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

HJ 590-2010

Replacing GB/T 15438-1995

**Ambient air. Determination of ozone. Ultraviolet photometric
method**

环境空气 臭氧的测定 紫外分光光度法 含2018年第1号修改单

(English Translation)

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Foreword

In order 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 Air Pollution, protect the environment and protect people this standard is formulated for the health of the body and the monitoring method for the regulation of ozone in the ambient air.

This standard specifies the ultraviolet photometric method for the determination of ozone in ambient air.

This standard is a revision of the "Measurement of Ambient Air Ozone by Ultraviolet Spectrophotometry" (GB/T 15438-1995).

This standard was first published in 1995. The original standard drafting unit was the Anshan Environmental Monitoring Center Station. This is the first revision. Revision the main contents are.

- Revised the scope of application of ozone determination in air and its reference conditions.
- Revised the "Interference and Elimination" clause.
- The physical meaning of the representatives in the formula $\ln(I/I_0) = -\alpha \cdot d$ is clearly defined. The formula for calculating the ozone concentration has been increased.
- Added terms and definitions.
- Added quality assurance and quality control provisions.
- Supplementary and complete the technical conditions and precautions for testing.
- Added requirements and confirmation steps for zero air quality.
- Added Appendix B, Appendix C and Appendix D.

Appendix A and Appendix B of this standard are normative appendices, and Appendix C and Appendix D are informative appendices.

From the date of implementation of this standard, the national environmental protection standard "Environment" approved and issued by the former National Environmental Protection Agency on March 25, 1995 Determination of air ozone by ultraviolet spectrophotometry (GB/T 15438-1995) abolished.

This standard is revised by the Science and Technology Standards Department of the Ministry of Environmental Protection.

This standard is mainly drafted by. Shenyang Environmental Monitoring Center Station.

This standard was approved by the Ministry of Environmental Protection on October 21, 2010.

This standard has been implemented since January 1, 2011.

This standard is explained by the Ministry of Environmental Protection.

Determination of ambient air ozone by ultraviolet photometry WARNING. This method requires the use of toxic gaseous ozone. The ultimate concentration of ozone in the laboratory is 200 µg/m³. Excess ozone it should be drained into the activated carbon scrubber or outdoors and away from the sampling inlet.

1 Scope of application

This standard specifies the ultraviolet photometric method for the determination of ozone in ambient air.

This standard applies to the instantaneous determination of ozone in ambient air, and also to the continuous automatic monitoring of ozone in ambient air.

This standard applies to the determination of ozone in the ambient air concentration range of 0.003 ~ 2 mg/m³.

2 Terms and definitions

The following terms and definitions apply to this standard.

Zero air zero air

Refers to air that is free of ozone, nitrogen oxides, hydrocarbons, and any other substances that can cause ultraviolet absorption by the ozone analyzer. Zero space See Appendix A for methods and acceptance criteria for gas quality.

Pass standard transfer standard Refers to the ambient ozone that can be used to calibrate after calibration with an ozone standard reference photometer (SRP) or an ultraviolet calibration photometer (6.2.1).

The analyzer delivers the working standard of accuracy. As a standard for the delivery of ozone, at least standard reference photometer or UV calibration luminosity should be used every 6 months.

Calibrate once.

3 Principle of the method

When the sample air enters the instrument's pneumatic system through the dehumidifier and particulate filter at a constant flow rate, it is divided into two paths, one for the sample.

The air, all the way through the selective ozone scrubber becomes zero air, the sample air and zero air alternately enter the sample absorption under the control of the solenoid valve the pool (or into the sample absorption and reference cells, respectively), ozone has characteristic absorption of ultraviolet light at a wavelength of 253.7 nm. Set zero air through absorption the light intensity detected at the time of the pool is I_0 , and the light intensity detected when the sample air passes through the absorption pool is I , then I/I_0 is the light transmittance. Microprocessor of the instrument According to the Lambert-Beer law formula (1), the ozone concentration is calculated from the light transmittance.

$\ln(I/I_0) = -\alpha c d$ (1) where. I/I_0 - the transmittance of the sample, that is, the ratio of the light intensity of the sample air to zero air;

ρ --the mass concentration of ozone under the temperature of sampling temperature, $\mu\text{g}/\text{m}^3$;

D --the optical path of the absorption cell, m;

A --the absorption coefficient of ozone at 253.7 nm, $a=1.44 \times 10^{-5} \text{ m}^2/\mu\text{g}$.

4 Interference and elimination

Contaminants with a mass concentration of less than $0.2 \text{ mg}/\text{m}^3$, which are common in ambient air, do not interfere with the determination of ozone. But when the air is oxidized when the mass concentrations of nitrogen and sulfur dioxide are $0.94 \text{ mg}/\text{m}^3$ and $1.3 \text{ mg}/\text{m}^3$, respectively, the determination of ozone yields approximately $2 \mu\text{g}/\text{m}^3$ and 8 respectively.

Positive interference of $\mu\text{g}/\text{m}^3$.

If the particles in the air are not removed, it may accumulate ozone in the sampling line, making the measurement result low, adding particles.

The filter can be removed.

During the residence of the sample air in the sampling line, the nitric oxide and the ozone will react to some extent.

For calibration see Appendix B of this standard.

The interference of other compounds on the UV Ozone Meter is given in Appendix C of this standard.

5.1 Sampling pipeline

The sampling line shall be made of an inert material such as glass or polytetrafluoroethylene that does not chemically react with ozone.

Note: In order to shorten the residence time of the sample air in the pipeline, short sampling lines should be used as much as possible. Experiments show that if the sample air stays in the pipeline Less than 5 s between, the ozone loss is less than 1%.

5.2 Particulate filter

The filter is composed of a filter membrane and a support thereof, and the material thereof is an inert material such as polytetrafluoroethylene which does not chemically react with ozone.

Note: 1 The membrane is made of Teflon with a pore size of $5 \mu\text{m}$. 2 Generally, the new filter membrane needs to be equilibrated by the ambient air for a period of time to obtain a stable reading.