption zeroing solution Add 2-propanol (4.3) to potassium chloride solution (2 000 mg/L) to make the concentration of 2-propanol 10 % (volume fraction).

5 Apparatus

The apparatus used in this measurement method shall be as follows.

5.1 Atomic absorption spectrometer That specified in clause 5 of JIS K 0121.

5.2 Sample atomization chamber and burner Those for trace sodium determination shall be used.

5.3 Hollow cathode lamp for sodium

5.4 Pipette That capable of measuring 0.5 ml and 4.5 ml.

5.5 Plastic gloves Those of non-powdered

5.6 Volumetric flask That of polypropylene or borosilicate glass and 1 000 ml and 100 ml in capacity.

5.7 Spatula

5.8 Air-monitoring cassette Air-monitoring cassette (hereafter referred to as "cassette") having a size classification capability of 4 μm 50 %. Filters shall be made of polytetrafluoroethylene resin (hereafter referred to as "PTFE") with a 99.9 % collection efficiency of airborne particles and aerosols of over 0.3 μm in diameter, and classified into two types according to the sample collecting devices as shown in table 1.

Table 1 Types of cassette

Type	Example of structure
JIS type cassette	See figure 1
ISO type cassette	See figure A.1

5.9 Fixed rate pump That having the vacuum suction capability of the flow specified by cassette and the function to maintain the constant flow.

5.10 Flatbed laboratory shaker That capable of holding and shaking to extract sodium from PTFE filters (hereafter referred to as “flatbed shaker”).

5.11 PTFE filter pretreatment unit with high efficiency particulate air filter (HEPA) An apparatus of assembling manifold with high efficiency particulate air filters (HEPA) used for cleaning and drying capable of collecting airborne particles and aerosols of over 0.3 µm in diameter at the minimum flow rate of 5 L/min. A unit with multiple pretreatment apparatus (hereafter referred to as “pretreatment unit”) shall be used. The type of pretreatment unit shall be shown in table 2.

Note that the high efficiency particulate air filter (HEPA) shall be the dust collection filter for pretreatment drying and shall not be used for the cassette (5.8).

Table 2 Types of pretreatment unit

Type	Unit
JIS type pretreatment unit	See figure 2
ISO type pretreatment unit	See figure A.2 and figure A.3

6 Procedure

6.1 Sample preparation and precautionary measures

6.1.1 Preparation and cleaning of PTFE filter prior to air and PA dust sample collection

6.1.1.1 When using JIS type cassette

- Before using for the air sampling, PTFE filters (see figure 1) which have been cleaned shall be labelled with unique identification numbers for tracing their preparation date. The prepared PTFE filters of about 10 % (blank filters) shall be used for the sodium contamination test.
- PTFE filters for the contamination test shall be selected from the first, middle and last parts of the batch.
- Contamination of PTFE filters shall be tested by treating them in the same manner as the sample for air collection and measurement. When the sodium content of tested PTFE filter is over 0.17 µg, all PTFE filters shall be re-cleaned. The availability thereof shall be determined by re-testing filters of 10 %.
- Absorbance of water (4.2) used for rinsing and measurement values of sodium of blank filters (10 %) for the contamination test shall be recorded. The mean value of three measurements or more shall be considered as the blank value.
- Moisten PTFE filters with 0.5 ml of 2-propanol, clean with potassium chloride solution (2 000 mg/L), rinse with water (4.2), then dry.
- Assemble the necessary number of PTFE filters in the pretreatment unit (see figure 2) without touching with the fingers any inside surface of filters. Analysts shall wear plastic gloves to reduce contamination. Use forceps to handle PTFE