

ICS 13.100
CCS C 60



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

GBZ/T 300.163-2018

**Determination of toxic substances in workplace air -- Part 163:
Toluene diisocyanate**

工作场所空气有毒物质测定 第163部分：甲苯二异氰酸酯

(English Translation)

Issued on: July 16, 2018

Implemented on: July 1, 2019

Issued by: National Health and Family Planning Commission

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Foreword

This part is the 163th part of GBZ/T 300 "Measurement of Toxic Substances in Workplace Air".

This part is drafted in accordance with the rules given in GB/T 1.1-2009.

This section is mainly drafted by. Shanghai Chemical Occupational Disease Prevention and Control Institute, Zhejiang Provincial Center for Disease Control and Prevention, Shanghai Disease Prevention and Control center.

1 Scope

This part of GBZ/T 300 specifies the measurement of impregnated filter paper for the determination of toluene diisocyanate (TDI) in the workplace air - high performance liquid phase Chromatography.

This section applies to the detection of toluene diisocyanate concentration in the workplace air.

2 Normative references

The following documents are indispensable for the application of this document. For dated references, only the dated version applies to this document.

For undated references, the latest edition (including all amendments) applies to this document.

GB/T 6682 Analytical laboratory water specifications and test methods GBZ 159 Sampling specification for monitoring of hazardous substances in the workplace air Basic information on 3 toluene diisocyanate the basic information of toluene diisocyanate is shown in Table 1.

Table 1 Basic information of toluene diisocyanate

Chemical material

Chemical Abstracts

(CAS number)

Molecular formula relative molecular mass Toluene-2,4-diisocyanate
(Toluene-2,4-diisocyanate, 2,4-TDI) 584-84-9 C₉H₆N₂O₂ 174.15 Toluene-2,6-diisocyanate
(Toluene-2,6-diisocyanate, 2,6-TDI) 91-08-7

4 Impregnated filter paper collection of toluene diisocyanate - high performance liquid chromatography

4.1 Principle

Reaction of toluene diisocyanate (TDI) in air with 1-(2-pyridyl)piperazine (1-2PP) on impregnated filter paper to form TDI-urea derivatives it is adsorbed on the filter paper, and after elution and filtration, it is determined by high performance liquid chromatography, and the retention time is qualitative, and the peak height or the peak area is quantified.

4.2 Instrument

4.2.1

Glass fiber filter paper with a pore size of 0.8 μm and a diameter of 37 mm or 40 mm.

4.2.2

Impregnated filter paper. In the fume hood, spread the glass fiber filter paper on a clean flat carrier and add 0.50 mL to the center of the filter paper.

1-2PP solution A, the solution should be saturated with the entire filter paper. After being placed for 30 minutes, it should be stored in a sealed dark container and stored in an environment of 2 ° C to 8 ° C.

One month.

4.2.3

Sampling clamp, filter material diameter is 37 mm or 40 mm.

4.2.4

Air sampler, flow rate 0.1 L/min ~ 5.0 L/min.

4.2.5

Plug-in test tube, 5 mL or 10 mL.

4.2.6

Microinjector, 10 μ L or 100 μ L.

4.2.7

Organic phase needle filter with a pore size of 0.45 μ m.

4.2.8

Analytical balance with an accuracy of 0.00001 g and 0.001 g.

4.2.9

High performance liquid chromatograph equipped with UV detector or diode array detector, instrument operation reference conditions.

a) Column. C18 column, 250 mm x 4.6 mm x 5 μ m, or other LC column with similar separation performance;

b) mobile phase. acetonitrile. ammonium acetate solution = 40:60 (volume ratio);

c) Measurement wavelength. 254 nm;

d) Flow rate. 1.0 mL/min;

e) Column temperature. 30 $^{\circ}$ C;

f) Injection volume. 20 μ L.

4.3 Reagent materials

4.3.1

Unless otherwise specified, the reagents used were of analytical grade. The water is the first grade water specified in GB/T 6682.

4.3.2

Acetonitrile. chromatographically pure.

4.3.3

Dichloromethane.

4.3.4

Dimethyl sulfoxide.

4.3.5

Ammonium acetate.

4.3.6 1-(2-Pyridyl)piperazine (1-2PP). purity $\geq$ 98%.

4.3.7

Eluent. Measure 10 mL of dimethyl sulfoxide and pour into 90 mL of acetonitrile and mix.

4.3.8

Ammonium acetate solution (0.02 mol/L). Weigh 1.540 g of ammonium acetate, dissolve in water, and dilute to 1000 mL, and mix.

4.3.9 1-2PP solution A (2.0 mg/mL). Weigh 0.200 g of 1-2PP and dissolve it in 100 mL of dichloromethane.

4.3.10 1-2PP solution B (10.0 mg/mL). Weigh 0.100 g of 1-2PP and dissolve it in 10 mL of acetonitrile.

4.3.11

Toluene-2,4-diisocyanate (2,4-TDI). purity $\geq$ 98%.

4.3.12

Toluene-2,6-diisocyanate (2,6-TDI). purity $\geq$ 98%.

4.3.13

Standard solution. accurately weigh the appropriate amount of 2,4-TDI or 2,6-TDI into a brown volumetric flask, dissolve it with acetonitrile and prepare a concentration of about 2.0.

The mg/mL 2,4-TDI or 2,6-TDI standard stock solution can be stored for one week in the dark at 2 °C ~ 8 °C. Dilute with acetonitrile before use the standard solution was mixed with 250 µg 2,4-TDI and 250 µg 2,6-TDI per ml. Or formulated with a nationally recognized standard solution.

4.4 Sample collection, transportation and storage

4.4.1

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

4.4.2

Short-time sampling. At the sampling point, use the sampling clamp with the impregnated filter paper to collect the sample at a fixed point sampling rate of 1 L/min for 15 min.

Air sample.

4.4.3

Long-time sampling. At the sampling point, use the sampling clamp with the impregnated filter paper, and use the fixed point or individual sampling method, 1 L/min flow rate.