

STANDARD

6326-3

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1989-07-01

**Natural gas — Determination of sulfur
compounds —**

Part 3 :

Determination of hydrogen sulfide, mercaptan sulfur
and carbonyl sulfide sulfur by potentiometry

Gaz naturel — Détermination des composés soufrés —

*Partie 3 : Détermination du sulfure d'hydrogène, des thiols et du sulfure de
carbonyle par potentiométrie*



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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 approval before their acceptance as International Standards by the ISO Council. They are approved in accordance with ISO procedures requiring at least 75 % approval by the member bodies voting.

International Standard ISO 6326-3 was prepared by Technical Committee ISO/TC 158, *Analysis of gases*.

ISO 6326 consists of the following parts, under the general title *Natural gas — Determination of sulfur compounds*:

- *Part 1: General introduction*
- *Part 2: Gas chromatographic method using an electrochemical detector for the determination of odoriferous sulfur compounds*
- *Part 3: Determination of hydrogen sulfide, mercaptan sulfur and carbonyl sulfide sulfur by potentiometry*
- *Part 4: Determination of individual sulfur compounds by gas chromatography with a flame photometric detector*
- *Part 5: Lingener combustion method*

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International Organization for Standardization
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Introduction

The standardization of several methods for the determination of sulfur compounds in natural gas is necessary in view of the diversity of these compounds [hydrogen sulfide, carbonyl sulfide, thiols (mercaptans), tetrahydrothiophene (THT), etc.] and the purposes of the determinations (required accuracy, measurement at the drilling head or in the transmission pipes, etc.).

In order to enable the user to choose the method most appropriate to his needs and to perform the measurements under the best conditions, ISO 6326 has been prepared in several parts.

ISO 6326-1 gives a rapid comparison of standardized methods and therefore provides information for the choice of the method.

The other parts of ISO 6326, including this part, describe in detail the various standardized methods.

The determination of total sulfur is specified in ISO 4260 : 1987, *Petroleum products and hydrocarbons — Determination of sulfur content — Wickbold combustion method*.

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Natural gas — Determination of sulfur compounds —

Part 3 :

Determination of hydrogen sulfide, mercaptan sulfur and carbonyl sulfide sulfur by potentiometry

1 Scope

This part of ISO 6326 specifies a potentiometric method for the determination of hydrogen sulfide, mercaptan sulfur, and carbonyl sulfide sulfur in natural gas in the concentration range equal to or above 1 mg/m³. The gas must be free of dust, mist, oxygen, hydrogen cyanide and carbon disulfide. The hydrogen sulfide/mercaptan sulfur ratio and also the mercaptan sulfur/hydrogen sulfide ratio should not exceed 50 : 1.

The method is not recommended for gases containing more than approximately 1,5 % (V/V) carbon dioxide.

NOTE — In all parts of ISO 6326, 1 m³ of gas is expressed at normal conditions (0 °C; 101,325 kPa).

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this part of ISO 6326. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this part of ISO 6326 are encouraged to investigate the possibility of applying the most recent editions of the standards listed below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 385-1 : 1984, *Laboratory glassware — Burettes — Part 1 : General requirements.*

ISO 648 : 1977, *Laboratory glassware — One-mark pipettes.*

ISO 1042 : 1983, *Laboratory glassware — One-mark volumetric flasks.*

3 Principle

Hydrogen sulfide and mercaptans are absorbed in a 35 % (m/m) aqueous potassium hydroxide solution and carbonyl sulfide in a 5 % (m/m) ethanoholic monoethanolamine solution. The solutions are titrated potentiometrically using silver nitrate solutions with a silver/silver sulfide electrode system to indicate the end point.

4 Reagents and materials

During the analysis, use only reagents of recognized analytical grade and only distilled water or water of equivalent purity.

4.1 Potassium hydroxide, solution.

Dissolve 35 g of potassium hydroxide (KOH) in 65 g of water.

NOTE — In order to prevent interference by heavy metal ions, 0,5 g of a mixture of polyaminoacetic acids is added for each 50 ml of absorption solution to inactivate the heavy metal ions.

The mixture consists of equal parts of

the pentasodium salt of diethylenetriamine pentaacetic acid (Na₅DTPA);

the trisodium salt of *N*-hydroxyethylenediamine triacetic acid (Na₃HEDTA);

the sodium salt of *N,N*-di(2-hydroxyethyl-glycin) (NaDHEG);

the tetrasodium salt of ethylenediamine tetraacetic acid (Na₄EDTA).