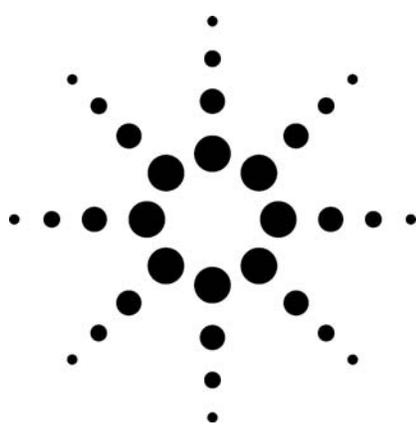


Agilent 355 Sulfur Chemiluminescence Detector (SCD): Sulfur Compounds in Light Petroleum Liquids Such as Gasoline



Technical Overview

Introduction

This technical overview briefly describes the analysis of light petroleum liquids as fully defined in ASTM D5623-94. The method is applicable to distillates, gasoline motor fuels (including those containing oxygenates), and other petroleum liquids with a final boiling point of approximately 230 °C (450 °F) or lower at atmospheric pressure.

Gas chromatography with sulfur chemiluminescence detection (SCD) provides a rapid and highly specific means to identify and quantify various sulfur compounds that may be present in miscellaneous petroleum feeds and products, such as gasoline. Frequently, petroleum feeds and products contain varying amounts and types of sulfur compounds. Many sulfur compounds can be corrosive to equipment, inhibit or destroy catalysts employed in downstream processing, and impart undesirable odors to products. The ability to speciate sulfur compounds in various petroleum liquids is useful in controlling sulfur compounds in finished products and is frequently more important than the ability to simply measure total sulfur content alone.

The following chromatogram illustrates the ability of the Agilent 355 Sulfur Chemiluminescence Detector (355 SCD) to speciate sulfur compounds in a typical sample of gasoline. An internal

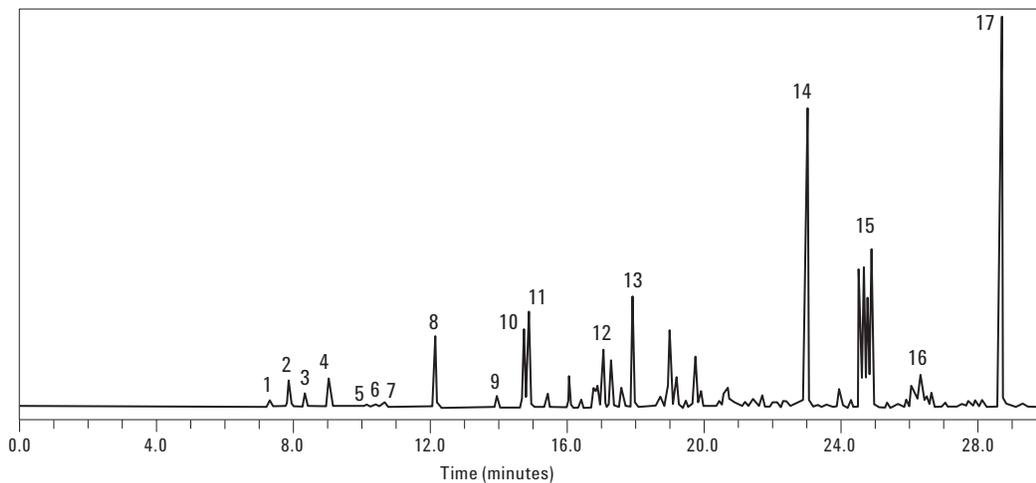
standard (diphenyl sulfide) was added to the gasoline prior to analysis to aid in quantification.

This gasoline sample contained approximately 85 ppm wt total sulfur. Conditions are as follows: Agilent 355 SCD operated according to standard conditions: column: 30 m, 0.32 mm id, 4 µm methyl silicone WCOT fused silica; temperature program: -10 °C for three minutes to the final required temperature at a rate of 10 °C/minute.

Unlike the flame photometric detector or the pulsed flame photometric detector, the 355 SCD response is inherently linear, equimolar, and far less susceptible to hydrocarbon interference. These advantages eliminate the need for linearizing data or determining separate response factors for individual sulfur compounds.

Furthermore, hydrocarbons are virtually invisible to the 355 SCD. The coelution of hydrocarbon and sulfur peaks does not present a problem for the 355 SCD. Frequent column changes are required for analysis of various hydrocarbon products by flame photometric detectors to avoid serious quenching and inaccurate results. The linear and equimolar response, sensitivity, and selectivity of the 355 SCD is established and approved by the American Society of Testing and Measurements for sulfur in light petroleum liquids. (ASTM D5623-94).





- | | |
|-------------------------------------|------------------------------|
| 1 Ethanethiol | 10 2-Methylthiophene |
| 2 Dimethyl Sulfide | 11 3-Methylthiophene |
| 3 Carbon Disulfide | 12 C2-Thiophenes |
| 4 2-Propanethiol | 13 Diethyl Disulfide |
| 5 2-Methyl-2-Propanethiol | 14 Benzothiophene |
| 6 1-Propanethiol | 15 C1-Benzothiophene |
| 7 Ethylmethyl Sulfide | 16 C2-Benzothiophene |
| 8 Thiophene/2-Methyl-1-Propanethiol | 17 DiphenylSulfide (Int Std) |
| 9 Dimethyl Disulfide | |

Figure 1. Sulfur compounds in gasoline.

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