

ICS 13.040.20  
CCS Z 15

**HJ**

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

**HJ 1044-2019**

---

**Ambient air - Automatic determination of sulfur dioxide -  
Ultraviolet fluorescence method**

环境空气 二氧化硫的自动测定 紫外荧光法

**(English Translation)**

**Issued on: January 1, 1970**

**Implemented on: April 24, 2020**

---

**Issued by: Ministry of Ecology and Environment**

## Table of Contents

|                                             |
|---------------------------------------------|
| Foreword                                    |
| 1 Scope                                     |
| 2 Normative references                      |
| 3 Methodology                               |
| 4 Interference and cancellation             |
| 5 Reagents and materials                    |
| 6 Instruments and equipment                 |
| 7 Analysis steps                            |
| 8 Calculation and Representation of Results |
| 9 Precision and accuracy                    |
| 10 Quality Assurance and Quality Control    |
| 11 Notes                                    |

### Foreword

In order to implement the "Environmental Protection Law of the People's Republic of China" Environment, protect human health, standardize the automatic determination method of sulfur dioxide in ambient air, and formulate this standard.

This standard specifies the ultraviolet fluorescence method for automatic determination of sulfur dioxide in ambient air.

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. Dalian Ecological Environment Monitoring Center, Liaoning Province.

Verification units of this standard. Harbin Environmental Monitoring Center Station, Hangzhou Environmental Monitoring Center Station, Anshan Ecology, Liaoning Province Environmental Monitoring Center, Guangzhou Environmental Monitoring Center Station, Shenyang Ecological Environment Monitoring Center in Liaoning Province and Qingdao Ecological Environment Center in Shandong Province Environmental Monitoring Center.

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.

Automatic determination of sulfur dioxide in ambient air by ultraviolet fluorescence method  
WARNING. Sulfur dioxide is a toxic gas. Prevent leakage during operation and do protective work as required.

## 1 Scope

This standard specifies the ultraviolet fluorescence method for automatic determination of sulfur dioxide in ambient air.

This standard applies to the automatic determination of sulfur dioxide in ambient air.

When the measuring range of the instrument is (0 to 500) nmol/mol, the detection limit of this method in the reference state is 3 µg/m<sup>3</sup>.

The lower limit is 12 µg/m<sup>3</sup>; the detection limit of the method under standard conditions is 3 µg/m<sup>3</sup>, and the lower detection limit is 12 µg/m<sup>3</sup>.

## 2 Normative references

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

HJ 193 Ambient air gaseous pollutants (SO<sub>2</sub>, NO<sub>2</sub>, O<sub>3</sub>, CO) continuous automatic monitoring system installation and acceptance technology specification  
HJ 654 Ambient air gaseous pollutants (SO<sub>2</sub>, NO<sub>2</sub>, O<sub>3</sub>, CO) continuous automatic monitoring system technical requirements and inspection Test method  
HJ 663 Technical Specification for Ambient Air Quality Evaluation (Trial)  
HJ 818 Ambient air gaseous pollutants (SO<sub>2</sub>, NO<sub>2</sub>, O<sub>3</sub>, CO) continuous automatic monitoring system operation and quality control technology Technical specifications

## 3 Method principle

The sample air enters the instrument reaction chamber through the particulate filter at a constant flow rate, and the sulfur dioxide molecules are affected by the wavelength Excited sulphur dioxide molecules are generated after exposure to ultraviolet light at 200 nm to 220 nm, and the wavelength is emitted during the return to the ground state for 240 nm to 420 nm fluorescence, the concentration of sulfur dioxide in the sample air is proportional to the fluorescence intensity within a certain concentration range.

## 4 Interference and cancellation

### 4.1

When the sample air contains 2155  $\mu\text{g}/\text{m}^3$  methane, it will affect the measurement result of sulfur dioxide by 3  $\mu\text{g}/\text{m}^3$ . It is normal the interference of methane in the ambient air is negligible.

### 4.2

When the sample air contains 6939  $\mu\text{g}/\text{m}^3$  hydrogen sulfide, the effect on the sulfur dioxide measurement result is not higher than 1  $\mu\text{g}/\text{m}^3$ , which is normal.

The interference of hydrogen sulfide in the ambient air is negligible.

### 4.3

When the sample air contains 123  $\mu\text{g}/\text{m}^3$  of nitric oxide, it will affect the measurement result of sulfur dioxide by 3  $\mu\text{g}/\text{m}^3$ , which is normal.

The interference of nitric oxide in the ambient air is negligible.

### 4.4

When the sample air contains aromatic hydrocarbons, it will affect the measurement result of sulfur dioxide and can be removed by a hydrocarbon remover.

## 5 Reagents and materials

### 5.1

Zero gas. Zero gas is generated by a zero gas generating device, and can also be provided by a zero gas cylinder. The performance index of zero gas should meet HJ 654 Requirements. If synthetic air is used, the oxygen concentration shall be  $(20.9 \pm 2.0)\%$  of the synthetic air.

### 5.2

Standard gas. Certified reference material of sulfur dioxide, the unit is  $\mu\text{mol}/\text{mol}$ .

### 5.3

Filter membrane. The material is polytetrafluoroethylene, and the pore size is  $\leq 5 \mu\text{m}$ .

## 6 Instruments and equipment

### 6.1

Injecting pipeline. should be polytetrafluoroethylene, fluorinated polyethylene propylene, stainless steel that does not chemically react with sulfur dioxide or borosilicate glass.

## 6.2

Particulate matter filter. installed between the sampling manifold and the instrument inlet. Particle filter other than the filter membrane it should be polytetrafluoroethylene, fluorinated polyethylene propylene, stainless steel or borosilicate glass that does not react with sulfur dioxide and other materials. The instrument does not require an external particulate filter if it has a built-in particulate filter.

## 6.3

Sulfur dioxide analyzer. The performance index shall meet the requirements of HJ 654. The sulfur dioxide measurement system is shown in Figure 1.

1-air inlet; 2-roof; 3-fan; 4-dehumidifying device; 5-injection pipeline; 6-way valve; 7-zero gas; 8-standard gas; 9- particulate filter;

10-Sulfur dioxide analyzer; 11-Hydrocarbon remover; 12-Reaction chamber; 13-Signal output; 14-Flow controller; 15-Pump; 16-Evacuation port;

17-Data output.

Figure 1 Schematic diagram of sulfur dioxide measurement system

## 7.1 Installation and commissioning of the instrument

After the newly purchased instrument is installed, various parameters should be set and debugged according to the operation manual. Debugging indicators include zero noise, Minimum detection limit, range noise, indication error, range accuracy, 24 h zero point drift and 24 h range drift.

The detection methods and indicators are implemented in accordance with HJ 193.

## 7.2 Inspection

During the operation of the instrument, zero point check, range check and linearity check are required. The inspection method is in accordance with the appendix of HJ 818.

Record B is executed. If the inspection results are unsatisfactory, the instrument needs to be calibrated and repaired if necessary.

After the instrument is repaired, perform a linear check and recalibrate the instrument.

### 7.3.1 Determine instrument range

Instrument range should be determined according to the actual concentration of sulfur dioxide in different seasons. When the sulfur dioxide concentration is below the range at 20%, a lower range should be selected.