

ICS 75.060

CCS E 24



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

GB/T 27894.1-2020

Replacing GB/T 27894.1-2011

**Natural gas - Determination of composition and associated
uncertainty by gas chromatography - Part 1: General guidelines
and calculation of composition**

Issued on: September 29, 2020

Implemented on: April 1, 2021

**Issued by: State Administration for Market Regulation, China National
Standardization Administration**

Table of Contents

1 Scope	1
2 Normative references	1
3 Terms and definitions	1
4 Symbol	4
5 Principles of Analysis	5
6 Analysis process	6
7 Control Chart	17
8 Test report	17
Appendix A (informative appendix) ISO 6974-3..2000-ISO 6974-6 analysis method application range and chromatographic conditions comparison	18
Appendix B (informative appendix) Bridging components and normalization methods	20
Appendix C (informative appendix) Methane subtraction method	25
Appendix D (Normative Appendix) Relative Response Factor	26
Appendix E (Informative Appendix) Judgment of Outliers	28
Appendix F (Normative Appendix) Pressure Correction in Calibration and Sample Analysis	29
Appendix G (informative appendix) Applicable software for generalized least squares regression analysis	30
Appendix H (Informative Appendix) Use of Control Chart	32
Reference	33

Foreword

GB/T 27894 "Determination of Composition and Calculation of Uncertainty Related to Natural Gas by Gas Chromatography" is divided into 6 parts.

---Determination of composition and calculation uncertainty of natural gas by gas chromatography. Part 1.General guidelines and composition calculation;

---Determination of composition of natural gas by gas chromatography and calculation of uncertainty. Part 2.Calculation of uncertainty;

---The composition of natural gas is determined by gas chromatography under a certain degree of uncertainty. Part 3.Determination of hydrogen, helium, oxygen, and oxygen with two packed columns

Nitrogen, carbon dioxide and hydrocarbons up to C₈;

---Determination of composition of natural gas by gas chromatography under certain uncertainty. Part 4.Used in laboratory and online measurement system

Two chromatographic columns determine nitrogen, carbon dioxide and C1 to C5 and C6 hydrocarbons;

---Determination of composition of natural gas by gas chromatography under certain uncertainty. Part 5.Used in laboratory and online process system

Three chromatographic columns determine nitrogen, carbon dioxide and C1 to C5 and C6 hydrocarbons;

---Determination of composition of natural gas by gas chromatography under a certain degree of uncertainty. Part 6.Determination of hydrogen, gas with three capillary columns Helium, oxygen, nitrogen, carbon dioxide and C1 to C8 hydrocarbons.

This part is Part 1 of GB/T 27894.

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

This part replaces GB/T 27894.1-2011 "Determination of composition of natural gas by gas chromatography under certain uncertainty, Part 1

Points. Analysis Guidelines. Compared with GB/T 27894.1-2011, the main technical changes in this part are as follows.

---Modified the standard name;

---Modified the scope (see Chapter 1, Chapter 1 of the.2011 edition);

---Modified the normative references (see Chapter 2, Chapter 2 of the.2011 edition);

---Added the definition of terms (see Chapter 3, Chapter 3 of the.2011 edition);

---Modified symbols and subscripts (see Chapter 4, Chapter 4 of the.2011 edition);

---Modified the analysis principle part (see Chapter 5, Chapter 5 of the.2011 edition);

--- Deleted the chapters on materials, instruments, characteristic requirements, and sampling (see Chapters 6, 7, 8, 9 of the.2011 edition);

---Modified the analysis steps (see Chapter 6, Chapter 10 of the.2011 edition);

---Modified the characteristic comparison of typical analysis methods (see Appendix A, Appendix A of the.2011 edition);

---Modified the use of control charts (see Appendix H, Appendix B of the.2011 edition);

---Added the introduction of bridging components and normalization methods (see Appendix B);

---Added methane subtraction method (see Appendix C);

- Added the relative response factor data of FID and TCD (see Appendix D);
- Added the judgment of outliers (see Appendix E);
- Added pressure correction in calibration and sample analysis (see Appendix F);
- Introduction to the applicable software for generalized least squares regression analysis has been added (see Appendix G).

The translation method used in this part is equivalent to ISO 6974-1:2012 "Natural Gas Determination of Composition and Calculation by Gas Chromatography Uncertainty

Degree Part 1. General Guidelines and Composition Calculation. Chinese documents that have a consistent correspondence with the international documents cited in this section as follows.

---GB/T 10628-2008 Gas analysis calibration gas composition determination and calibration comparison method (ISO 6143:2001,

IDT)

---GB/T 27418-2017 Measurement Uncertainty Evaluation and Expression (ISO /IEC Guide 98-3:2008, MOD)

---GB/T 28766-2018 Natural gas analysis system performance evaluation (ISO 10723:2012, IDT)

This section has made the following editorial changes.

- Amend "ISO 6974-3" to "ISO 6974-3:2000";
- Modify "ISO 6974-5" to "ISO 6974-5:2000".

This part was proposed and managed by the National Natural Gas Standardization Technical Committee (SAC/TC244).

Drafting organizations of this section. China National Petroleum Corporation Southwest Oil and Gas Field Branch Natural Gas Research Institute, Daqing Oilfield Co., Ltd.

Ren company, China National Petroleum Corporation Natural Gas Sales Branch, China National Petroleum Corporation North China Oilfield Branch

Company, Nanjing Rundao Oil Monitoring Technology Co., Ltd., China National Petroleum Corporation Limited for natural gas quality control and energy measurement

Laboratory, oil industry natural gas quality supervision and inspection center.

Introduction

ISO 6974 provides natural gas analysis methods and methods for calculating component

mole fractions and uncertainties. ISO 6974 (all parts)

It is used to determine H₂, He, O₂, N₂, CO₂ and hydrocarbon compounds as a single component or a group of components, such as C₅ or more (without

C₅) All hydrocarbon compounds are defined as C₆. This method is suitable for calibrating gas mixture, calorific value of gas and calculation of other physical parameters

Provide gas composition data and uncertain data, etc. ISO 6974-3:2000 and subsequent parts detail specific application methods.

This part of GB/T 27894 gives general guidelines for the analysis of natural gas by gas chromatography, and the determination of the mole fraction of natural gas components.

Determined data processing method.

ISO 6974-2 gives the steps to calculate the uncertainty of the mole fraction of each component.

ISO 6974-3:2000 and subsequent parts give different gas chromatography analysis methods, including daily laboratory analysis and online process

application. Appendix A of this section gives a comparison of ISO 6974-3:2000 and subsequent analysis methods.

This part of GB/T 27894 is used in combination with the gas chromatographic analysis method given in ISO 6974-3:2000 and subsequent parts.

Calculate the component mole fraction. If you need to calculate the mole fraction and uncertainty, this section also needs to combine ISO 6974-2 and gas chromatography analysis methods.

This part of GB/T 27894 gives all the basic steps for establishing an analysis method, including an overview of the analysis structure, determining the scope of work and

Establish analysis procedures. Once the scope of work is determined, the following types of components can be evaluated and confirmed.

---The main component or component family that can be analyzed by direct measurement (direct measurement component);

---Use indirect methods such as other reference components in the standard gas mixture to obtain the component or component family (indirect

Measurement component);

--- The mole fraction can be assumed to be a constant unmeasured component (unmeasured component).

This part of GB/T 27894 gives three types of operation methods. single operation, multiple