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**INDUSTRY STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

HJ 1042-2019

**Ambient air and waste gas - Determination of trimethylamine -
Solvent absorption-Headspace/gas chromatography**

环境空气和废气 三甲胺的测定 溶液吸收-顶空气相色谱法

(English Translation)

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Foreword

In order to implement the Law of the People's Republic of China on Environmental Protection and the Law of the People's Republic of China on the Prevention and Control of Atmospheric Pollution, Environment, protect human health, standardize the determination method of trimethylamine in ambient air and exhaust gas from fixed pollution sources, and develop this standard.

This standard specifies the gas chromatography method for the determination of trimethylamine in ambient air and exhaust gas from stationary sources.

This standard is issued for the first time.

This standard is formulated by the Department of Eco-Environmental Monitoring, Laws and Standards Department of the Ministry of Ecology and Environment.

This standard was drafted. Shandong Ecological Environment Monitoring Center.

Verification units of this standard. Tianjin Ecological Environment Monitoring Center, Shandong Jinan Ecological Environment Monitoring Center, Shandong Province Fang Ecological Environment Monitoring Center, Shandong Provincial Product Quality Inspection Research Institute, Shandong Ante Testing Co., Ltd. and Shandong Yiwei Testing Ltd.

This standard was approved by the Ministry of Ecology and Environment on October 24, 2019.

This standard will be implemented from April 24, 2020.

This standard is explained by the Ministry of Ecology and Environment.

Determination of ambient air and exhaust gas trimethylamine. Solution absorption-headspace/gas chromatography Warning. The hydrochloric acid and ammonia used in the experiment are strongly irritating and corrosive. The reagent preparation process should be in a fume hood Protective equipment should be worn during operation to avoid breathing into the respiratory tract and contact with skin and clothing.

1 Scope

This standard specifies the solution absorption-headspace/gas chromatography method for the determination of trimethylamine in ambient air and exhaust gas from stationary sources.

This standard applies to trimethylamine in ambient air, air from fugitive emission monitoring points of fixed pollution sources, and organized exhaust emissions.

Determination.

When using a hydrogen flame ionization detector, when the air sampling volume is 20 L (reference state), the absorption liquid volume is 10 ml the detection limit of the method is 0.004 mg/m³, and the lower detection limit is 0.016 mg/m³. When the exhaust gas sampling volume is 20 L (standard when the volume of the absorption solution is 50 ml, the detection limit of the method is 0.04 mg/m³, and the lower limit of determination is 0.16 mg/m³.

When using a nitrogen and phosphorus detector, when the air sampling volume is 20 L (reference state) and the absorption liquid volume is 10 ml, the square the detection limit of the method is 0.0007 mg/m³, and the lower detection limit is 0.0028 mg/m³. When the exhaust gas sampling volume is 20 L (standard state), when the volume of the absorption solution is 50 ml, the detection limit of the method is 0.006 mg/m³, and the lower limit of determination is 0.024 mg/m³.

2 Normative references

This standard refers to the following documents or clauses therein. For undated references, the valid version applies to this standard.

GB 14554 Emission Standard for Odor Pollutants GB/T 16157 Determination of particulate matter and sampling of gaseous pollutants in exhaust from stationary sources HJ 194 Technical Specifications for Manual Monitoring of Ambient Air Quality HJ 905 Technical Specification for Odor Pollution Environmental Monitoring HJ/T 55 Technical guidelines for

fugitive emissions monitoring of air pollutants HJ/T 397 Fixed source exhaust gas monitoring technical specifications

3 Method principle

After the trimethylamine in the ambient air and the exhaust gas is absorbed by the dilute acid, the absorption liquid is transferred to the headspace bottle and treated with alkali. In a at a fixed temperature, trimethylamine in the sample volatilizes into the liquid space. After the two phases of gas and liquid reach thermodynamic equilibrium, the Methylamine concentration is directly proportional to the concentration in the liquid phase. Separated by gas chromatography with hydrogen flame ionization detector/nitrogen phosphorus detector Detection. Qualitatively based on retention time of chromatographic peaks and quantified by external standard method.

4 Interference and cancellation

Under the analytical conditions recommended by this method, ammonia, methylamine, dimethylamine, ethylamine, diethylamine, and triethylamine can all be combined with trimethylamine Achieve effective separation without disturbing the determination.

5 Reagents and materials

Unless otherwise specified, analytical reagents that meet national standards are used. Experimental deionized water Water or distilled water.

5.1

Sulfuric acid. $\rho(\text{H}_2\text{SO}_4) = 1.84 \text{ g/ml}$, excellent purity.

5.2

Hydrochloric acid. $\rho(\text{HCl}) = 1.189 \text{ g/ml}$, excellent grade pure.

5.3

Sodium hydroxide (NaOH). super pure.

5.4

Sodium chloride (NaCl). Burn in a muffle furnace at 400°C for 4 h before use, cool in a desiccator to room temperature, and transfer Store in ground glass bottle.

5.5

Potassium sulfate (K_2SO_4). Burn at 450°C for 4 h in a muffle furnace before use, cool in a desiccator to room temperature, and turn Move to a ground glass bottle for storage.

5.6

Ammonia water. $\rho(\text{NH}_3 \cdot \text{H}_2\text{O}) = 0.91 \text{ g/ml}$.

5.7

Trimethylamine hydrochloride. $w(\text{CH}_3)_3\text{N} \cdot \text{HCl} \geq 98\%$.

5.8

Absorption liquid. One of the following two absorption liquids can be used.

5.8.1

Sulfuric acid absorption solution. $c(\text{H}_2\text{SO}_4) = 0.06 \text{ mol/L}$.

Transfer 3.2 ml of sulfuric acid (5.1), slowly add an appropriate amount of water, cool and dilute to a 1000 ml volumetric flask.

uniform. Provisional use.

5.8.2

Hydrochloric acid absorption solution. $c(\text{HCl}) = 0.12 \text{ mol/L}$.

Take 10.0 ml of hydrochloric acid (5.2), slowly add an appropriate amount of water, cool and dilute to a 1000 ml volumetric flask.

Mix well. Provisional use.

5.9

Sodium hydroxide solution. $w(\text{NaOH}) = 50\%$.

Weigh 50 g of sodium hydroxide (5.3) and dissolve in 50 ml of water.

5.10

Trimethylamine standard stock solution. $\rho(\text{TMA}) = 100 \text{ mg/L}$.

Accurately weigh 0.1620 g of trimethylamine hydrochloride (5.7), dissolve by taking 10.00 ml of absorbent solution (5.8), and determine the volume to 1000 ml. Refrigerated below 4 °C can be stored for one month.

5.11

Trimethylamine standard solution. $\rho(\text{TMA}) = 1.00 \text{ mg/L}$.

Accurately transfer 1.00 ml of trimethylamine standard stock solution (5.10) into a 100 ml volumetric flask. Dilute with absorbing solution (5.8).

Release to scale. Refrigerated below 4 °C can be stored for one month.

5.12

Nitrogen. Purity $\geq 99.999\%$.