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

GB/T 16781.2-2010

Replacing GB/T 16781.2-1997

**Natural gas -- Determination of mercury -- Part 2: Sampling of
mercury by amalgamation on gold/platinum alloy**

天然气 汞含量的测定 第2部分：金-铂合金汞齐化取样法

(English Translation)

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Foreword

GB/T 16781 "Natural gas - Determination of mercury content" is divided into two parts.

--- Part 1. chemisorption sampling method;

--- Part 2. gold - platinum alloy amalgamation sampling.

This section GB/T 16781 Part 2.

The partial modification of the use of ISO 6978-2:2003 "Determination of mercury - Part 2 gas content. gold - platinum alloy amalgamation sampling" (In English).

This part of ISO 6978-2:2003 The main differences are.

--- Delete ISO 6978-2:2003 Foreword, Preface to rewrite this section;

--- Chapter 2 normative references, and some apply to international standard formulation modified to apply to our standard of presentation, part ISO standard for China to replace the contents of the corresponding national standards, the remaining chapters corresponding to the content is modified accordingly, delete "Measurement uncertainty Given the degree of expression guidelines (GUM) "normative references;

- Deleted Chapter 4 standard gas volume metering reference conditions related to expression;
- The 6.2 on mercury safety measures expressed in Chapter 8;
- In order to be consistent with our borrow "gas standard reference conditions" and other relevant standards, the ISO 6978-2:2003 in Chapter 10 "With Formula (2) calculation 273.15K, the sample volume extracted under 10.325kPa conditions" with "by the formula (2) calculation of 293.15K, Under conditions 10.325kPa extracted sample volume, "and label the formula (2) standard reference conditions be amended accordingly.

This Part replaces GB/T 16781.2-1997 "Natural gas - Determination of mercury - Cold atomic fluorescence spectrometry." This portion GB/T 16781.2-1997 technical content, that the measurement range, test principle, equipment, reagents, sampling, measurement of mercury and other content completely with, major changes were made.

This part is proposed by the China National Petroleum Corporation.

This part of the National Standardization Technical Committee centralized natural gas.

This section drafted by. China Southwest Oil and Gas Field Branch Gas Research Institute of Petroleum.

Introduction

Natural gas may contain a certain amount of mercury, which is typically elemental mercury form. High mercury content must be gas purification treatment, this can avoid handling and transportation process condensate mercury, but also meet the requirements of the gas sales contract. When liquefied natural gas can only contain provisions Low levels of mercury, which is to avoid serious corrosion problems, such as corrosion of the aluminum heat exchangers liquefaction plant.

Natural gas containing hydrocarbons, in particular, the presence of low concentrations of aromatic hydrocarbons interfere with atomic absorption spectrometry (AAS) or atomic fluorescence spectrometry (AFS) Determination of mercury, so at this time of mercury in natural gas can not be directly measured. Therefore, prior to analysis, it should be collected and aryl mercury Fragrant hydrocarbon separation.

The purpose of measuring the mercury content as follows.

- Monitor gas quality,
- Removing mercury monitoring gas treatment plant operation.

Several methods have been developed to collect or enrichment of mercury from natural gas. Collect mercury from dry natural gas generally does not involve special problems. However, Natural gas condensate close to the state of mercury sampling should be done

carefully (see ISO 6570).

GB/T 16781 part two describes the sampling theorem mercury, predetermined sampling methods and determining the mercury content in natural gas pipeline General requirements for the amount. GB/T 16781 in the provisions of this part of the gold - platinum alloy amalgamation sampling method, and in Section 1 of the iodine impregnated silica gel Chemisorption sampling.

Natural gas - Determination of mercury content Part 2. gold - platinum alloy amalgamation sampling Warning --- GB/T 16781 application may involve hazardous substances and their operations and equipment. However, GB/T 16781 did not specify its make with all the security issues. Users of this section has the responsibility to establish appropriate safety and health practices and determine its application prior to use or scope.

1 Scope

This section provides gold - platinum (Au/Pt) alloy amalgamation sampling method for the determination of mercury content in natural gas pipeline approach. This method is applicable in excluding crude gas condensate product sampling. This method is applicable to atmospheric pressure natural gas $0.01\mu\text{g}/\text{m}^3 \sim 100\mu\text{g}/\text{m}^3$ within the range Determination of natural gas within $0.001\mu\text{g}/\text{m}^3 \sim 1\mu\text{g}/\text{m}^3$ range mercury content Determination of mercury content and high pressure (maximum pressure up 8MPa) below.

The absorbance or fluorescence at 253.7nm of mercury vapor is collected to determine the amount by which the measurement wavelength.

NOTE: Method GB/T 16781.1 is given for the determination of mercury content in natural gas impregnated silica gel with iodine chemisorption method, sampling pressure up to 40MPa when measured in the range of $0.1\mu\text{g}/\text{m}^3 \sim 5000\mu\text{g}/\text{m}^3$.

2 Normative references

The following documents contain provisions which, through reference GB/T 16781 in this section constitute provisions of this section. For dated reference documents Member, all subsequent amendments (not including errata content) or revisions do not apply to this section, however, we are encouraged to reach agreement under this section all parties that proposed to use the latest versions of these documents. For undated reference documents, the latest versions apply to this section.

GB/T 13609 Gas sampling guidelines (GB/T 13609-1999, eqv ISO 10715:1997) GB/T 20604 Gas vocabulary (GB/T 20604-2006, ISO 14532:2001, IDT)

3 Terms and Definitions

GB/T 20604 gives terms and definitions apply to this standard.

4 Test principle

Sampling should be carried out at a temperature above the dew point of the gas sample at least 10 °C conditions. Gas through two series, filling series of fine gold -Platinum alloy wire quartz glass sample tubes; mercury by amalgamation on which action has been collected. Then, the sample tubes are heated separately to each 700 °C, the desorption from mercury amalgam. Mercury is released to move with the flow of air filled gold - platinum alloy wire tube analysis (secondary amalgamation). However After analysis tube was heated to 800 °C, the mercury will be transferred to the atomic absorption spectrometry or atomic fluorescence spectrometer, measured at a wavelength of 253.7nm.

The sampling method is applicable to atmospheric pressure measured within the natural gas 0.01µg/m³ ~ 100µg/m³ range and high-pressure mercury content of day Determination of mercury content within 0.001µg/m³ ~ 1µg/m³ range of natural gas. To prevent mercury from surface diffusion to gold - platinum alloy wire inside, from Reduced under specified conditions of transfer of mercury recovery must be measured within one week after the sample was collected mercury.

Other materials may be used in place of adsorption gold - platinum alloy wire, such as having a high surface area silica impregnated with gold, as long as they display on natural gas Effective role.

Note: The test has been proven by compartment, the two sampling techniques are comparable in the two different concentration levels.

5 Instruments

Parameters affect the measurement shall be traceable to national or international standards. Volume measurement (volume, temperature, gas pressure and atmospheric pressure) is not Determine the degree of uncertainty directly affects the gas mercury content determination. Therefore, you should use the appropriate, acceptable through reference measuring instrument calibration the uncertainty of the amount of volume measurement device is reduced to less than 1%.