INTERNATIONAL STANDARD

ISO 6978

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Natural gas — Determination of mercury

Gaz naturel — Détermination de la teneur en mercure

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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.

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.

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

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Natural gas — Determination of mercury

WARNING — Mercury presents a health hazard if incorrectly handled. Avoid prolonged inhalation of the vapour. Spillages of mercury should be removed immediately, even from places which are difficult to access.

1 Scope

This International Standard specifies two methods, A and B, for the determination of mercury, including elemental mercury, dimethyl mercury and diethyl mercury, in natural gas.

Method A prescribes sampling at atmospheric pressure, using absorption in potassium permanganate solution followed by reduction of mercury ions and subsequent analysis by flameless atomic absorption spectrometry. The lower detection limit is 0,05 $\mu g/m^3$ for a sampling time of 2 h. Aromatic hydrocarbons may interfere. If aromatic hydrocarbons are present, method B is recommended.

Method B prescribes sampling at atmospheric or higher pressure using adsorption of mercury on silver/gold followed by desorption and subsequent analysis by flameless atomic absorption spectrometry. The lower detection limit is 3×10^{-4} $\mu g/m^3$ at a minimum pressure of 3 MPa (30 bar) and for a sampling time of 2 h.

Method A is recommended for natural gases with a high mercury content ($> 0,5$ $\mu g/m^3$) while method B is preferred for lower mercury concentrations (10^{-3} $\mu g/m^3$ to 1 $\mu g/m^3$).

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 641:1975, *Laboratory glassware — Interchangeable spherical ground joints.*

ISO 3696:1987, *Water for analytical laboratory use — Specification and test methods.*

ISO 4793:1980, *Laboratory sintered (fritted) filters — Porosity grading, classification and designation.*

3 Principle

3.1 Method A: Determination of mercury by sampling at atmospheric pressure

The gas is passed through a gas washing bottle filled with a potassium permanganate-sulfuric acid solution. The mercury present in the gas is oxidized to mercury(II) ions. The excess of permanganate is reduced by a hydroxylamine hydrochloride solution, and the mercury(II) ions are reduced by a tin(II) chloride solution to form elemental mercury which is drawn into nitrogen stream. The nitrogen stream is passed through an absorption cell (optical path length 175 mm) which is placed in an atomic absorption spectrometer. The mercury is determined by measuring the absorbance of the mercury resonance line at 253,7 nm.

3.2 Method B: Determination of mercury by sampling at atmospheric or high pressure

The gas is passed through a silica tube containing silver lint placed in a stainless steel high-pressure vessel. Mercury present in the gas is quantitatively trapped by the silver and is subsequently released by heating the tube in an oven at 850 °C whilst passing a stream of air. The mercury vapour is trapped in a second silica tube filled with gold thread, whilst hydrocarbons and other contaminants are oxidized and passed through. The tube contain-