

ICS 13.100
CCS C 52



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

GBZ/T 300.61-2017

**Determination of Toxic Substances in Workplace Air - Part 61:
Butylene, 1,3-Butadiene and Dicyclopentadiene
(English Translation)**

Issued on: November 9, 2017

Implemented on: May 1, 2018

**Issued by: National Health and Family Planning Commission of the
People's Republic of China**

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1 Scope

This Part of GBZ/T 300 specifies the butylene direct injection - gas chromatography, and the 1,3-butadiene and dicyclopentadiene solvent desorption - gas chromatography in workplace air.

This Part is applicable to the detection of the concentration of butylene, 1,3-butadiene and dicyclopentadiene in the workplace air.

2 Normative References

The following documents are essential to the application of this document. For the dated documents, only the versions with the dates indicated are applicable to this document; for the undated documents, only the latest version (including all the 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 of Butylene, 1,3-Butadiene and

Dicyclopentadiene

The basic information of butylene, 1,3-butadiene and dicyclopentadiene can refer to Table 1.

b) Column temperature: 50°C;

- c) The temperature of the gasification chamber: 150°C;
- d) The temperature of the detection chamber: 150°C;
- e) Carrier gas (nitrogen) flow rate: 40mL/min.

4.3 Reagents

4.3.1

Dibutyl phthalate and beta, beta'-oxydipropionitrile, chromatographic stationary liquid.

4.3.2 6201 red carrier, 60mesh~80mesh.

4.3.3

Butylene, the mass of 1mL of gas at 20°C is 2.33mg.

4.3.4

Standard gas

Before use, fill the empty drying tube with water and put it upside down into a 500mL beaker containing water. The upper port of the drying tube is sealed with a silicone rubber pad; and a section of rubber tube is covered; take a small amount of water as water seal. Pass in pure butylene gas from the lower port of the drying tube to replace the effluent. Use a syringe to take 1.0mL of butylene through the water seal from the upper port of the drying tube. When the syringe needle is pulled out and pass the water seal, a small amount of water is drawn to seal the extracted butylene. Inject butylene into a 100mL airtight glass syringe; dilute it to 100.0mL by clean air; and prepare the butylene standard gas. Or use an airtight syringe to accurately take a certain amount of butylene; inject it into a 100mL airtight glass syringe; dilute it to

100.0mL by clean air; and prepare the butylene standard gas. Or use nationally recognized standard gas to prepare.

4.4 Collection, transportation and storage of samples

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, clean the gas sampling bag by

sample air for 3~5 times; and then collect the sample air. After sampling, immediately close the intake valve of the gas sampling bag; and place it in a clean container for transportation and storage. The sample shall be measured within 24h.

4.4.3 Sample blank: Bring the gas sampling bag to the workplace; after collecting the clean air, transport, store and measure it together with the sample. There are no less than 2 sample blanks for each batch of samples.

4.5 Analysis procedures

4.5.1

Sample processing

Put the gas sampling bag that has sampled in the laboratory of the determination standard series for determination.

5.3.4 Methylene chloride, chromatographic identification without interference peaks.

5.3.5 Standard solution: add about 2mL of methylene chloride into a 5mL volumetric

flask; and use an airtight syringe to inject a certain amount of 1,3-butadiene into the methylene chloride; and use methylene chloride to make the constant volume.

Calculate the concentration of this solution from the amount of added 1,3-butadiene;

and it is the butadiene standard solution. Or use a nationally recognized standard solution to prepare.

5.4 Collection, transportation and storage of samples

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 charcoal tube to

collect air samples for 15min at a flow rate of 200mL/min.

5.4.3 Long-time sampling: At the sampling point, use an activated charcoal tube to

collect air samples for 2h~8h at a flow rate of 50mL/min.

5.4.4 After sampling, immediately seal both ends of the activated charcoal tube and

place it in a clean container for transportation and storage. The samples can be stored in a refrigerator at 4°C for 7d.

5.4.5 Sample blank: At the sampling point, open both ends of the activated charcoal tube and immediately seal it; and then transport, store and measure together with the sample. There shall be no less than 2 sample blanks in each batch of samples.

5.5.1 Sample processing: Pour the sampled active charcoal into two solvent desorption

bottles, respectively; add 1.0mL of methylene chloride to each; after sealing, desorb for 30min; shake from time to time. The sample solution is available for determination.

5.5.2 Drawing of standard curve: Take 4~7 pieces of volumetric flasks; and use

methylene chloride to dilute the standard solution to form a standard series of 1,3-butadiene with a concentration range of 0.0 μ g/mL~620.0 μ g/mL. Refer to the operating conditions of the instrument; adjust the gas chromatograph to the best measurement state; inject a sample of 1.0 μ L; and respectively measure the peak height or peak area of each concentration of each standard series. Draw a standard curve or calculate a regression equation with the measured peak height or peak area versus the corresponding 1,3-butadiene concentration (μ g/mL); and the correlation coefficient shall be ≥ 0.999 .

5.5.3 Sample determination: Use the operating conditions for determining the standard

series to determine the sample solution and sample blank solution; and according to the measured peak height or peak area value, the concentration of 1,3-butadiene in determination. Constant temperature measurement or programmed temperature-rise measurement can be selected according to the measurement needs.

6 Dicyclopentadiene Solvent Desorption - Gas

Chromatography

6.1 Principle

The vaporized dicyclopentadiene in the air is collected by activated charcoal, and the sample is injected after carbon disulfide desorption, separated by a gas chromatographic column, and detected by a hydrogen flame ionization detector; so that retain the retention time qualitative, and peak height or peak area quantitative.

6.2.1 Activated charcoal tube, solvent desorption type, contain 100mg/50mg of activated charcoal.

6.2.2 Air sampler, the flow rate range is 0mL/min~500mL/min.

6.2.3 Solvent desorption bottle, 5mL.

6.2.4 Micro syringe.

6.2.5 Gas chromatograph equipped with hydrogen flame ionization detector.