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Methods for determination of carbon disulfide 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 the Japanese Industrial Standards Committee in accordance with the Industrial Standardization Law:

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Methods for determination of carbon disulfide in flue gas

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

Remarks 1 The flue gas in this Standard means the gas exhausted at flue, chimney, duct, or the like in the manufacturing process, combustion or other chemical reaction, or the operation process of various chemical products and the like.

2 The normative references of this Standard shall be shown in Attached Table 1.

2 Common items The items common to the method for chemical analysis, method for sampling of flue gas, method for absorption spectrophotometry analysis and method for gas chromatographic analysis shall be in accordance with **JIS K 0050**, **JIS K 0095**, **JIS K 0115** and **JIS K 0114**, respectively.

3 Classification of methods for determination and summary The classification of methods for determination and summary shall be as shown in Table 1.

Table 1 Classification of methods for determination and summary

Class of method for determination	Summary of method for determination			Condition to be applied
	Summary	Sampling	Determination range vol ppm	
Absorptiometry of copper diethyldithiocarbamate	Carbon disulfide in exhaust gas is absorbed in copper diethylamino-ethanol solution, and the absorbance (435 nm) of copper diethyldithiocarbamate generated in absorption solution and the amount of carbon disulfide is determined.	Absorption bottle method Absorption solution: prepared by adding ethanol to the solution of copper sulfide, diethylamine hydrochloride, ammonia and citric acid. Amount of solution: 50 ml × 2 Place cadmium acetate solution into the (front) absorption bottle and remove the coexisting hydrogen sulfide. Amount of solution: 50 ml × 1	3 to 60 ⁽¹⁾	In accordance with 5.1.1.
Method of gas chromatograph	A sample of gas is taken and the amount of carbon disulfide is determined from the chromatogram obtained by introducing the sampled gas into gas chromatograph.	Vacuum collection bottle method, or collection bag method	0.2 to 10 ⁽²⁾ (flame photometric detector)	

Notes (1) Determination range presumes the case where, in absorptiometry, 10 l of sample gas is taken and the sample solution for analysis is made by diluting the absorption solution to 200 ml.

(2) In the case of introducing 0.1 ml to 5 ml of sample gas for analysis.

4 Sampling method of sample gas The sampling method of gas shall be in accordance with collection bottle method, vacuum collection bottle method and collection bag method.

Take the sample gas to be used for analysis at the same position twice or more in principle within near time, and analyze them respectively.

4.1 Method using absorption bottle This method shall apply to absorptiometry.

4.1.1 Reagents and preparation of reagent solution

(1) Reagents

- (a) **Water** That of grade A2 specified in **JIS K 0557**.
- (b) **Copper (II) sulfate pentahydrate** That specified in **JIS K 8983**.
- (c) **Diethylamine hydrochloride**
- (d) **Ammonia solution** That specified in **JIS K 8085**.
- (e) **Citric acid monohydrate** That specified in **JIS K 8283**.
- (f) **Ethanol (99.5)** That specified in **JIS K 8101**.
- (g) **Cadmium acetate dihydrate** That specified in **JIS K 8362**.

(2) Preparation method of reagent solution (absorption solution)

- (a) **Absorption solution** Take 0.2 g of copper (II) sulfate pentahydrate, dissolve it by adding water and make it 1 l in total. Transfer 10 ml of this solution into 100 ml volumetric flask, add 0.75 g of diethylamine hydrochloride, add 3-ml solution of 0.5-ml ammonia solution and 5-g citric acid monohydrate dissolved in 100-ml water and add ethanol (99.5) up to the marked line.
- (b) **Absorption solution for removing hydrogen sulfide** Dissolve 1 g of cadmium acetate into 100-ml water.

4.1.2 Devices and apparatus The devices and apparatus shall be as follows.

- (1) **Absorption bottle** Three bottles, which are 100 ml to 250 ml in capacity and illustrated in Fig. 3 (a) of **JIS K 0095**, shall be connected and used.
- (2) **Gas sampling apparatus** The apparatus shall have the construction illustrated in Fig. 2 (a) of **JIS K 0095**.

4.1.3 Sampling of gas and preparation of sample solution for analysis

- (1) **Sampling of gas** The attachment of sampling tube and introduction tube shall be in accordance with 5.1.1 of **JIS K 0095**.

The symbols of apparatus indicated herein shall be in accordance with Fig. 1.

- (a) Place 50-ml absorption solution for removing hydrogen sulfide in absorption bottle (H_1), and add 50 ml of absorption solution in each absorption bottle (H_2 and H_3).