

ERRATA

Table 1 *Types and principles of methods for analysis*

Test portion sampling

Error: sodium hydroxide solution 0.1 mol/l

Correct: sodium hydroxide solution 5 mol/l

Remarks: This erratum is for correcting the first edition of this Standard.

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Methods for determination of hydrogen cyanide in flue gas

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Foreword

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

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Methods for determination of hydrogen cyanide in flue gas

1 Scope This Japanese Industrial Standard specifies the methods for determination of hydrogen cyanide in flue gas.

Remarks 1 The flue gas mentioned in this Standard is the gas discharged from chimney, flue, duct (hereafter referred to as "duct") and the like due to chemical reaction, combustion and the like.

2 The normative references to this Standard are shown in Annex table 1.

2 Common items The items common to method for chemical analysis method for sampling of flue gas, method for gas chromatographic analysis, method for molecular absorption metric analysis and ion-selective electrode method shall be in conformance respectively with JIS K 0050, JIS K 0095, JIS K 0114, JIS K 0115 and JIS K 0122.

3 Types and principles of methods for analysis The types and principles of the methods for analysis shall be as shown in Table 1.

Table 1 Types and principles of methods for analysis

Type of analyzing method	Principle of analyzing method			Applicable condition
	Summary	Test portion sampling	Range of determination ⁽¹⁾ volppm (mg/m ³ N)	
Ion-selective electrode method	Upon completion of the absorption of the hydrogen cyanide within the test portion gas in the sodium hydroxide solution, the electric potential is measured using the cyanide ion electrode.	Absorption bulb method absorbent: sodium hydroxide solution 0.1 mol/l Amount of solution: 50 ml × 2	1 to 750 ⁽²⁾ (1.2 to 900)	Follow 5.1
Gas chromatographic analysis	The test portion gas is directly introduced into the gas chromatograph with alkali thermal ionization detector and the gas chromatogram is obtained.	Absorption bulb method absorbent is not used.	0.1 to 2 500 (0.12 to 3 000)	Follow 6.1
4-pyridinecarboxylic acid – pyrazolone absorptiometry	Upon completion of the absorption of the hydrogen cyanide within the test portion gas into the sodium hydroxide solution, 4-pyridinecarboxylic acid pyrazolone solution is added for colouring and the absorbance (638 nm) is measured.	Absorption bulb method Absorbent: sodium hydroxide solution 0.1 mol/l Amount of solution: 50 ml × 2	0.5 to 10 ⁽²⁾ (0.6 to 12)	Follow 7.1

Notes ⁽¹⁾ The unit "N" is the capital letter of Normal which means a standard condition (0 °C, 101.32 Pa).

⁽²⁾ A case where the test portion solution for analysis is prepared by diluting the absorbent (100 ml) through which 10 l of the test portion gas passed to 250 ml.

4 Sampling of test portion gas The sampling method of test portion gas shall be as follows:

The test portion gas used for the analysis shall be sampled twice or more times within a closely limited period by selecting the position where the representative gas can be taken, for example the point at which the flow velocity of the gas does not change remarkably in terms of time and space, and each sample is used for the analysis.

4.1 Reagents and preparation of reagent solution

4.1.1 Reagents

- (1) **Water** of class A2 specified in JIS K 0557.
- (2) **Sulfuric acid** specified in JIS K 8951.
- (3) **Diarsenic trioxide** specified in JIS K 8044.
- (4) **Ammonia solution** specified in JIS K 8085.
- (5) **Sodium hydroxide** specified in JIS K 8576.
- (6) **Disodium molybdate dihydrate** specified in JIS K 8906.
- (7) **Zinc sulfate heptahydrate** specified in JIS K 8953.
- (8) **Ammonium sulfate** specified in JIS K 8960.
- (9) **Lead (II) acetate trihydrate** specified in JIS K 8374.
- (10) **Disodium dihydrogen ethylenediamine tetraacetate dihydrate** specified in JIS K 8107.
- (11) **Ammonium amidosulfate** specified in JIS K 8588.

4.1.2 Preparation of reagent solution

- (1) **Sulfuric acid (15+85)** Add quietly 15 ml of the sulfuric acid little by little to 85 ml of the water.
- (2) **Sulfuric acid (3+97)** Add 3 ml of the sulfuric acid to 97 ml of the water.
- (3) **Sodium hydroxide solution (5 mol/l)** Used as an absorbent solution and made to 1 l by dissolving 200 g of the sodium hydroxide in the water (³).
- (4) **Sodium hydroxide solution (1 mol/l)** Used putting in a washing bottle and made to 100 ml by dissolving 4 g of the sodium hydroxide in the water.
- (5) **Sodium molybdate dihydrate (100 g/l)** Dissolve 10 g of the sodium molybdate dihydrate in the water to make to 100 ml.
- (6) **Zinc sulfate-ammonia solution** Dissolve 20 g of the zinc sulfate heptahydrate in 50 ml of the water, add 35 ml of the ammonia solution and 10 g of the ammonium sulfate, and add further the water to make to 100 ml.
- (7) **Lead acetate-sodium hydroxide solution** Dissolve 1 g of the lead acetate trihydrate in 100 ml of the sodium hydroxide (0.2 mol/l) and filtrate.
- (8) **Ammonium amidosulfate solution (100 g/l)** Dissolve 10 g of the ammonium amidosul-

fate in the water to make to 100 ml.

Note (3) If the acid gas such as chlorine coexists in the test portion gas, 1 ml of diarsenic trioxide solution [made by adding 10 ml of sodium hydroxide solution (100 g/l) to 1 g diarsenic trioxide and heating to dissolve] shall be added in advance.

4.2 Instruments and apparatus

(1) Absorption bulb

- (a) **Cases of ion-selective electrode method and absorptiometry** Two absorption bulbs (250 ml in capacity) are used connecting to each other as exemplified in Fig. 1, (a) and (b).
- (b) **Case of gas chromatography method** One absorption bulb (100 ml in capacity) is used as exemplified in Fig. 1, (c).

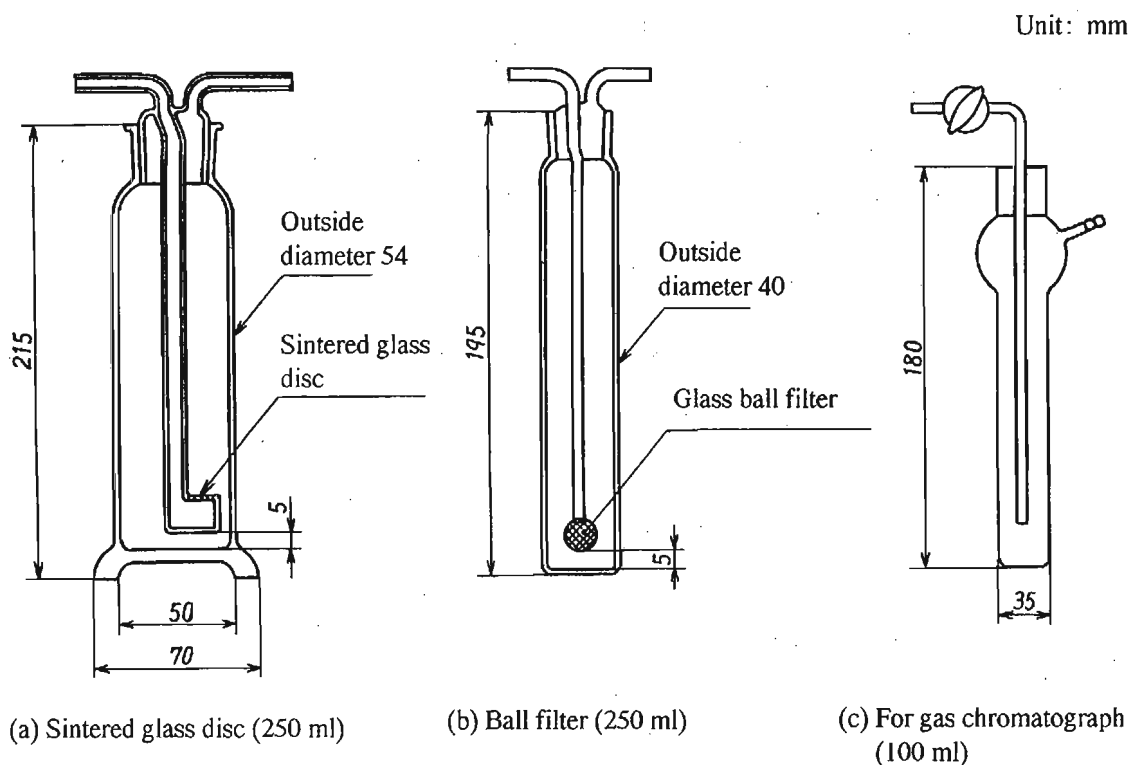
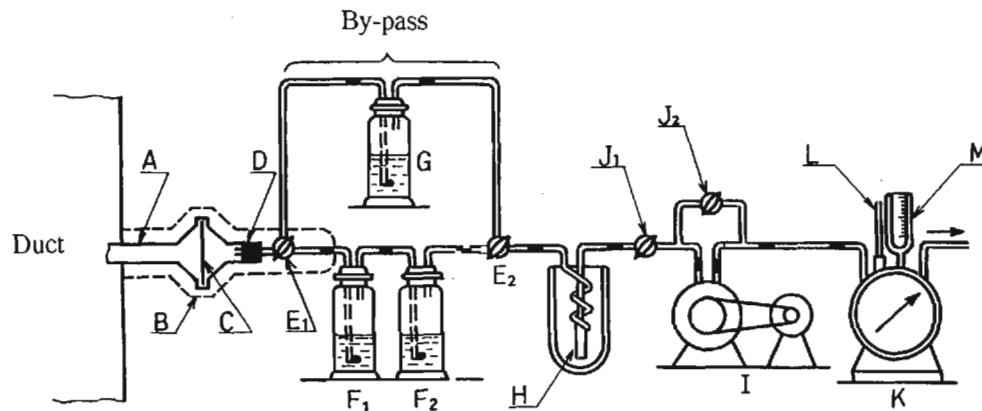


Fig. 1 Examples of absorption bulbs

(2) Test portion gas sampling apparatus

- (a) Cases of ion-selective electrode method and absorptiometry That of the structure exemplified in Fig. 2 shall be used.



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|---|---|
| A : Test portion gas sampling tube | H : Trap |
| B : Heat insulating material | I : Suction pump |
| C : Filter medium | J ₁ , J ₂ : Flow adjusting cock |
| D : Silicone rubber | K : Wet type gas meter |
| E ₁ , E ₂ : Three-way cock for duct change-over | L : Thermometer |
| F ₁ , F ₂ : Absorption bulb (250 ml in capacity) | M : Manometer |
| G : Gas washing bottle [50 ml of sodium hydroxide solution (40 g/l) is put] | |

Fig. 2 An example of test portion gas sampling apparatus