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**Natural gas — Determination of  
mercury —**

Part 2:

**Sampling of mercury by amalgamation on  
gold/platinum alloy**

*Gaz naturel — Détermination de la teneur en mercure —*

*Partie 2: Échantillonnage du mercure par amalgamation sur alliage  
or/platine*



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## Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 6978-2 was prepared by Technical Committee ISO/TC 193, *Natural gas*, Subcommittee SC 1, *Analysis of natural gas*.

This first edition of ISO 6978-2, together with ISO 6978-1, cancels and replaces ISO 6978:1992, which has been technically revised.

ISO 6978 consists of the following parts, under the general title *Natural gas — Determination of mercury*:

- *Part 1: Sampling of mercury by chemisorption on iodine*
- *Part 2: Sampling of mercury by amalgamation on gold/platinum alloy*

## Introduction

Natural gases may contain considerable amounts of mercury, which are generally present in the elemental form. Gases with high mercury content have to be purified to avoid the condensation of mercury during processing and transport as well as to be compliant with the demands of gas sales contracts. Low mercury concentrations are specified when natural gas is to be liquefied. This is to avoid severe corrosion problems, for instance in aluminium heat exchangers of liquefaction plants.

Since the presence of hydrocarbons, in particular aromatic hydrocarbons present in low concentrations in almost every natural gas, interferes in the determination of mercury by atomic absorption spectrometry (AAS) or atomic fluorescence spectrometry (AFS), mercury cannot be determined directly in natural gas. Therefore, prior to the analytical determination, mercury has to be collected and separated from aromatic hydrocarbons.

The purpose of the determination of the mercury content can be

- to monitor gas quality,
- to monitor the operation of gas treatment plants for mercury removal.

Several methods for the collection or enrichment of mercury from natural gas have been developed. The collection of mercury from dry natural gas normally poses no particular problem. However, care should be taken when sampling mercury from natural gases under nearly condensing conditions (see ISO 6570).

The two parts of ISO 6978 describe the principles of sampling and specify the general requirements for methods for sampling mercury and for determining total mercury in pipeline quality natural gas. This part of ISO 6978 specifies a method of sampling mercury by amalgamation on gold/platinum alloy thread whereas Part 1 specifies a method of sampling mercury by chemisorption on iodine-impregnated silica gel.

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# Natural gas — Determination of mercury —

Part 2:

## Sampling of mercury by amalgamation on gold/platinum alloy

**WARNING** — The use of this part of ISO 6978 may involve hazardous materials, operations and equipment. This part of ISO 6978 does not purport to address all of the safety problems, associated with its use. It is the responsibility of the user of this part of ISO 6978 to establish appropriate safety and health practices and to determine the applicability or regulatory limitations prior to use.

### 1 Scope

This part of ISO 6978 specifies a method for the determination of total mercury content of pipeline quality natural gas using a sampling method by amalgamation on gold/platinum (Au/Pt) alloy thread. This method is applicable to the sampling of raw natural gas when no condensation is present. At atmospheric pressure, this method is suitable for the determination of mercury content within the range of  $0,01 \mu\text{g}/\text{m}^3$  to  $100 \mu\text{g}/\text{m}^3$  in natural gas samples. At higher pressures (up to 8 MPa), this sampling method is suitable for the determination of mercury contents within the range of  $0,001 \mu\text{g}/\text{m}^3$  to  $1 \mu\text{g}/\text{m}^3$ . The collected mercury is determined by measuring the absorbance or fluorescence of mercury vapour at 253,7 nm.

**NOTE** ISO 6978-1 gives a sampling method suitable for the determination of mercury contents in natural gas by chemisorption on iodine-impregnated silica gel for the working range of  $0,1 \mu\text{g}/\text{m}^3$  to  $5\,000 \mu\text{g}/\text{m}^3$  for sampling at pressures up to 40 MPa.

### 2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 10715, *Natural gas — Sampling guidelines*

ISO 14532, *Natural gas — Vocabulary*

*Guide to the expression of uncertainty in measurement (GUM)*, BIPM, IEC, IFCC, ISO, IUPAC, IUPAP, OIML

### 3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 14532 apply.

### 4 Principle

Sampling is performed at a temperature at least  $10 \text{ }^\circ\text{C}$  higher than the dewpoint of the gas sampled. The gas is passed through two quartz glass sampling tubes in series containing fine gold/platinum alloy thread. The mercury is collected on the gold/platinum alloy thread by amalgamation. Subsequently, each sampling tube is separately heated to  $700 \text{ }^\circ\text{C}$  to desorb the mercury from the amalgam. The released mercury is transferred by