

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

HJ 975-2018

**Solid waste - Determination of benzene and its analogies -
Headspace-gas chromatography**

固体废物 苯系物的测定 顶空-气相色谱法

(English Translation)

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Foreword

To implement the Environmental Protection Law of the People's Republic of China and the Law of the People's Republic of China on the Prevention and Control of Environmental Pollution by Solid Waste this standard is formulated to protect the ecological environment, protect human health, and regulate the determination of benzene in solid waste and its leachate.

This standard specifies the headspace-gas chromatography for the determination of benzene in solid waste and its leachate.

Appendix A of this standard is a normative appendix, and Appendix B is an informative appendix.

This standard is the first release.

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

This standard was drafted. Anshan City Environmental Monitoring Center Station.

This standard is verified by. Liaoning Provincial Environmental Monitoring Experimental Center, Shenyang Environmental Monitoring Center Station, Dalian Environmental Monitoring Center, Fushun Environmental Monitoring Center Station, Liaoyang Environmental Monitoring Station and Jinzhou Environmental Monitoring Center Station.

This standard is approved by the Ministry of Ecology and Environment on November 13, 2018.

This standard has been implemented since March 1, 2019.

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

1 Determination of solid waste benzene series by headspace-gas chromatography

Warning. The organic solvents and standard solutions used in the experiment are volatile and toxic substances. The reagent preparation and pretreatment process should be in a fume hood; wear protective equipment as required to avoid direct contact with skin and clothing.

1 Scope of application this standard specifies the headspace-gas chromatography for the determination of benzene in solid waste and its leachate.

This standard applies to solid waste and its leachate in benzene, toluene, ethylbenzene, p-xylene, m-xylene, cumene, Determination of nine benzene compounds such as o-xylene, n-propylbenzene and styrene. Other standards for benzene compounds may also be used if they are verified.

Method determination.

When the solid waste sampling amount is 2 g, the detection limit of the nine target methods is 0.004~0.006 mg/kg, the lower limit of determination.

It is 0.016~0.024 mg/kg. When the solid waste leachate sample volume is 10 ml, the method detection limit of the nine targets is 0.7~2 µg/L, the lower limit of determination is 2.8~8 µg/L. See Appendix A for details.

2 Normative references

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

HJ/T 20 Technical Specifications for Sampling and Sample Preparation of Industrial Solid Waste HJ/T 298 Hazardous Waste Identification Technical Specification HJ/T 299 solid waste leaching toxicity leaching method sulfuric acid nitric acid method HJ/T 300 solid waste leaching toxicity leaching method acetic acid buffer solution method

3 Principle of the method

At a certain temperature, the benzene series in the sample in the headspace bottle volatilizes into the upper space, generating vapor pressure and achieving thermodynamic motion.

After the state equilibrium, the benzene series in the gas phase is separated by gas

chromatography and detected by a flame ionization detector. Characterized by retention time, Quantification by external standard method.

4 Reagents and materials

Unless otherwise stated, analytically pure reagents that meet national standards were used for the analysis.

4.1

Experimental water. double distilled water or water prepared by ultrapure water meter. Need to pass a blank test before use, the target is thick the degree is below the method detection limit.

4.2

Methanol (CH_3OH). pesticide residue level or equivalent. Confirm the retention time interval of the target by blank test There is no interference peak appearing inside.

4.3

Sodium chloride (NaCl).

It was fired in a muffle furnace at 400°C for 4 h, cooled and transferred to a ground glass bottle and stored in a desiccator.

24.4 Phosphoric acid (H_3PO_4). $\rho=1.69\text{ g/ml}$, excellent grade.

4.5

Saturated sodium chloride solution.

Measure 500 ml of water (4.1), add phosphoric acid (4.4) to adjust $\text{pH} \leq 2$, add 180 g of sodium chloride (4.3), dissolve and Mix and store at 4°C or below.

4.6

Standard stock solution. $\rho = 1000\text{ mg/L}$, the solvent is methanol. Can be purchased directly from commercially available certified standard solutions, or standard Material preparation.

4.7

Standard use solution 1. $\rho = 10\text{ mg/L}$, the solvent is methanol.

4.8

Standard use solution 2. $\rho = 100\text{ mg/L}$, the solvent is methanol.

4.9

Quartz sand. $0.30\sim 0.85\text{ mm}$ (50 ~ 20 mesh).

It was fired in a muffle furnace at 400°C for 4 h, cooled and transferred to a ground glass

bottle and sealed for storage.

4.10

Carrier gas. high purity nitrogen (purity $\geq 99.999\%$).

4.11

Gas. High purity hydrogen (purity $\geq 99.999\%$).

4.12

Gas. Air.

5 Instruments and equipment

5.1

Gas Chromatograph. with capillary column split/splitless inlet, programmable temperature, flame ionization detector (FID).

5.2

Column. Quartz capillary column, 30 m x 0.32 mm x 0.25 m (polyethylene glycol 20M), can also be used it is equivalent to a capillary column.

5.3

Headspace sampler. The temperature control range of the furnace is between room temperature and 120 °C; the temperature control accuracy is ± 1 °C.

5.4

Reciprocating Oscillator. The oscillation frequency is 50~250 times/min, and the oscillation amplitude is 20 mm.

5.5

Balance. The sensitivity is 0.01 g.

5.6

Sampling bottle. 60 ml or 200 ml threaded brown wide-mouth glass bottle with Teflon/silica gel liner screw cap.

5.7

Sampling equipment. shovel and stainless steel medicine spoon.

5.8

Portable refrigerator.

5.9

Microinjectors. 5 μl , 10 μl , 25 μl , 100 μl , 500 μl , 1000 μl .