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**NATIONAL OCCUPATIONAL HEALTH STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

GBZ/T 300.68-2017

**Determination of toxic substances in workplace air - Part 68:
Styrene, methylstyrene and divinyl benzene
(English Translation)**

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1 Scope

This part of GB/T 300 specifies the solvent desorption-gas chromatography method for the determination of styrene, methylstyrene and divinylbenzene in the air of the workplace and the thermal desorption-gas chromatography method for the determination of styrene.

This part applies to the determination of the concentrations of vaporous styrene, methylstyrene and divinylbenzene in the air of the workplace.

2 Normative references

The following documents are essential for the application of this document. For any referenced document with a date, only the version with the date is applicable to this document. For any referenced document without a date, the latest version (including all amendments) is applicable to this document.

GBZ 159 Specifications of air sampling for hazardous substances monitoring in the workplace

GBZ/T 210.4 Guide for establishing occupational health standards - Part 4.

Determination methods of air chemicals in workplace

3 Basic information on styrene, methylstyrene and

divinylbenzene

The basic information on styrene, methylstyrene and divinylbenzene is shown in Table

1.

a) Chromatographic column. 30 mx0.32 mmx0.5 μ m, FFAP;

- b) Column temperature. 80 °C;
- c) Vaporization chamber temperature. 150 °C;
- d) Testing room temperature. 150 °C;
- e) Carrier gas (nitrogen) flow rate. 1 mL/min;
- f) Split ratio. 10.1.

4.3 Reagents

4.3.1

Carbon disulfide. No interfering peaks are found in chromatographic identification.

4.3.2

Standard solution. Add carbon disulfide to a volumetric flask, weigh it accurately, then add a certain amount of styrene and/or methyl styrene, weigh it accurately again, and make up the volume with carbon disulfide. Calculate the concentration of the solution from the difference in weight, which is the styrene and/or methyl styrene standard solution. Or prepare it with a nationally recognized standard solution.

4.4 Sample collection, transportation and storage

4.4.1

On-site sampling shall be carried out in accordance with GBZ 159.

4.4.2

Short-time sampling. At the sampling point, use an activated carbon tube to collect air samples at a flow rate of 100 mL/min for 15 minutes.

4.4.3

Long-term sampling. At the sampling point, use an activated carbon tube to collect air samples at a flow rate of 50 mL/min for 2~8 hours.

4.4.4

After sampling, immediately seal both ends of the activated carbon tube and place it in a clean container for transportation and storage. The sample can be stored in a refrigerator for 14 days.

4.4.5

Sample blank. At the sampling point, open both ends of the activated carbon tube and seal them immediately, then transport, store and measure together with the sample.

Each batch of samples shall have no less than 2 sample blanks.

4.5.1 Sample treatment. Place the front and rear section activated carbon into two

solvent desorption bottles respectively, add 1.0 mL of carbon disulfide to each, seal, and desorb for 30 minutes, shaking occasionally. The sample solution is for determination.

4.6.3 The time-weighted average exposure concentration (CTWA) in the air shall be calculated in accordance with the provisions of GBZ 159.

4.7 Description

4.7.1

This method is developed in accordance with the method and requirements of

GBZ/T 210.4. The detection limit of this method is 2.5 µg/mL, the lower limit of quantification is 8.3 µg/mL, and the quantitative determination range is 8.3 µg/mL~900

µg/mL; based on the collection of 1.5 L air sample, the minimum detection concentration is 1.7 mg/m³, and the minimum quantitative concentration is 5.5 mg/m³;

the relative standard deviation is 4.2%~5.3%, the penetration capacity (100 mg of activated carbon) is 6.9 mg, and the desorption efficiency is 79.5%. The desorption efficiency of each batch of activated carbon tubes shall be measured.

4.7.2

This method can also be used with other equivalent gas chromatographic columns.

Constant temperature measurement or programmed temperature measurement can be selected according to the measurement requirements.

5.1 Principle

The vaporous styrene in the air is collected by activated carbon, injected after thermal desorption, separated by a gas chromatography column, and detected by a hydrogen flame ionization detector. The retention time is used for qualitative analysis and the peak height or peak area is used for quantitative analysis.

5.2.1 Activated carbon tube. thermal desorption type, containing 100 mg of activated

carbon.

5.2.2 Air sampler. with a flow range of 0 mL/min ~ 500 mL/min.

5.2.3 Thermal desorber.

5.2.4 Syringe. 1 mL, 100 mL.

5.2.5 Gas chromatograph with a hydrogen flame ionization detector. Reference

operating conditions.

- a) Chromatographic column. 30 m×0.32 mm×0.5 μm, FFAP;
- b) Column temperature. 80 °C;
- c) Vaporization chamber temperature. 150 °C;
- d) Testing room temperature. 150 °C;
- e) Carrier gas (nitrogen) flow rate. 1 mL/min;
- f) Split ratio. 10:1.

5.3 Reagents

5.3.1

Styrene. At 20 °C, the mass of 1.0 μL of gas is 0.9060 mg.

5.3.2

Standard gas. Use a microsyringe to accurately extract 1.0 μL of styrene, inject it into a 100 mL airtight glass syringe, dilute it to 100.0 mL with clean air, and prepare

9.06 μg/mL standard gas. Or use a nationally recognized standard gas to prepare.

5.4 Sample collection, transportation and storage

5.4.1

On-site sampling shall be carried out in accordance with GBZ 159.

5.4.2

Short-time sampling. At the sampling point, use an activated carbon tube to collect air samples at a flow rate of 100 mL/min for 15 minutes.

5.4.3

Long-term sampling. At the sampling point, use an activated carbon tube to collect air samples at a flow rate of 50 mL/min for 2~8 hours.

5.4.4

After sampling, immediately seal both ends of the activated carbon tube and place it in a clean container for transportation and storage. The sample can be stored in a refrigerator for 14 days.