



**Test for Hydrogen Sulfide and Carbon Dioxide
in Natural Gas Using Length of Stain Tubes**

*Adopted as a Standard 1984
Revised 2019*

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Impact Statement

Test for Hydrogen Sulfide and Carbon Dioxide in Natural Gas Using Length of Stain Tubes

Purpose

This Standard covers the determination of the concentration of H₂S and CO₂ in Natural Gas using a length of stain tube. The ranges covered is 3 ppmv to 5% by volume H₂S and 0.25 to 10% by volume of CO₂. The Method as written is applicable to the determination of H₂S and CO₂ in hydrocarbons and in air.

This Standard has seen only reprinting and few revisions since 1977 when it was adopted as a tentative method. It was adopted as a Standard in 1984, revised in 1986 and reprinted in 1988, 1997, 1998 and 1999.

The current revision updates some materials used in the procedures which by today's best practices would be found obsolete in terms of what we would use to collect or transport a sample to the stain tube, i.e. gum rubber tubing, etc.

The most significant addition to the Standard is a "Cautionary Statement". The intention of the statement is to inform the user that it is critical that manufacturer's instructions be followed implicitly. Each lot of stain tubes is tested by the manufacturer for compliance to stated accuracy and each lot or box of stain tubes quite possibly is slightly different in terms of how they are to be used, i.e. exposure times, indicating colors or contaminants, etc. Further the manufacturer's instructions will state the exponent to be used for multiple or partial testing "pulls" of the pump or if these are allowed at all. This information may vary from lot to lot and from one brand of tube to another.

Also of significance is the concept that if high accuracy and repeatability is required and chromatography is not indicated or feasible, there are many portable handheld electronic devices available which operate on low power and are intrinsically safe. Therefore, the user should consider if a length of stain tube is really the best commercially available option based on their situation and requirements.

Impact

It is not expected that the use of this Standard will have any new or increased impact.

The users of this Standard should perform their own economic evaluation to include the use of handheld portable electronic devices as applicable.

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1. CAUTIONARY STATEMENT

H₂S or CO₂ Determination in Natural Gas by Length of Stain Tubes

The need to determine the concentration of Hydrogen Sulfide or Carbon Dioxide in Natural Gas can be driven by numerous factors, including safety related incidents. The user should be aware that if definitive, highly accurate and repeatable readings are needed, length of stain tubes may not be the first choice as a commercially viable solution.

In recent years there have been advancements in the determination of components of interest in various gases and liquids by means of portable or handheld electronic devices which are outside the scope of this document. Concentration level accuracies can be greatly enhanced by the use of these electronic devices and of course chromatographic analysis can be the most accurate means of determining the concentration levels of components of interest.

The analytical results from a length of stain tubes are highly dependent on many factors. Therefore, it is imperative that the user read, understand and follow the instructions in each box of tubes implicitly since every box or lot of tubes potentially has its own individual characteristics. Interferences may include temperature and moisture content of the product under test, ambient conditions, and a number of other diluents and contaminants. Ambient or operational conditions may preclude the use of a stain tube. It may be too hot or humid outside or the conditions in the Natural Gas may not be appropriate for stain tube use. Manufacturer's instructions will direct the user.

Stain tube accuracies as stated by most manufacturers is $\pm 25\%$. While GPA Midstream testing shows $\pm 16\%$ accuracy in controlled conditions, it is important for the user to determine if the stated accuracy by the stain tube manufacturer is acceptable, based on the operational conditions, ambient conditions and safety requirements for the determination of the concentration level of H₂S or CO₂ in Natural Gas.

2. SCOPE

- 2.1. This method covers the determination of hydrogen sulfide in natural gas in the range of 3 ppmv to 5 vol %.
- 2.2. This method covers the determination of carbon dioxide in natural gas in the range of 0.25 to 10 vol %.
- 2.3. This method as written is applicable to the determination of hydrogen sulfide and carbon dioxide in hydrocarbons and in air.