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Testing methods for volatile organic compounds in industrial water and waste water

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In the event of any doubts arising as to the contents,
the original JIS is to be the final authority.

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Foreword

This translation has been made based on the original Japanese Industrial Standard revised by the Minister of Economy, Trade and Industry, through deliberations at the Japanese Industrial Standards Committee in accordance with the Industrial Standardization Law.

Consequently **JIS K 0125**:1995 is replaced with this Standard.

Attention is drawn to the possibility that some parts of this Standard may conflict with patent rights, applications for a patent after opening to the public or utility model rights. The relevant Minister and the Japanese Industrial Standards Committee are not responsible for identifying any of such patent rights, applications for a patent after opening to the public or utility model rights.

Testing methods for volatile organic compounds in industrial water and waste water

1 Scope

This Japanese Industrial Standard specifies the testing methods for the following volatile organic compounds in industrial water and waste water : dichloromethane, dibromochloromethane, tetrachloromethane (carbon tetrachloride), trichloromethane (chloroform), tribromomethane (bromoform), bromodichloromethane, 1,2-dichloroethane, 1,1,1-trichloroethane, 1,1,2-trichloroethane, 1,1-dichloroethene (1,1-dichloroethylene), *cis*-1,2-dichloroethene (*cis*-1,2-dichloroethylene), *trans*-1,2-dichloroethene (*trans*-1,2-dichloroethylene), tetrachloroethene (tetrachloroethylene), trichloroethene (trichloroethylene), 1,2-dichloropropane, 1,3-dichloro-1-propene, 1,4-dichlorobenzene (*p*-dichlorobenzene), dimethylbenzene (xylene), benzene, methylbenzene (toluene), chloroethylene (vinyl chloride monomer), 1,4-dioxane and formaldehyde.

NOTE 1 A list of target substances for respective analytical methods specified in this Standard is given in Annex G.

NOTE 2 Compounds indicated above with the common names in attached parentheses are hereafter referred to by their common names.

1.1 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 0114 *General rules for gas chromatography*

JIS K 0123 *General rules for gas chromatography/mass spectrometry*

JIS K 0211 *Technical terms for analytical chemistry (General part)*

JIS K 0215 *Technical terms for analytical chemistry (Analytical instrument part)*

JIS K 0512 *Hydrogen*

JIS K 0557 *Water used for industrial water and wastewater analysis*

JIS K 1107 *Nitrogen*

JIS K 8027 *Acetylacetone (Reagent)*

JIS K 8034 *Acetone (Reagent)*

JIS K 8061 *Sodium sulfite (Reagent)*

JIS K 8102 *Ethanol (95) (Reagent)*

JIS K 8150 *Sodium chloride (Reagent)*

JIS K 8161 *Dichloromethane (Reagent)*

JIS K 8180 *Hydrochloric acid (Reagent)*

JIS K 8322 *Chloroform (Reagent)*

JIS K 8355 *Acetic acid (Reagent)*

JIS K 8356 *Zinc acetate dihydrate (Reagent)*

JIS K 8359 *Ammonium acetate (Reagent)*

JIS K 8461 *1,4-Dioxane (Reagent)*

JIS K 8465 *1,2-Dichloroethane (Reagent)*

JIS K 8574 *Potassium hydroxide (Reagent)*

JIS K 8659 *Starch, soluble (Reagent)*

JIS K 8666 *Trichloroethylene (Reagent)*

JIS K 8680 *Toluene (Reagent)*

JIS K 8848 *Hexane (Reagent)*

JIS K 8858 *Benzene (Reagent)*

JIS K 8872 *Formaldehyde solution (Reagent)*

JIS K 8891 *Methanol (Reagent)*

JIS K 8913 *Potassium iodide (Reagent)*

JIS K 8920 *Iodine (Reagent)*

JIS K 8951 *Sulfuric acid (Reagent)*

JIS K 8987 *Sodium sulfate (Reagent)*

JIS K 9037 *Pararosolic acid (Reagent)*

JIS K 9502 *L(+)-Ascorbic acid (Reagent)*

JIS R 3503 *Glass apparatus for chemical analysis*

JIS R 3505 *Volumetric glassware*

2 Terms and definitions

For the purposes of this Standard, the terms and definitions given in **JIS K 0101**, **JIS K 0102**, **JIS K 0211** and **JIS K 0215** apply.

3 General

3.1 General requirements

The general requirements for chemical analyses are specified in **JIS K 0050**.

3.2 Gas chromatography

The general requirements for gas chromatography are specified in **JIS K 0114**.

3.3 Gas chromatography mass spectrometry

The general requirements for gas chromatography mass spectrometry are specified in **JIS K 0123**.

3.4 Determination range

The determination ranges are indicated by the concentration of the target component in the sample (μg/L).

3.5 Repeatability

The repeatability is indicated for each analytical method by the coefficient of variation (%) which has been obtained by conducting a repeatability test within its determination range.

The coefficient of variation is calculated by the following equation :

$$\text{Coefficient of variation (\%)} = \frac{\sigma}{\bar{x}} \times 100$$

where, σ : standard deviation

$\bar{x}$: averaged value

3.6 Test environment

The environment in which analyses specified in this Standard are conducted should be kept under the following conditions.

a) The laboratory should be free from contamination which is likely to come from its surroundings; it should be sufficiently separated from laboratories where organic solvents may be handled. The temperature inside the laboratory should be kept at 20 °C to 25 °C.

b) Possible contamination resulting from the air conditioning of the building, especially of air-circulating type, should be avoided with scrupulous measures.

3.7 Water

Water to be used for preparation of calibration curve and for blank tests shall be provided by an ultrapure water system, which, prior to use, shall have been validated to be appropriate for use in a specific analysis method by conducting a blank test. Alternatively, commercially available water or mineral water for analysis of volatile organic compounds, or water provided by a water purifying system equipped with pre-treatment conditioning system for volatile organic compounds may be used. Water used for determination of formaldehyde shall be that specified in **5.7.1 b)**.

Distillation of water, where required, shall be performed as follows.

— Take 1 L to 3 L of water in an Erlenmeyer flask, heat it strongly to boil, and continue boiling until it is reduced to about one-third of the initial volume.

— Immediately transfer it to a place free from contamination from surroundings, and allow to cool.

NOTE : Heating should be strong enough for thorough removal of volatile organic compounds.

3.8 Reagents

a) If the reagent to be used is specified in a Japanese Industrial Standard, that of the most superior grade or that suitable for the purpose of use shall be selected among those specified. If there is no Japanese Industrial Standard for that reagent, any reagent that has been validated not to adversely influence the determination shall be used.

b) The concentrations of reagent solutions are generally specified in mass concentrations, with the unit of g/L or mg/L. In the case of compounds, the mass as anhydride is indicated. The mol concentration is indicated by mol/L.

The concentrations of standard solutions, however, are specified by the mass dissolved in 1 ml (mg/ml or μg/ml).

c) The concentrations of liquid reagents are specified by the mix ratio with water, using indication such as [Reagent name (a + b)], which means that a ml of reagent has been mixed with b ml of water.

d) Reagents and waste solutions shall be handled with utmost care and in accordance with related laws and regulations.

e) The standard solutions and internal standard solutions shall be as follows.

1) The standard solutions and the mixed standard solutions to be used shall be traceable to the National Measurement Standard (Article 134 of the Measurement Act).

NOTE 1 Traceable solutions are, for example, solutions bearing a JCSS mark or the international MRA-compliant solutions. However, since vinyl chloride monomer with ensured traceability is not commercially available, those with manufacturer-guaranteed concentrations may be used.

2) The preparation of standard solutions shall be in accordance with Annex A. The mixed standard solutions and internal standard solutions shall be prepared as specified in each subclause of analysis method. If suitable for the purpose of use, commercially available analytical standard solutions with a guaranteed concentration may be used.

3) When the target substances are individually tested, standard solutions for relevant substances shall be prepared.

NOTE 2 The names of reagents are coordinated with the nomenclature of compounds specified by the Chemical Society of Japan and names of **JIS** reagents, which are based on the nomenclature system for inorganic and organic compounds prescribed by the International Union of Pure and Applied Chemistry (IUPAC).