

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

HJ 973-2018

**Stationary source emission - Determination of carbon
monoxide - Fixed potential by electrolysis method**

固定污染源废气 一氧化碳的测定定电位电解法

(English Translation)

Issued on: January 1, 1970

Implemented on: January 1, 1970

Issued by: Ministry of Ecology and Environment

Table of Contents

Foreword

1 Scope of application

2 Normative references

3 Terms and definitions

4 Principle of the method

5 Interference and elimination

6 Reagents and materials

6.1 Carbon monoxide standard gas

6.2 Zero gas

7 Instruments and equipment

7.1 Constant potential electrolysis carbon monoxide analyzer

Foreword

To protect the "Environmental Protection Law of the People's Republic of China" and the "Air Pollution Control Law of the People's Republic of China" this standard is formulated to ensure the health of human body and to regulate the determination of carbon monoxide in waste gas from fixed sources.

This standard specifies a potentiometric electrolysis method for the determination of carbon monoxide in a fixed source of exhaust gas.

The concentration in this standard refers to the mass concentration or volume fraction.

Appendix A of this standard is an informative annex.

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. Shandong Environmental Monitoring Center Station, Shandong University.

This standard is verified by. Tianjin Ecological Environment Monitoring Center, Hebei Environmental Monitoring Center, and Nanjing Environmental Monitoring Xinzhan, Jinan Environmental Monitoring Center Station, Liaocheng Environmental Monitoring Center, Zouping County Environmental Monitoring 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 carbon monoxide in fixed source pollution - Determination of potentiometric electrolysis

1 Scope of application

This standard specifies a potentiometric electrolysis method for the determination of carbon monoxide in a fixed source of exhaust gas.

This standard applies to the determination of carbon monoxide in fixed source pollution.

The detection limit of this standard is 3 mg/m³, and the lower limit of determination is 12 mg/m³.

2 Normative references

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

GB/T 16157 Determination of particulate matter in fixed pollution source exhaust gas and sampling method of gaseous pollutants HJ/T 373 Technical Specifications for Quality Assurance and Quality Control of Fixed Pollution Source Monitoring (Trial) HJ/T 397 Fixed Source Exhaust Gas Monitoring Technical Specification

3 Terms and definitions

The following terms and definitions apply to this standard.

Zero gas

There is no measurement component or less than the specified value, other component concentration does not interfere with the measurement component result or the resulting measurement component is dry Disturbing negligible gases.

Calibration span

The upper limit of the calibration of the instrument is the concentration value of the standard gas used for calibration. (For multi-point calibration, the standard gas used for calibration) the highest mass concentration value of the body), the calibration range (indicated by CS below) should be less than or equal to the full scale of the instrument.

Calibration error

The standard gas is directly introduced into the error between the analyzer's measurement and the standard gas concentration.

System bias

The difference between the direct introduction of the standard gas into the analyzer and the measurement result of the sample tube into the analyzer, which is the calibration range percentage.

Zero drift

Before and after the test, the difference between the analyzer and the same zero gas measurement is the percentage of the calibration range.

23.6

Range drift

Before and after the test, the difference between the analyzer's measurement results for the same concentration of standard gas, as a percentage of the calibration range.

4 Principle of the method

The sample is taken into a pass consisting mainly of an electrolytic cell, an electrolyte and an electrode (sensitive electrode, reference electrode and counter electrode) Sensor. Carbon monoxide diffuses through the permeable membrane to the surface of the sensitive electrode, and an oxidation reaction occurs on the sensitive electrode.

eHCOOHCO 242 232 -

This results in a limit diffusion current (i). Under the specified working conditions, the number of electron transfer (Z), Faraday constant (F), the gas diffusion area (S), the diffusion coefficient (D), and the thickness of the diffusion layer (δ) are constant, and the limit is expanded within a certain range.

The magnitude of the scattered current (i) is proportional to the concentration of carbon monoxide (c), so the oxygen can be determined from the ultimate diffusion current (i).

Carbon concentration (c).

DSFZ

$i \propto c \dots (1)$

5 Interference and elimination

5.1

Particles, moisture, etc. in the gas to be tested are likely to condense on the surface of the sensor permeable membrane and cause damage to the sensor, affecting one

Determination of carbon oxide; filtration should be carried out using a dust filter device or a dehumidification device to eliminate the influence.

5.2

Hydrogen has a significant interference with the determination of carbon monoxide. The carbon monoxide sensor installed in the analyzer should have anti-hydrogen interference function.

5.3

Acid gas interferes with the determination of the sample. The analyzer should be filtered with a built-in chemical filter to eliminate the effect.

5.4

Ethylene interferes with the determination of the sample. When determining the sample gas containing ethylene concentration exceeding 100 $\mu\text{mol/mol}$, it should be used with caution.

This standard.

6.1 Carbon monoxide standard gas

Commercially available certified standard gas, uncertainty $\leq 2\%$.

6.2 Zero gas

Nitrogen with a purity of $\geq 99.99\%$ or clean air that does not interfere with the measurement.

37.1.1 Composition

Constant potential electrolysis carbon monoxide analyzer (abbreviation. analyzer or instrument) consists of. analyzer (including gas flow meter and Control unit, pump, sensor, etc.), sampling tube (including dust filter, etc.), air duct, dehumidifier, portable Printing machine, etc.

7.1.2 Performance requirements

a) indication error. no more than $\pm 5\%$ (standard gas concentration value 8 sampling and determination

8.1 Determination of sampling points and sampling frequency According to GB/T 16157, HJ/T 373 and HJ/T 397 and relevant regulations, the sampling position, sampling point and frequency are determined.

8.2 Tester air tightness check According to the instruction manual of the instrument, connect the analyzer, sampling tube, air tube, etc. correctly, and then press the working condition of the instrument.