

ICS 75.060
CCS E 24



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

GB/T 11060.4-2017

**Natural gas -- Determination of sulfur compound -- Part 4:
Determination of total sulfur content by oxidative
micro-coulometry method
(English Translation)**

Issued on: December 29, 2017

Implemented on: July 1, 2018

**Issued by: General Administration of Quality Supervision, Inspection and
Quarantine**

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Foreword

GB/T 11060 "Natural gas - Determination of sulfur compound" is divided into the following 12 parts.

- Part 1. Determination of hydrogen sulfide content by iodometric titration method;
- Part 2. Determination of hydrogen sulfide content by methylene blue method;
- Part 3. Determination of hydrogen sulfide content by lead acetate reaction rate dual photo path method;
- Part 4. Determination of total sulfur content by oxidative microcoulometry method;
- Part 5. Determination of total sulfur content by hydrogenolysis and rateometric colorimetry method;
- Part 6. Determination of hydrogen sulfide, mercaptan sulfur and carbonyl sulfide sulfur by potentiometry;
- Part 7. Determination of total sulfur content by Lingener combustion method;
- Part 8. Determination of total sulfur content by ultraviolet fluorescence

method;

- Part 9. Determination of mercaptan sulfur content by iodometric titration

method;

- Part 10. Determination of sulfur compounds using gas chromatography

method;

- Part 11. Determination of mercaptan sulfur content by iodometric titration

method;

- Part 12. Determination of hydrogen sulfide content by laser absorption spectroscopy.

This part is part 4 of GB/T 11060.

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

This part is an amendment to GB/T 11060.4-2010 "Natural gas - Determination of sulfur compound - Part 4. Determination of total sulfur content by oxidative microcoulometry method". As compared with GB/T 11060.4-2010, in addition to editorial changes, the main technical changes of this part are as follows.

Natural gas - Determination of sulfur compound -

Part 4. Determination of total sulfur content by
oxidative microcoulometry method

Warning - This part does not cover all safety issues related to its application. Before using this part, the user is responsible for formulating corresponding safety and protection measures, and defining the scope of application.

1 Scope

This part of GB/T 11060 specifies the test method of using the microcoulometry method for the determination of total sulfur in natural gas.

This part applies to the determination of total sulfur in natural gas. The measurement range is 1 mg/m³ ~ 200 mg/m³, and the measurement range can be extended to higher concentrations by dilution.

2 Normative references

The following documents are essential to the application of this document. For the dated documents, only the versions with the dates indicated are applicable to this document; for the undated documents, only the latest version (including all the amendments) are applicable to this standard.

GB/T 6682 Water for analytical laboratory use - Specification and test methods (GB/T 6682-2008, ISO 3696.1987, MOD)

GB/T 8170 Rules of rounding off for numerical values & expression and judgement of limiting values

GB/T 13609 Natural gas sampling guidelines (GB/T 13609-2017, ISO 10715.1997, MOD)

3 Test principles

Sulfur-containing natural gas is mixed and combusted with oxygen in a quartz conversion tube, the sulfur is converted into sulfur dioxide, which enters the titration tank with nitrogen and reacts with iodine. Iodine consumed is supplemented by electrolytic potassium iodide. In accordance with the Faraday's law of electrolysis, the amount of sulfur in the sample is calculated from the amount of electricity consumed by the electrolysis and calibrated with a gas reference material.

4.6 Gas reference materials. It is recommended to use the hydrogen sulfide gas reference material in methane or nitrogen, or use the thiocarbon-oxygen gas reference material in methane or nitrogen, which has certificate or analysis report. The sulfur content of the gas reference material is as close as possible to the sulfur concentration in the sample to be measured.

5.1 Converter. it has three separate heating stage (combustion stage, preheating stage and outlet stage) or one heating stage (combustion stage).

5.2 Titration cell. A pair of electrolysis electrodes and a pair of indication

reference electrodes are inserted in the cell.

5.3 Microcoulometer. When sulfur dioxide enters the titration cell and the

concentration of iodine in the cell is reduced, it can automatically (or manually) perform contact electrolysis, to restore the iodine to its original level, automatically record the electrolysis time and current, finally display the sulfur content directly. The microcoulometer shall have a clear response to 1 ng of sulfur.

5.8 Medical syringes. 0.25 mL, 1 mL, 2 mL and 5 mL each, which shall have a

ascertained, and re-measurement shall be performed.

7.1.1 Sampling from natural gas pipelines

It is performed in accordance with GB/T 13609.

7.1.2 Sampling from gas cylinder

USE the sample to rinse the syringe for 3 to 5 times before formal sampling. During sampling, it shall use the gas pressure in the bottle to push the syringe core to the desired scale, then insert the instrument inlet, so that the sample enters within 3 s ~ 5 s. The injection volume should be controlled between 0.25 mL ~ 5 mL.

7.1.3 Sampling from airbags

USE the sample to rinse the syringe for 3 to 5 times before formal sampling. During sampling, it shall press the airbag to use the gas pressure in the airbag to push the syringe core to the desired scale, then insert the instrument inlet, so that the sample enters within 3 s ~ 5 s. The injection volume should be controlled between 0.25 mL ~ 5 mL.